

OUTCOME BASED CURRICULUM 2016

Program Diploma in Textile manufacture



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Nagpur**

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OUTCOME BASED CURRICULUM 2016



Program: Diploma in Textile Manufactures



by

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Accepted by

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Government Polytechnic, Nagpur

(An Autonomous Institute of Government of Maharashtra)

OUTCOME BASED CURRICULUM-2016

DIPLOMA IN TEXTILE MANUFACTURES

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CHAPTER 1

Government Polytechnic, Nagpur an Introduction

This chapter gives the history of Government Polytechnic, Nagpur.

1.1 History

The **Government Polytechnic, Nagpur** is an oldest technical institution in central India. It was founded on 14th July 1914 as the Government Engineering School. At its commencement the school had 16 students on roll and was located in the Victoria Science College (now the Institute of Science) in Nagpur. During its first year the school provided courses in Civil Engineering & Mechanical Engineering up to diploma standard. Later in 1915 Automobile Engineering Course was also established which was subsequently converted into Post Diploma in Automobile Engineering. The institution has given birth to Engineering College presently known as Visvesvaraya National Institute of Technology, Nagpur (VNIT). The school was expanding rapidly & from 16 students enrolled in 1914 increased to nearly 2000 in current year and Govt. Engineering School converted to Government Polytechnic, Nagpur.

1.2 Autonomy

The Institute has recently celebrated its Centenary year. Government Polytechnic, Nagpur has history of 102 Glorious Years. The Government Polytechnic, Nagpur is committed to contribute to through excellence in technical education, to serve as valuable resource for industry and society. The institute is always upright in responding to educational needs of its changing world's scenario.

From academic session 1995 the institute was conferred with autonomous status by Government of Maharashtra as per Government Resolution No. WBP-1093/(2640) (69)VE-5 Dated- 31st March, 1994, in context of academic matter viz. identification of

need of new programs, requisite curriculum design, implementation of self-designed curriculum, assessment, evaluation and certification of students.

1.3 Awards

Some of the prestigious awards received by Government Polytechnic, Nagpur are as follows:

- State Award “Best Overall Performance 1996” (ISTE Narsee Monjee Award)
- State Award “Best Polytechnic, 1997” , (Govt. of Maharashtra)
- National Awards “Best Polytechnic, Student Chapter 2002”,(Institute of Engineers (India))
- National Awards “Best Polytechnic, Student’s Project ,2002” (ISTE Narsee Monjee)
- State Award “Best Overall Performance 2016” (ISTE Narsee Monjee Award)
- National Education Award for “Best Technical Educational Institute in Maharashtra State-2016”

1.4 Geographical Location of Nagpur City

The latitude of Nagpur, India is 21.146633, and the longitude is 79.088860. Nagpur, India is located at India country in the Cities place category with the gps coordinates of 21° 8' 47.8788" N and 79° 5' 19.8960" E. Nagpur, India elevation is 311 meters height. Nagpur is located at the exact centre of the Indian peninsula. Figure 1.1 shows the location. The city has the Zero Mile Stone locating the geographical centre of India, which was used by the British to measure all distances within the Indian subcontinent. [Wikipedia]. The city gets its name from the river Nag, which flows through the city, originating at a small village called Lavha. It is famous for the Nagpur orange and is known as the "Orange City" for being a major trade centre of oranges cultivated in the region.



Figure 1.1. Location of Nagpur City

1.5 Government Polytechnic, Nagpur Campus

Government Polytechnic, Nagpur is situated in heart of the Nagpur City at “Sadar” area, 2.1 km walking distance from zero mile stone as well as Nagpur railway station. The campus map of GPN is shown in Fig. 1.2.



Figure 1.2. Government Polytechnic, Nagpur Campus

CHAPTER 2

Polytechnic Education System

This chapter describes the polytechnic education system in India. Various bodies responsible for polytechnic education in India are also described below.

2.1 Higher Education System in India

The aim of any country's higher education system is sustainable development and achieving higher growth rates. It is enabled through creation, transmission and dissemination of knowledge. To achieve this, India has setup a school education system and higher education system. The higher education system is one of the strongest parts of the Indian education system.

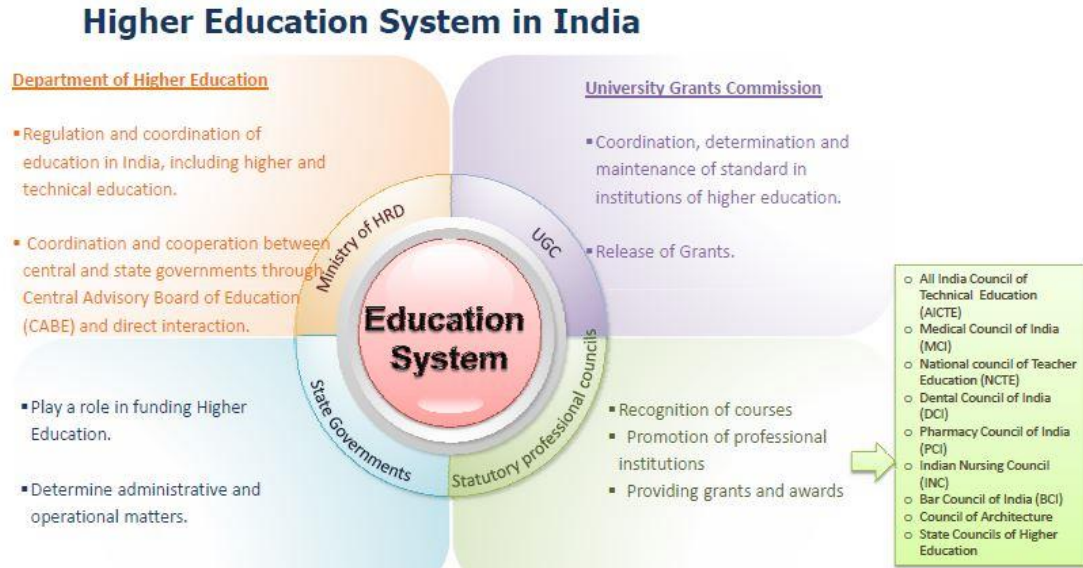


Figure 2.1. Higher Education System in India

Figure 2.1 shows the various bodies responsible for higher education in India, with their roles; as follows:

1. Ministry of Human Resource Development (HRD)

- Regulating and coordination of education in India
 - Coordination and cooperation between central government through central advisory board of education (CABE) and direct interaction
2. University Grant Commission
 - Coordination, determination and maintenance of standards in institutes of higher education
 - Release of grants
 3. State Governments
 - Funding Higher Education
 - Determine administrative and operational matters
 4. Statutory Professional Councils their roles and responsibilities.
 - Recognition of Courses
 - Promotion of Professional institutions
 - Providing grants and awards

The higher education in India is categorised in to following three categories as shown in Fig 2.2:

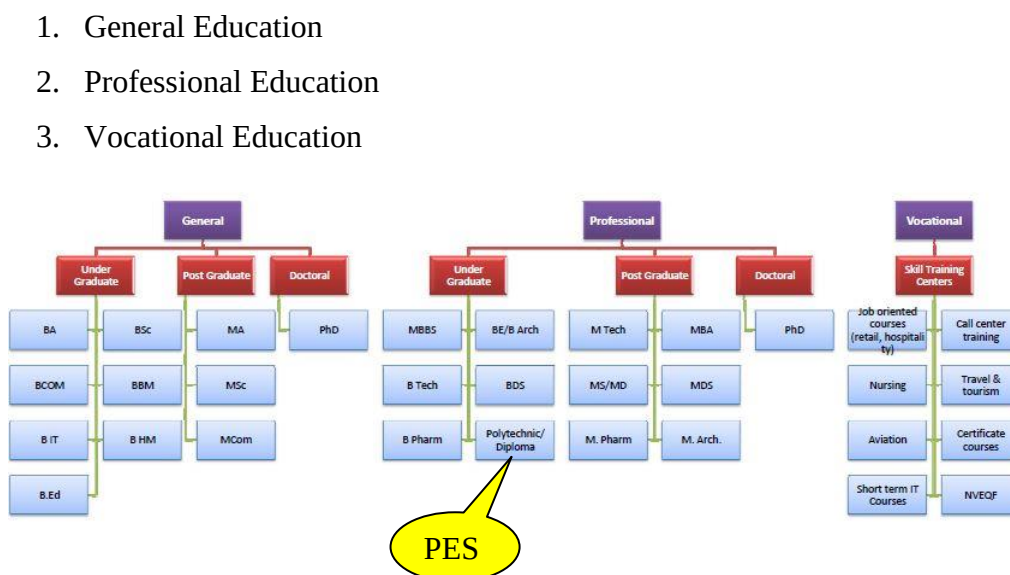


Figure 2.2. Classification of Higher Education System in India

Polytechnic Education System (PES) in India is the undergraduate level category of professional Education.

GPN is one of the autonomous polytechnic of PES in India. It is mandatory for GPN to follow the guidelines framed by the various bodies responsible for technical education, which are as follows:

2.1.1 Department of Higher Education, MHRD

The Department of Higher Education, MHRD, is responsible for the overall development of the basic infrastructure of Higher Education sector, both in terms of policy and planning in India. Under a planned development process, the Department looks after expansion of access and qualitative improvement in the Higher Education, through world class Universities, Colleges and other Institutions

2.1.2 All India Council for Technical Education (AICTE)

The All India Council for Technical Education (AICTE) has been in existence since November 1945 as a national level Apex Advisory Body. AICTE became a statutory body through an act of Parliament 52, in 1987.

AICTE was established with a view to the proper planning and co-ordinated development of the technical education system throughout the country, the promotion of qualitative improvement of such education in relation to planned quantitative growth and the regulation and proper maintenance of norms and standards in the technical education system for matters connected therewith. One of the major functions of AICTE is to lay down norms and standards for courses, curricula, physical and instructional facilities, staff pattern, staff qualifications, quality instructions, assessment and examinations.

2.1.3 National Board of Accreditation (NBA)

The National Board of Accreditation (NBA), India was initially established by AICTE (All India Council of Technical Education) under section 10(u) of AICTE act, in the year 1994, for periodic evaluations of technical institutions & programmes basis according to specified norms and standards as recommended by AICTE council.

NBA in its present form came into existence as an autonomous body with effect from 7th January 2010, with the objective of Assurance of Quality and Relevance of Education, especially of the programmes in professional and technical disciplines, i.e., Engineering and Technology, Management, Architecture, Pharmacy and Hospitality, through the mechanism of accreditation of programs offered by technical institutions.

NBA has introduced a new process, parameters and criteria for accreditation. These are in line with the best international practices and oriented to assess the outcomes of the programme. NBA adopted Outcome Based Education (OBE) model for accreditation of all engineering programs in India from 2013.

2.1.4 Higher and Technical Education, Government of Maharashtra

It is the apex authority responsible for steering and supporting the development and growth of quality Higher and Technical Education that meets educational and social objectives of the state. This department is highly committed towards inclusive education and realizes the importance of quality of education and has undertaken numerous initiatives for achieving highest quality standards in the field of education. Accreditation and Re-accreditation of the Universities and Institutes of higher learning has been made mandatory to ensure the quality of institutions.

2.1.5 Directorate of Technical Education (DTE), Government of Maharashtra

The role of the Directorate is to maintain, enhance the standard, quality of technical education by laying the policies, establishing developing Govt. Institutions, guiding supervising the aided, private institutions, interacting with industry and national level institutions, co-ordinating with other departments of State Government, Government of India Statutory Organisations and to contribute to the development of industry society at large.

2.1.6 Maharashtra State Board of Technical Education (MSBTE)

Maharashtra State Board for Technical Education (MSBTE) was established with the enactment of the Maharashtra State Board of Technical Education Act 1997 to regulate the matters pertaining to diploma level technical education in the state of Maharashtra.

According to act section 34, the autonomous institutions shall be required to obtain equivalence for their courses and programmes from the MSBTE. The MSBTE shall monitor all academic and examination related activities of the Autonomous Institutions such as curriculum, teaching examination scheme, teaching hours, academic schedule, eligibility of candidate to appear for the examination, etc.

2.2 Polytechnic Education System

Polytechnic education in India constitutes an important segment of Technical Education and contributes significantly to the economic development. Aimed at creating a vast amount of technical manpower, the polytechnics have played a vital role in providing skilled manpower at various levels for organized, unorganized and Service Sectors.

The aim of the polytechnic education is to create a pool of skill based manpower to support shop floor and field operations as a middle level link between technicians and engineers. The pass-outs of Diploma level Institutions in Engineering & Technology play an important role in managing shop-floor operations. It is further an established fact that small & medium Industry prefer to employ Diploma Holders because of their special skills in interpreting engineering, drawings, estimating, costing, billing, supervision, measurement, testing, repair & maintenance etc.

Curriculum is an educational programme designed, developed & implemented in formal educational system to achieve pre-determined & pre-stated educational objectives. Every individual social system comes in to existence as a result of need of its output emerged in its environment. Educational objectives of PES can be stated as follows:-

- a) To cater to specific manpower need in overall Technical Manpower Spectrum of industry and society that lies between craftsman on one side and technocrat on other.

- b) To cater the man power need of primary, secondary and tertiary sector of industry.
- c) To cater to individual educational need for development of self, community and society.
- d) To cater to an individual need to update him in tune with advancement in engineering and technology.

Educational objectives stated above talk about manpower with-certain task profile. To develop such task profile in an individual, which consists in general of all duties and associated tasks and sub tasks that an individual is supposed to perform, it is required to organize various experiences in different setups viz. classrooms, laboratories, workshops and fields, through out any educational programme. With such experiences it should be ensured that students acquire requisite knowledge, skills, attitudes and abilities to perform sub tasks and duties and finally job which he is likely to get after passing programme.

Hence, it is essential to design education program taking in to account predetermined objectives in the form of curriculum, then develop requisite resources viz. physical like space, equipment, and furniture etc. human, information and implement it to achieve the educational objectives.

CHAPTER 3

Curriculum Development System

This chapter describes the organization structure, curriculum development system and the various bodies responsible for the development of curriculum of GPN.

3.1 Organizational Structure of GPN

GPN, being part of PES it has been catering needs of individual, community, society and industry since last 102 years. Up to 1995 services being offered by GPN were under different status viz. university, MP DTE and MSBTE.

In 1995 the institute was conferred with autonomous status by Government of Maharashtra as per Government Resolution No. WBP-1093/(2640) (69)VE-5 Dated- 31st March, 1994, in context of academic matter viz. identification of need of new programs, requisite curriculum design, implementation of self-designed curriculum, assessment, evaluation and certification of students. In nutshell accountability regarding academic matters referred above followed by placement of students in world of work is trusted on the institute. Functional organization of students in world of work is entrusted to the institute. Functional organization parallel to hierarchical organization of institute is constituted for running institute under autonomous status effectively and efficiently. Fig. 3.1 shows the organizational structure of GPN.

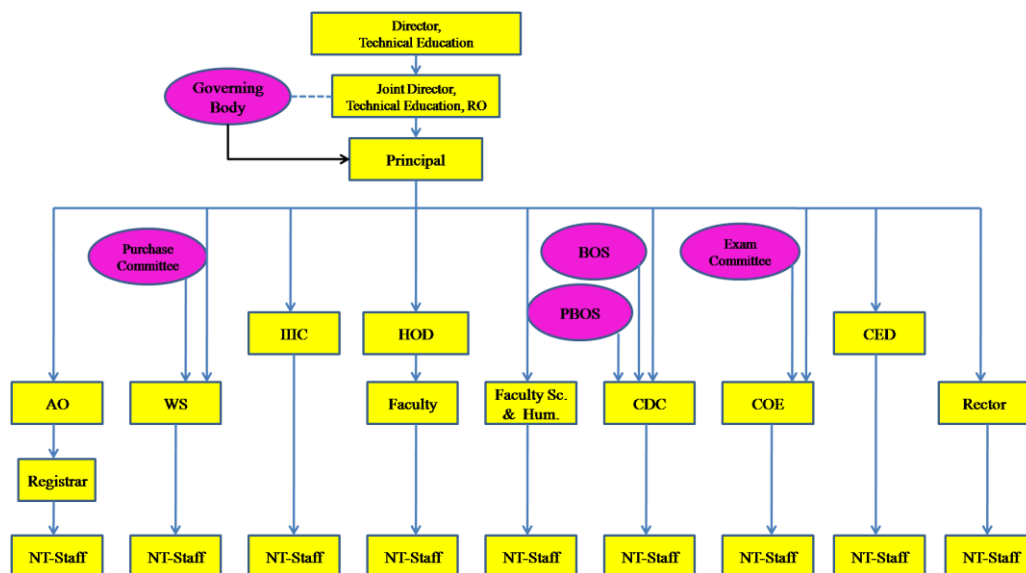


Figure 3.1. Organizational Structure of GPN

3.2 Curriculum Development System

Since, 1995 the institute has been designing/revising and implementing curricula of 11 programmes. This is being done using Curriculum Development System shown in Figure 3.2.

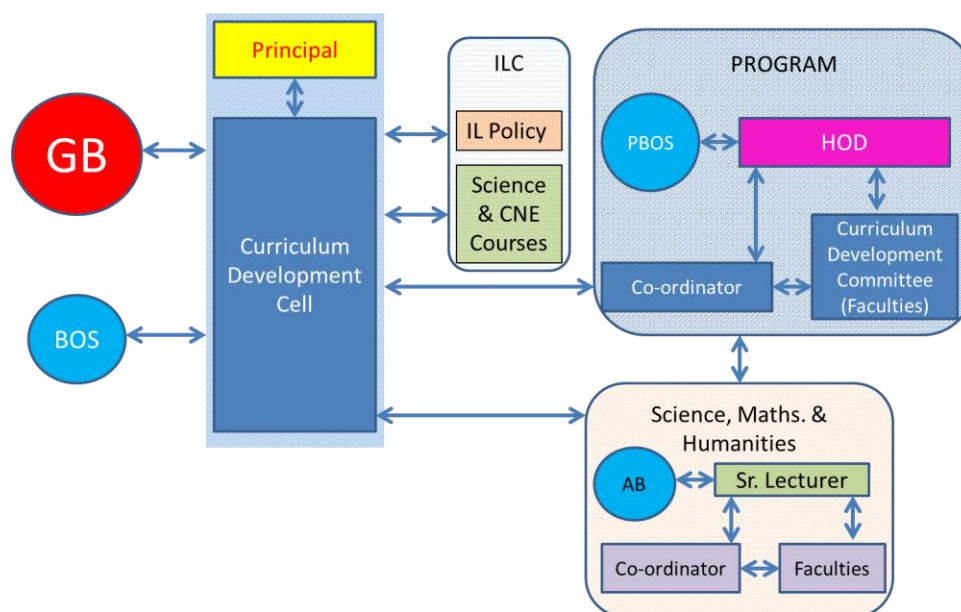


Figure 3.2. Curriculum Development System

Curriculum Development System consists of Programs (Civil, Mechanical, and Electrical etc.), Non Programme Department (Science, Maths, and Humanities), Institute Level Committee (ILC), and Curriculum Developmental Cell (CDC) headed by Principal of the Institute. Institute follows certain process in designing, revising, developing and implementing curriculum and student assessment & evaluation for enhanced students' learning. The constitutional bodies Governing Body (GB), Board of Studies (BOS) and Program wise Board of Studies (PBOS) for programs and non-constitutional body i.e. Advisory Board (AB) for Non Programme Department are responsible for approval of curriculum.

This section elaborates the philosophy adopted in curriculum design, the mechanism for curriculum implementation and approach for assessment of students' performance.

3.2.1 Governing Board (GB)

GB is an apex body. The committee members and roles and responsibilities of GB of GPN are stated below:

- **Committee Members:**

1. Joint Director of Technical Education Maharashtra State, Bombay - Chairman
2. Nominee from Western Regional Committee Govt. of India - Member
3. Regional Officer, Human Resource Development or Co-ordinator, TTTI, Pune - Member
4. Representative from the Local Centre the I.E.(India) - Member
5. Representative from the Engineering Association - Member
6. Representative from the District Industries - Member
7. Project Director, State Project Implementation Unit (World Bank) – Member
8. Principal of the Polytechnic – Member Secretary

- **Functions and Responsibilities:**

1. To decide the policy of the institute and decide guidelines of the function of various committees.
2. To analyse all issues and provide policy directive for developing the scheme and implementing it at the institute level.

3. To appoint the various committees of Governance for smooth functioning of the Institute.
4. To institute scholarships fellowships studentships, Mudat prize and certificates on the recommendation of Board of Studies.
5. Approve new programmes of studies leading to Diploma/Post-Diploma.
6. Approve modifications in present curriculum in order to meet the changed demands of the industry society from time to time.
7. Approve Annual Reports of the Institute
8. Approve Continuing Education Programmes or similar Activities Beneficial to the Students/Community Institute.
9. To approve the fees and other charges payable by the students of the Polytechnics on the recommendation of Board of Studies.

3.2.2 Board of Studies (BOS)

BOS is an Institute level committee. The committee members and roles and responsibilities of BOS of GPN are stated below:

- **Committee Members:**

1. Representative of the Industry - Chairman
2. Head of Department of 5 Programmes - Member
3. Local Experts of 5 Programmes- Member
4. Nominee of Board of Technical Examinations, M.S. Bombay- Member
5. In-charge of Curriculum Development Component– Member Secretary

- **Functions and Responsibilities:**

1. To prepare Syllabi for various courses and develop curriculum keeping in view the objectives of the Institute and the national requirement for consideration. Syllabi shall be equivalent to Syllabi of Board of Technical Examinations.
2. To suggest methodologies for innovative teaching and evaluation techniques.
3. To Co-ordinate research teaching, extension and other academic activities in the various departments/ institute.

4. To recommend books including test books for various courses of studies.

3.2.3 Program Wise Board of Studies (PBOS)

PBOS is a program level committee. GPN is having 11 PBOS committees. The committee members and roles and responsibilities of PBOS of program of GPN are stated below:

- **Committee Members:**

1. Head of the Department concerned- Chairman
2. Two Senior Lecturers- Member
3. One expert in the programme from the neighbouring institution - Member
4. Nominee from the Board of Technical Examinations Bombay - Member
5. One Expert from the local industry in each Programme – Member
6. In-charge of Curriculum Development component - Member-Secretary

- **Functions and Responsibilities:**

1. To decide Philosophy of curriculum design course wise.
2. To analyse present needs and to identify desirable changes, additions, deletions coursewise.
3. Analyse of personnel development.
4. Formation of Programme objectives.
5. Selection of contents.
6. Design of student's evaluation.
7. To decide resources required and development thereof.
8. To decide strategy of implementation.
9. Recommend equivalence for granting exemptions.

3.2.4 Advisory Board (AB)

Non Program Department (Science, Maths, and Humanities) are not having PBOS as per the Government Resolution. The AB is constituted in line with the PBOS for Non

Program Department. There are 4 AB each for Physics, Chemistry, Mathematics and English Department.

CHAPTER 4

Outcome Based Education Philosophy

Government Polytechnic, Nagpur adopted the OBE approach for curriculum design because, National Board of Accreditation (NBA) focusing on the adoption of OBE approach for all engineering programmes in India from 2013 for accreditation. Programmes to be accredited from 2013 will have to be based on OBE approach. NBA adopted Outcome based Model because, OBE is “Learner Centric” rather than “Teacher Centric”

4.1 Outcome Based Education

Outcome Based Education (OBE) is an education approach that focuses on the graduate attributes or outcomes after completing an academic programme. Outcome based approach means knowing what you want to achieve and then taking the steps to do so.

Some Benefits of OBE are-

1. More directed and coherent curriculum.
2. Graduates (students) will be more “relevant” to industry and other stakeholders.

The framework required for implementation of OBE consists of the following as shown in Figure 4.1 and consists of:

- Outcome Based Curriculum (OBC): What students should able to do?
- Outcome Based Teaching learning (OBTL): Making the students to achieve the outcomes
- Outcome Based Assessment (OBA): How to measure, what the students has achieved?

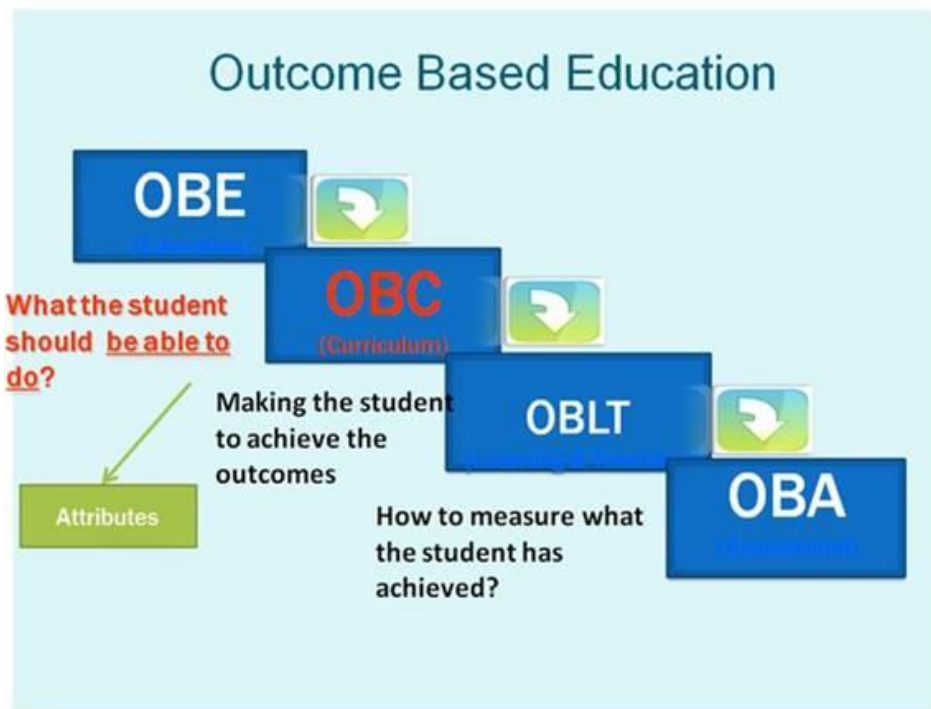


Figure 4.1. Outcome Based Education Framework

4.2 KEY constituents of OBE

Figure 4.2 shows the key constituent of OBE.

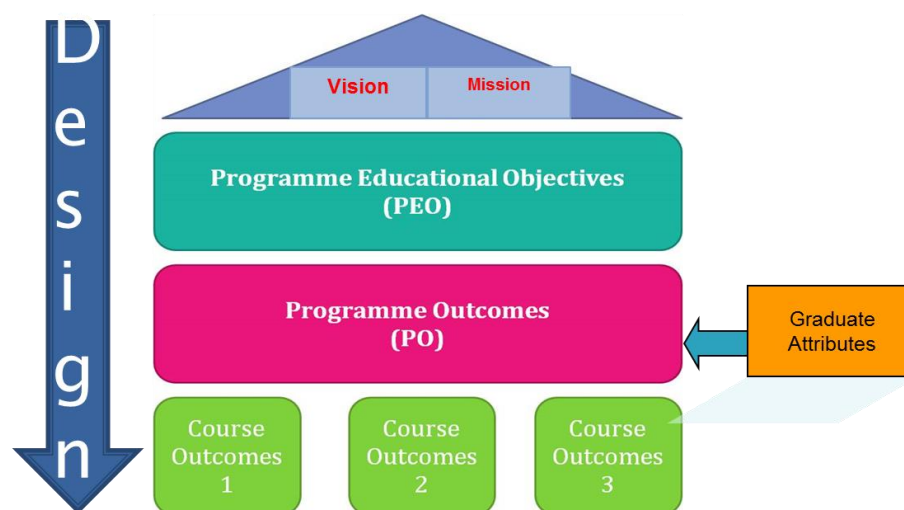


Figure 4.2. Key Constituents of OBE

4.2.1 Vision

Vision is a picture of the future you seek to create, described in the present tense, as if it were happening now. It shows where we want to go, and what we will be like when we get there.

4.2.2 Mission

Mission statement defines what an institution is, why the institution exists, and its reason for being. It defines what we are here to do together.

4.2.3 Graduate Attributes (GA's)

Graduate attributes are the qualities, skills and understandings a university community agrees its students should develop during their time with the institution. These attributes include but go beyond the disciplinary expertise or technical knowledge that has traditionally formed the core of most university courses. WA (Washington Accord) defines 12 GA's for Engineering Graduates.

4.2.4 Program Outcomes (PO's)

Programme Outcomes (POs) describe what students should know and be able to do at the end of the programme. They are to be in line with the graduate attributes (GAs) of NBA. PO's are to be specific, measurable and achievable. POs transform the PEOs into specific student performance and behaviors that demonstrate student learning and skill development.

Following are POs (Ten) for all diploma engineering programs as per NBA guidelines-

1. **Basic Knowledge:** Ability to apply knowledge of basic Mathematics, Science and Engineering to solve the engineering problems
2. **Discipline Knowledge:** Ability to discipline specific knowledge to solve core and/or applied engineering problems
3. **Experiments and Practice:** Ability to plan and perform experiments and practices and use the results to solve engineering problems

4. **Engineering tools:** Apply appropriate technologies and tools with an understandings of limitations
5. **The Engineer and Society:** Demonstrate knowledge to assess the societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to engineering practice.
6. **Environment and Sustainability:** Understand the impact of engineering solutions in societal and environmental context, and demonstrate knowledge and need for sustainable development.
7. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
8. **Individual and Team work:** Function effectively as an individual, and as a member or leader in diverse/ multidisciplinary teams.
9. **Communication:** An ability to communicate effectively.
10. **Life-long learning:** Recognize the need for, and have preparation and the ability to engage in independent and life-long learning in context of technological changes.

4.2.5 Program Educational Objectives (PEO's)

The Program Educational Objectives (PEOs) are broad statements that describe the career and professional accomplishments that the programme is preparing graduates to accomplish. PEOs should be measurable, appropriate, realistic, time bound and achievable.

4.2.6 Program Specific Outcomes (PSO's)

No definition for PSO's is found in literature. According to Dr. B.L. Gupta, NITTTR, Bhopal, PSO's are the broad statements of Program specific outcomes as per the local needs.

4.2.7 Course Outcomes (CO's)

Course Outcomes (COs) are clear statements of what a student should be able to demonstrate upon completion of a course. They should be assessable and measurable knowledge, skills, abilities or attitudes that students attain by the end of the course. It

is generally a good idea to identify between four and seven. All courses in a particular programme would have their own course outcomes. These course outcomes are designed based on the requirement of the programme outcomes (POs). Each course outcomes are mapped to a relevant PO and they are mapped to the programme educational objectives (PEO). The teaching learning process and assessment methods are to be designed in such a way to achieve the COs. It is important to ensure that the student is able to acquire the knowledge or skill required. Table 4.1 clarifies the difference between Course Objectives Vs Course Outcomes

Table 4.1. Difference between Course Outcomes and Course Objectives.

Course Objectives	Course Outcomes
Describe what a teacher needs to teach, and what needs to be planned to teach.	Describe what students should demonstrate upon the completion of a course.
Example- At the end of the course, students will- Understand the types of wiring system.	Example- At the end of the course, students will be able to- Choose a suitable wiring system for particular installation.

4.2.8 Specific Learning Outcomes (SLO's) or Learning Outcomes (LO's)

Learning outcomes (LO's) or Specific Learning Outcomes (SLO's) are “*statements of what is expected that the student will be able to do as a result of learning the activity*”. (Jenkins and Unwin, 2001); i.e at the end of each unit or chapter. SLO's should also be assessable and measurable knowledge, skills, abilities or attitudes that students attain by the end of the unit

CHAPTER 5

Bloom's Taxonomy

Outcome-based education is an educational model in which curriculum and pedagogy and assessment are all focused on student learning. Learning is a relatively permanent change in behaviour potentiality that results from reinforced practice or experience. A group of educational psychologists led by Benjamin Bloom develops a taxonomy, or classification system, for learning. Some aspects of Bloom's Taxonomy is described below.

5.1 Introduction to Bloom's Taxonomy

Benjamin Bloom (1948) developed classifications of intellectual behaviour and learning in order to identify and measure progressively sophisticated learning. Bloom's taxonomy is especially important in higher education where outcomes need to address the student ability to use information, not just recall and regurgitate concepts. Lower levels of learning are easier to assess but do not adequately display what the student can do with the knowledge. However, learning is not a purely cognitive function; learning occurs differently when it entails performing a skill or re-evaluating behavior. This approach is based on biological structure of human being as shown in figure 5.1.

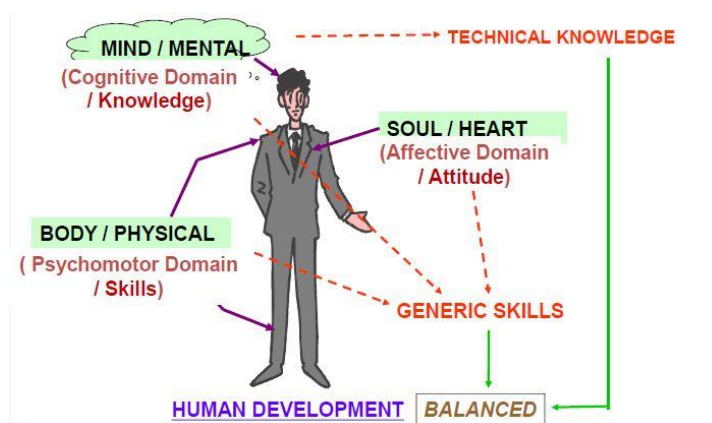


Figure 5.1. Human Being and Domains of Learning

Important elements of this approach which form basics of learning are explained below.

5.2 Domains of Learning

Learning is a process by which students develop relatively permanent change in mental associations through experience. This is how learning is defined by cognitive psychologists. Behavioral; psychologists define learning as a relatively permanent change in behavior. However, learning is not a purely cognitive function; learning occurs differently when it entails performing a skill or re-evaluating behavior.

There are following domains of learning:

- A: Cognitive Domain relates to intellectual skills or abilities
- B: Affective Domain relates to emotions, feelings, likes, dislikes etc.
- C: Psychomotor Domain relates to manipulative skills of hands, legs. Eye-hand coordination

In Engineering & Technology courses, endeavor is made to design curriculum with a focus on development of cognitive skills through classroom teaching, whereas manipulative (psychomotor) skills are developed in workshops, laboratories & seminars where students work individually or in a group. Development of affective skills attitudes and value is supposed to be acquired through projects and co-curricular activities. These are also developed from the work culture or institutions.

How far a student has developed these abilities/skills especially from cognitive and psychomotor domains is assessed on the basis of suitable examinations. When classroom and laboratory teaching is viewed in this light, evaluation becomes an integral part of teaching – learning process.

5.2.1 Cognitive Domain

Dr. Benjamin Bloom (1956) analysed questions asked in various examinations in American situation and proposed a hierarchical arrangement of instructional objectives (Intellectual abilities) tested by these questions.

The lowest level of cognitive learning achieved by a student is demonstrated by the recall of information that the student retrieves from his long term memory. So, the storage and retrieval of specific facts, concepts, principles, laws, definitions, properties, procedures etc. directly from memory was classified as a knowledge level objective. Thus questions

testing memory of students were treated as at the lowest level of the hierarchy of intellectual abilities. The other levels of hierarchy proposed by Dr. Bloom in 1956 relate to the degree of information processing required in the brain needed to provide answer to a question. The various levels in the cognitive hierarchy proposed by Dr. Bloom in 1956 and further revised in 2001 are shown in figure 5.2.

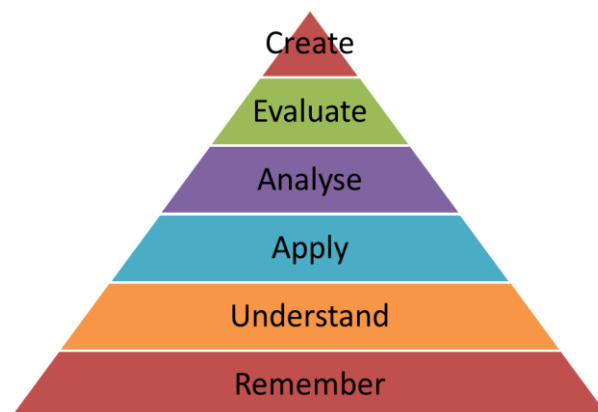


Figure 5.2. Revised cognitive hierarchy Levels

Table 5.1. Cognitive Domain Levels Action Verbs

Cognitive Domain Levels	Behavior descriptions	Action Verbs
Remember	Recall or recognize information	Define, Duplicate, List, Name, Identify, Recall, Reproduce, Recognize, Retrieve
Understand	Understand meaning, re-state data in one's own words, interpret, extrapolate, translate	Calculate, Categorize, Clarify, Classify, Compare, Conclude, Contrast, Describe, Exemplify, Expand, Illustrate, Infer, Interpret, Locate, Paraphrase, Predict, Report, Restate, Summarize, Translate
Apply	Use or apply knowledge, put theory into practice, use knowledge in response to real circumstances	Carry out, Classify, Demonstrate, Execute, Illustrate, Implement, Practice, Solve, Use, Utilize

Analyse	Interpret elements, organizational principles, structure, construction, internal relationships; quality, reliability of individual components	Appraise, Attribute, Compare, Contrast, Deconstruct, Detect, Differentiate, Discriminate, Distinguish, Examine, Formulate, Infer, Integrate, Organize, Parse, Relate, Select, Sequence, Structure, Test
Evaluate	Assess effectiveness of whole concepts, in relation to values, outputs, efficacy, viability; critical thinking, strategic comparison and review; judgment relating to external criteria	Appraise, Check, Coordinate, Critique, Defend, Detect, Dispute, Judge, Monitor, Prioritize, Rate, Reconstruct, Select, Support, Verify
Create	Develop new unique structures, systems, models, approaches, ideas; creative thinking, operations	Change, Combine, Compile, Compose, Construct, Create, Design, Formulate, Generate, Hypothesize, Improve, Invent, Plan, Predict, Produce

5.2.2 Psychomotor Domain

The Psychomotor Domain (RH Dave's version, 1970) was established to address skills development relating to the physical dimensions of accomplishing a task. Because, 'motor' skills extend beyond the originally traditionally imagined manual and physical skills, always consider using this domain, even if you think your environment is covered adequately by the Cognitive and Affective Domains. Whatever the situation, it is likely that the Psychomotor Domain is significant.

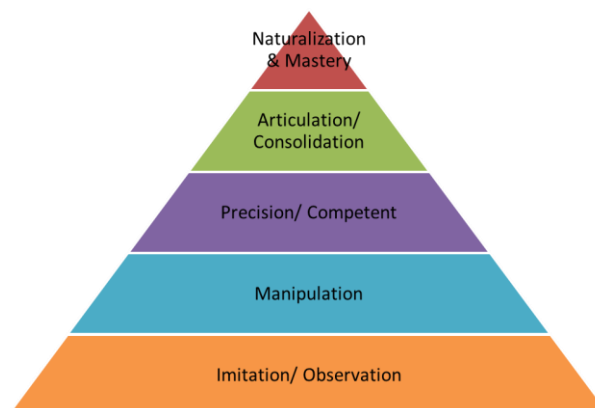


Figure 5.3. Psychomotor hierarchy Levels

Table 5.2. Psychomotor Domain Levels Action Verbs

Psychomotor Domain Levels	Behavior descriptions	Action Verbs
Imitation/ observation	Copy action of another; observe and replicate	Copy, follow, replicate, repeat, adhere, attempt, reproduce, organize, sketch, duplicate
Manipulation	Reproduce activity from instruction or memory	Re-create, build, perform, execute, implement, acquire, conduct, operate
Precision/ competent	Execute skill reliably, independent of help, activity is quick, smooth, and accurate	Demonstrate, complete, show, perfect, calibrate, control, achieve, accomplish, master, refine
Articulation/ consolidation	Adapt and integrate expertise to satisfy a new context or task	Solve, adapt, combine, coordinate, revise, integrate, adapt, develop, formulate, modify, master
Naturalization & Mastery	Instinctive, effortless, unconscious mastery of activity and related skills at strategic level	Construct, compose, create, design, specify, manage, invent, project-manage, originate

5.2.3 Affective Domain

Affective Domain, was detailed by Bloom, Krathwhol and Masia (1964, *Taxonomy of Educational Objectives: Vol. II, The Affective Domain*.) Bloom's theory advocates this structure and sequence for developing attitude - also now commonly expressed in the modern field of personal development as 'beliefs'. As with the other domains, the Affective Domain detail provides a framework for teaching, training, assessing and evaluating the effectiveness of training and lesson design and delivery, and also the retention by and affect upon the learner or trainee.

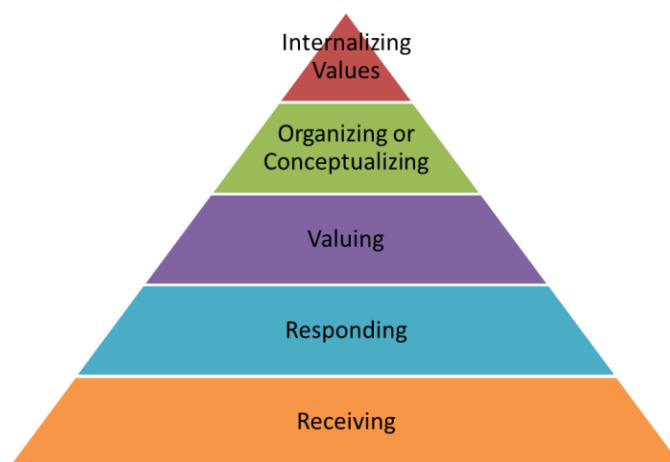


Figure 5.4. Affective Domain hierarchy Levels

Table 5.3. Affective Domain Levels Action Verbs

Affective Domain Levels	Behavior descriptions	Action Verbs
Receiving	Open to experience, willing to hear	Ask, listen, focus, attend, take part, acknowledge, hear, be open to, retain, follow, concentrate, read, do, feel
Responding	React and participate actively	React, respond, interpret, clarify, contribute, question, present, cite, write, perform
Valuing	Attach values and express personal opinions	Argue, challenge, debate, refute, confront, justify, persuade, criticize,
Organizing or Conceptualizing	Reconcile internal conflicts; develop value system	Build, develop, formulate, defend, modify, relate, prioritize, reconcile, contrast, arrange, compare
Internalizing Values	Adopt belief system and philosophy	Act, display, influence, solve, practice,

5.3 Program Outcomes and Domains of Learning

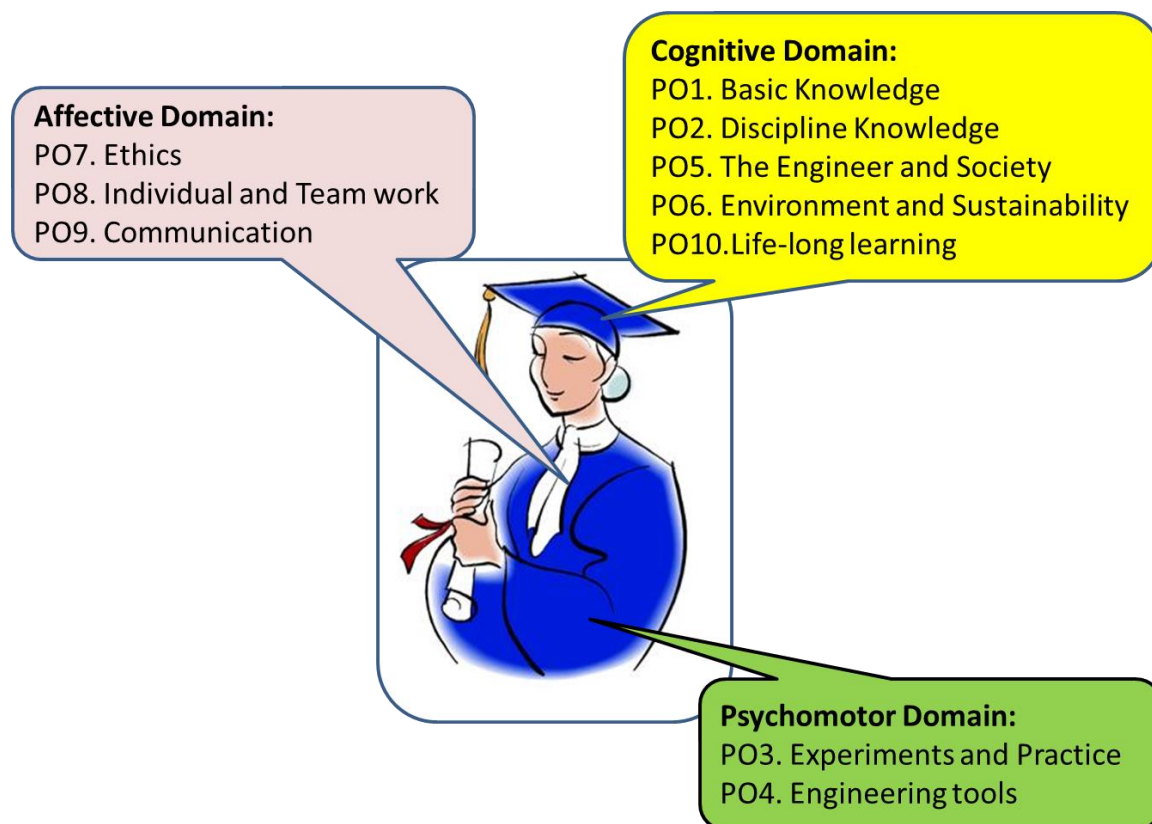


Figure 5.5. Program Outcomes and Domains of Learning

Program Outcomes (POs) framed by NBA for diploma students are the specific characteristics required by the stake holders in the students. There is definite relation between these outcomes with the three different domain of learning, which are described in figure 5.5. These classification plays major role while framing curriculum.

CHAPTER 6

Curriculum Revision Process

Since, autonomous status GPN revised curriculum after every 5 years. 2016 revision is the fifth revision. Concept of Bloom's Taxonomy is included in GPN curriculum since the beginning; however the complete model of OBE is adopted first time in the curriculum revision process. The complete curriculum revision process is described below.

6.1 Change Management

GPN is the diploma level educational institute is having total 12 diploma program, out of which 11 programs are under autonomous status. Curriculum revision of such 11 programs in a short period with the new unknown model is a huge task before CDC. It is natural reaction of human being even in the best circumstances for any change, is to resist.

GPN used ADKAR model for change management. This diagnostic tool helps our organization and our employees understand where they are in the change process. We use this tool to identify gaps in your change management process and to provide effective coaching for our faculties.

The ADKAR model is used to:

- manage faculties resistance
- help faculties transition through the change process
- create a successful action plan for curriculum development
- develop a strategy of curriculum development

6.1.1 ADKAR Model for Change Management

ADKAR has become very popular with managers and project teams because this change management model is easily applied and simple to teach to others, including executive sponsors of change. ADKAR stands for:

- **Awareness** : Awareness of the need for change
- **Desire** : Desire to participate and support the change
- **Knowledge** : Knowledge on how to change
- **Ability** : Ability to implement required skills and behaviors
- **Reinforcement** : Reinforcement to sustain the change

Following change management tools are used in curriculum revision process.

1. Communication
2. Motivation
3. Workshop
4. Resistance Management
5. Training

Figure 6.1 shows the mapping of these tools with ADKAR.

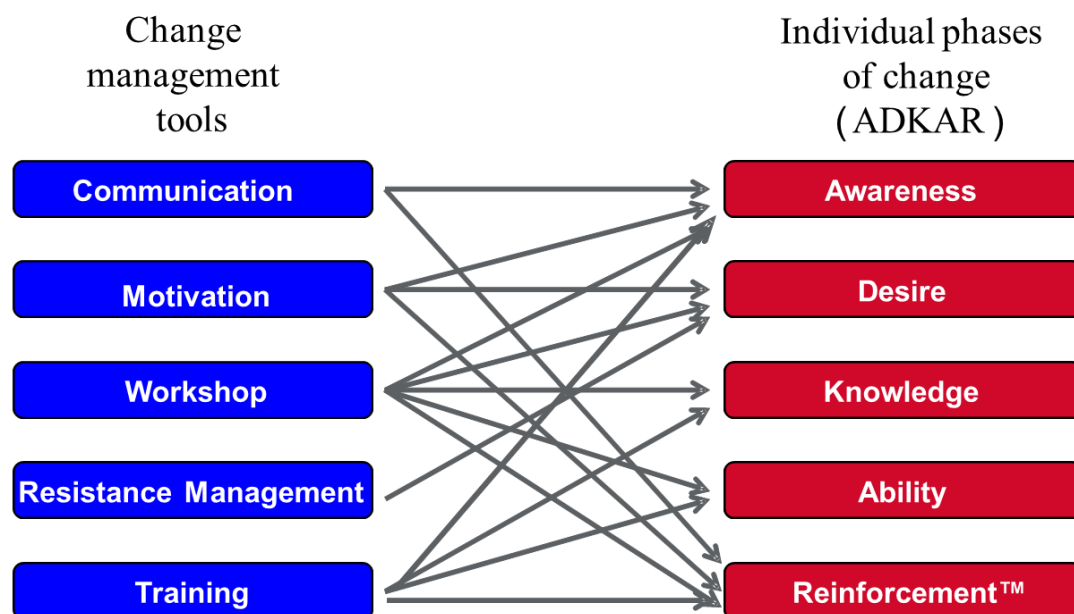


Figure 6.1. Mapping of change management tools with ADKAR

6.1.2 Results of ADKAR Model

As a result of using ADKAR model for change we got following results:

- Date of Starting curriculum Revision process : 23/01/2016
- Date of Completion of curriculum Revision process : 24/11/2016
- Time Period to complete curriculum Revision : 11 Months.
- No. of Programs for curriculum Revision : 11
- No. of Courses for curriculum Revision : 293
- Implementation of OBE curriculum from : July 2016

6.2 Curriculum Revision Process

Following Method is adopted for Development of Curriculum

- Study Outcome Base Education Philosophy
- Analyse OBE Curricula of Diploma in Engineering in India and Autonomous Institute (MS) curricula
- Analyse Model Diploma in Engineering curriculum by AICTE
- Compare 2011 curriculum with MSBTE existing curriculum
- Study NBA/AICTE/MSBTE/NSQF guidelines
- Organize Search Conference for validation of skills
- Collect Feedback (Program-wise) on existing curriculum from stake holders
- Curriculum mapping with POs to identify curriculum gaps
- Decide Institute Level policies
- Develop Model
- Prepare Action Plan for development
- Analyse and Brain storming at program level
- Develop Vision, Mission and PEOs and curriculum at program Level (Framing, Mapping, Editing, Revising)
- Approve from PBOS, BOS and GB.

6.2.1 Study of OBE Philosophy

CDC studies the OBE philosophy, which is described previously in this document. The training of faculties are arranged for awareness of faculties.

6.2.2 Analysis of OBE curricula

Following Boards in India adopted Outcome based curriculum for Diploma in Engineering:

- Gujarat Technological University-2014-15
- Board of Technical Examinations, Bengaluru, Karnataka- 2015-16
- State Board of Technical Education, Kerala state- 2015-16
- MSBTE is going for OBE from- 2017-18

The analysis of above OBE curriculum of each and every program is a huge task; however CDC studied curriculum of Diploma in Electrical Engineering of above said boards and analyze their curriculum based on the following points.

- Credits
- Credits Ratio TH:PR
- Total Courses
- Examination Scheme
- Comparison of Autonomous Curriculum in State

The results are shown in table 6.1 to 6.5

Table 6.1. Credits Comparison

Boards	Theory Periods	Practical Periods	Credits
GTU, Ahmedabad (OBE)	95	87	182
BTE, Bengaluru (OBE)	88	108 (2Pr=1Cr)	142
SBTE, Kerala (OBE)	NA	(2Pr=1Cr)	47 per Year
MSBTE, Mumbai (G scheme)	106	93	199
AICTE Model Curriculum	90	102 (2Pr=1Cr)	145
G. P. Nagpur (2011)	113	87	200

Table 6.2. Credit Ratio TH:PR Comparison

Boards	TH:PR
GTU, Ahmedabad (OBE)	52:48
BTE, Bengaluru (OBE)	62:32
SBTE, Kerala (OBE)	70:30 (I yr)
MSBTE, Mumbai (G scheme)	53:47
AICTE Model Curriculum	64:36
G. P. Nagpur (2011)	57:43

Table 6.3. Courses Comparison

Boards	Theory Courses	Practical Courses
GTU, Ahmedabad (OBE)	28	06
BTE, Bengaluru (OBE)	22	18
SBTE, Kerala (OBE)	NA	NA
MSBTE, Mumbai (G scheme)	31	12
AICTE Model Curriculum	29	16
G. P. Nagpur (2011)	29	12

Table 6.4. Examination Scheme Comparison

Boards	Theory		Practical	
	TEE	CA	TEE	CA
GTU, Ahmadabad (OBE)	70	30	20/40	30/60
BTE, Bengaluru (OBE)	100	25	50	25
SBTE, Kerala (OBE)	100	50	50	50

MSBTE, Mumbai (G scheme)	100	25	50	25/50
AICTE Model Curriculum	70	20*+10**	50	25
G. P. Nagpur (2011)	80	20	25	25/50

*Progressive Test

** Assignments

Table 6.5. Comparison of Autonomous Curricula

Institute	TH	TU	PR	Total	Theory Papers	Practical	Total Courses
G.P. Mumbai	96	12	68	176	25	13	38
VJTI, Mumbai	92	16	86	194	27	19	46
G.P. Aurangabad	103	00	81	184	26	13	39
G.P. Kolhapur	104	00	76	180	31	10	41
G.P. Nasik	111	03	82	196	29	11	40
G.P. Nagpur	113	05	82	200	29	12	41

6.2.3 Comparison with MSBTE Existing Curriculum

As mentioned 2.1.1, autonomous institutions shall be required to obtain equivalence for their courses and programs from the MSBTE, it is essential to compare GPN curriculum with existing curriculum for variation in content, Existing Courses for Revision/Deletion, New Courses proposed, detailed Comparison of Examination Scheme. This task is performed at program level. The analysis of this task is used to decide the course outcomes, course contents as well as to finalize the program structure of revised curriculum. The formats for the same are shown in table 6.6 to 6.9.

Table 6.6. Comparison of Existing Curriculum-2011 with MSBTE-2012 Curriculum

SN	MSBTE Curriculum				Equivalent course in Autonomous Curriculum				Content Variation if any with MSBTE
	Subject Code	Name of Subject	TH Periods	PR Periods	Course Code	Name of course	TH Credits	PR Credits	

Table 6.7. List of Existing Courses for Revision/Deletion etc.

Sr. No.	Course Code	Name of Course	Write-R (Revision) NR (No Revision) D (Deletion)	Reason for R/NR/D	Name of New title if proposed

Table 6.8. List of New Courses proposed

Sr. No.	Name of new courses proposed (if any)	Reason for introduction of New courses

Table 6.9. Comparison of Examination Scheme with MSBTE Curriculum

Sr. No.	Points	MSBTE Curriculum	Autonomous Curriculum	Remarks if any
1	Theory Paper Maximum marks			
2	Practical Maximum marks			
3	Progressive Test Maximum marks			
4	Term work Maximum marks			
5	No. of subject/courses having internal practical exam.			
6	No. of subject/courses having external practical exam			

7	No. of subject/courses having internal oral exam			
8	No. of subject/courses having external oral exam			
9	No. of subject/courses having term work			
10	No. of non-exam subject/courses			
11	Industrial training included in curriculum (Yes/No)			

6.2.4 Study of NBA/AICTE/MSBTE Guidelines

The guidelines given in following documents are studied, and the final conclusions are made to framed curriculum documents.

1. Orientation Workshop on Outcome Based Accreditation NBA training text material- to frame Vision, Mission of the Institute, Vision, Mission, PEOs of the program.
2. AICTE Guidelines- 21st Academic Council Meeting of AICTE on 3rd April, 2013 to decide percentage of various level courses. The abstract of the guidelines is mentioned in the table 6.10.

Table 6.10. Abstract of Guidelines

S. N.	Levels	Percentage	Course Heads
1	General	5 to 10%	Language / Communication skills
			Humanities and Social Science
			Economics & Principle of management
			NSS, NCC, NSO, Rural Development
2	Basic Science	15 to 25%	Computer literacy with numerical analysis
			Mathematics
			Physics
			Chemistry

3	Engineering Sciences and Technical Arts	15 to 25%	Engineering Graphics
			Workshop Practice
			Engineering Mechanics
			Electrical Science I (Basic Electrical Engineering)
			Thermodynamics and Heat Transfer
			Material Science and Engineering
			Electrical Science II (Electronics and Instrumentation)
4	Professional Subjects	55 to 65%	
i)	Professional Core	22.5 to 27.5%	Minimum number of Core courses suggested by experts
ii)	Professional Elective	12.5 to 15%	About 10% Electives should be made available to the students
iii)	Free Elective	7.5 to 10%	Open interdisciplinary electives allow a student to diversify his/her spectrum of knowledge
iv)	Project	5 to 10%	
v)	Seminar & Industrial Training	2.5 to 5%	

3. MSBTE Guidelines MSBTE/D-10/Director/2012/303 Dt.1st October, 2012-

The important guidelines given by MSBE are as follows:

- Credits should not be more than 160 and should be uniform across the program
- Curriculum should be laboratory based and having more practical weight age
- Curriculum should be restricted to five levels
- 4th and 5th level courses are considered for award of diploma
- Practical Examination should be based on performance only.

- Implant training should be made compulsory any time in vacation after first year and separate credits should be given.
- Online examination of courses should be start gradually. To begin with one course per semester.

6.2.5 Search Conference

The search conference is organized at institute level on dated 12/02/2016. The experts from the industries, academic institutions and alumni were present. The main objectives of organization of search conference are as follows:

- Validate generic and technical skills identified by the program.
- Suggest new skills to be developed in a technician pertaining to specific work area by industry/ field experts.
- Collect Feedback on existing curriculum and suggestions on previous received feedback.
- Suggest new course content to be incorporated in curriculum.
- Obtain suggestions on various topics related to program structure.
- Analyze and prepare a final list of generic skills and technical skills and from courses based on validated skills later on.
- Formation of Courses

6.2.6 Curriculum mapping

The 2011 curriculum is mapped to identify Program strengths (attributes that are widely addressed) and Gaps (attributes that are addressed by only a few learning experiences).

The simplest form of curriculum map is a matrix whose rows are the learning experiences (curriculum courses) and columns are the Graduate attributes (or Program Outcomes).

The curriculum courses include General Studies Courses, Basic Science Courses, Engineering Sciences and Technical Arts Courses, Professional Courses (Core, project, seminar etc.), Elective Courses.

To establish the curriculum map, each faculty member reviews his/her courses and identifies the attributes that are addressed in the course based on its content and materials.

A sample curriculum mapping sample is shown in Table 6.11. Program wise curriculum mapping is given in subsequent chapter.

Table 6.11. Curriculum mapping (Sample)

SN	Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
			Basic Knowledge	Discipline Knowledge	Experiments and Practice	Engineering tools	The Engineer and Society	Environment and Sustainability	Ethics	Individual and Team work	Communication	Life-Long Learning	Maintain Electrical Equipment's	Maintain Electrical Power System
1	EV1101	Environmental science	X	-	-	-	X	X	X	X	X	X	-	-
2	EE1301	Basic Electrical Engineering	X	X	X	X	-	-	X	X	X	X	X	X
3	EE1401	Electrical Circuit and Network	X	X	X	X	-	-	-	X	-	X	X	X
4	EE1402	Electrical Measurement	-	X	X	X	X	-	X	X	-	X	X	X

6.2.7 Institute Level Policies

Institute level policy for curriculum development is decided by the CDC on the basis of followings:

- OBE Model
- Analysis of various curriculum Autonomous Institute/ MSBTE curriculum/ OBE curriculum
- NBA/AICTE/MSBTE Guidelines
- Feed Back from stake holders
- Search Conference Outcomes
- Curriculum Mapping of 2011 curriculum and
- GPN 2011 Curriculum

The following institute level suggestions are forwarded to the various programs for framing program structure.

1. Levels of Courses V

- **Level I- General studies courses- 5 (5 to 10%)**

1. English
2. Communication Skill
3. Environmental science
4. Economics & Management
5. Rural development (Non Theory)

- **Level II- Basic Science Courses- 6 (15 to 25%)**

6. C programming (including introduction to office tools) (Non Theory) (Note: Letter on this course is changed to Computer Applications as suggested in CM/IT PBOS)
7. Physics
8. Chemistry
9. Mathematics-I
10. Mathematics-II
11. Mathematics- III

(Note: The program which does not require mathematics-III course, may opt for more Computer literacy with numerical analysis courses. Letter on three mathematics courses are converted into two mathematics courses, by increasing the credits)

- **Level III Engineering Sciences and Technical arts courses- 7 (15 to 25%) (should be programme specific)**

12. Engineering Graphics (Theory)
13. Workshop Practice (program specific) (Non Theory)
14. Electrical Science I (Basic Electrical Engineering)
15. Electrical Science II (Electronics and Instrumentation)
16. Material Science and Engineering (program specific)

17. Engineering Mechanics

18. Thermodynamics and Heat Transfer (or mechanical related e.g. Elements of Mechanical Engineering for EE or program specific as per the experts suggestions)

- **Level IV- i) Professional Core Courses– 11- 22.5% to 27.5%**

19. to 27- Theory cum Practical Courses

28 to 29 – Practical courses (Non-Theory)

(Note: Letter on number of core courses are increased to 14)

- ii) **Project Courses- 5 to 10%**

30 to 31 – Practical Courses prerequisite for project (Non-Theory) Department specific workshop + program related design laboratory

32. Industrial Project

- iii) **Seminar and Industrial Training Courses- - 2.5 to 5%**

33. Seminar

34. Industrial Training/Practices

- **Level V- Elective Courses– 11- 22.5% to 27.5%**

- i) **Professional Elective Courses- 5/8 - 12.5 to 15%**

35. to 42- Theory cum Practical Courses

(Note: Letter on number of professional electives are changed to 3/6)

- ii) **Free Elective- 7.5 to 10%**

43. Finishing School (Common for all Branch)

44 to 53. Any one Elective Course each from 10 programs

(Note: Letter on number of electives courses are changed to 1/12)

2. **Detailed Curriculum Response**

CDC has suggested the various responses on various criteria based on the above study and are given in table 6.12

Table 6.12. Suggestive Curriculum at a Glance

SN	CRITERION	Suggestive RESPONSE
1	Total No. of Courses in a Program	55*
2	Total courses required.	41
3	No. of courses having theory papers.	29
4	No. of courses having non Theory exam.	12
5	No. of General Studies courses	5
6	No. of Basic Science Courses	6
7	No. of Engineering Science courses	7
8	No. of Professional Core courses	11
9	No. of Professional Elective courses	5/8
10	No. of Professional Free Elective courses	2/10*
11	No. of Project courses	3
12	No. of Seminar courses	2/3
13	Total credits (1 Th Hr = 1Credit & 2 Pr Hr = 1Credit)	150-155
14	Total marks	4600 (approx.)
15	Proportion of Hours (Periods), Th : Pr	50:50 (approx.)
16	Proportion of credits, Th : Pr	65:35 (approx.)
17	Proportion of marks; Th : Pr	50:50 (approx.)
18	Total courses for Award of Class	12
19	Total theory paper courses for Award of Class	10
20	Total marks for Award of Class	1600

6.2.8 Development of Curriculum Revision Model

Top to bottom design approach model of OBE described in Figure 4.2 is found in literature. No other model is found in literature. OBE is not only top to bottom design approach; it is a 360⁰ approach model. Based on this 360⁰ CDC developed our own model based on the study described above. Government Polytechnic, Nagpur model is named as GoPoNa Model. The model is as shown in figure 6.2.

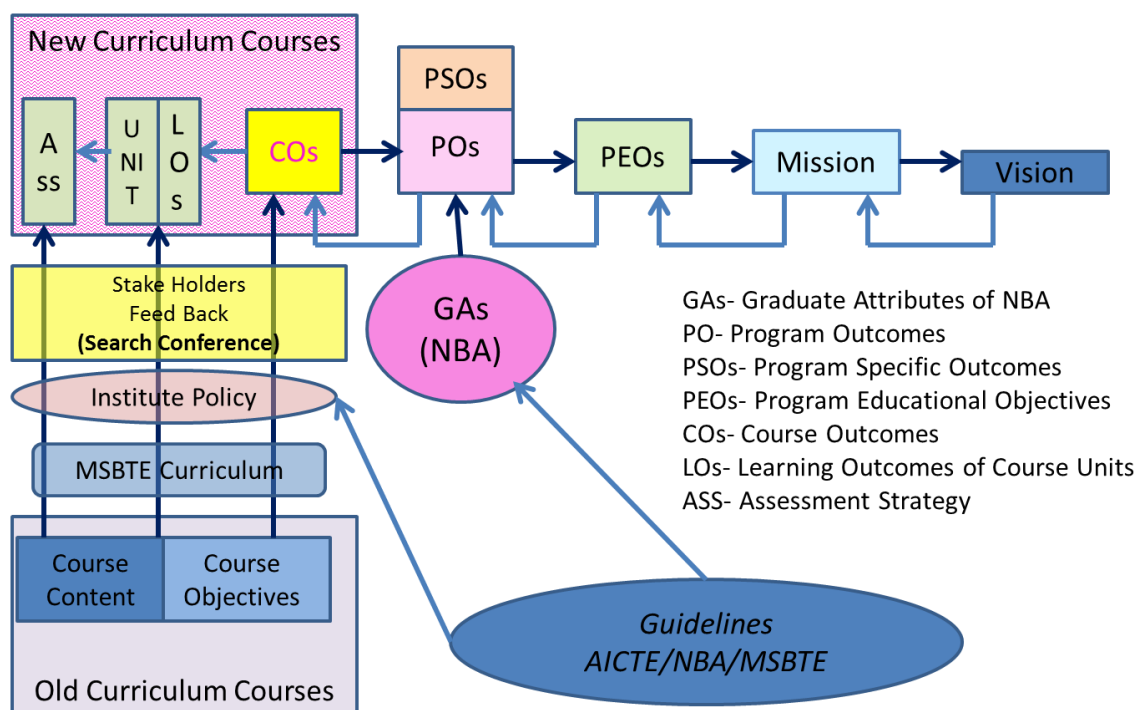


Figure 6.2. GoPoNa Model

GoPoNa Model is based on the OBE philosophy, various guidelines framed by the AICTE/NBA/MSBTE, and Search conference outcomes (feedback from stake holders). As OBE is 360⁰ approach various feedback loops are provided in the model for continuous improvement. The model is self-explanatory.

6.2.9 Preparation of Action Plan

Due to time constraint it is decided that the curriculum development process should be divided in to two phases. In first phase Curriculum of common courses i.e. Level I, II, III

are to be develop. And in second phase program specific courses of level IV and V are to be developed. The action plan is prepared for the both phases and is shown in table 6.13 and table 6.14 respectively.

Table 6.13. First Phase Action Plan

S.N.	Activity	Period/Date of Completion, up to
1	- Formation of PBOS at departmental level - Formation of institute level committee for deciding common policies. - Formation of committee for deciding Basic Engg. , Science and CNE courses policies	31/12/2015
2	Comparison of 2011 curriculum with MSBTE curriculum (Preliminary Task)	02/01/2016
3.	Meeting for deciding common policies of outcome based curriculum at institute level.	19/01/2016
4	Meeting for deciding policies of Basic Engg. , Science and CNE courses.	19/01/2016
5	Workshop for outcome based design procedure	22/01/2016
6	Preparation of Vision, Mission statements, POs and COs at program level	01/02/2016
7	Preparation of program structure based on outcome based education (course titles, scheme etc) by all programs (first draft, based on the information/data received from industries) & submission to I/C CDC.	10/02/2016
8	Checking of first draft of program structure of all program by curriculum revision committee (CDC) and return to respective program suggesting necessary corrections if any.	17/02/2016
9	Preparation of revised draft, if required, of program structure by the program and submission to CDC.	24/02/2016
10	Search conference for Validation of skills, program structure and course content detailing by all programs at department level.	02/03/2016
11	Course Content detailing of I, II & III sem. courses strictly as per Guideline of Curriculum Revision , information obtained from industries, content detailing format , feedback of MSBTE equiv. committee etc.	11/03/2016
12	Revising program structure, course content based on the outcome of search conference(if required)	19/03/2016

13	Arranging Program-wise Board of studies meeting (PBOS) of all program for courses of all levels by respective Program.	31/03/2016
	Suggestions in PBOS if any to be incorporated for getting approval from PBOS.	
14	Submission of curriculum of I, II & III sem. courses (soft copy) by program head/ “coordinator – curriculum” of program, to I/C CDC.	07/04/2016
15	Finalizing/checking of curriculum of I, II & III sem. courses of all program by Curriculum Revision Committee & submission to respective programs.	14/04/2016
16	Presentation of curriculum structure and courses in BOS meetings.	20/04/2016
17	Presentation of curriculum structure and courses in G.B. meetings	27/04/2016

Table 6.14. Second Phase Action Plan

S.N.	Activity	Period/Date of Completion, upto
1	Course Content detailing of III (if any), IV & V Level. courses strictly as per Guideline of Curriculum Revision , information obtained from industries, content detailing format , feedback of MSBTE equiv. committee etc.	06/06/2016 to 07/08/2016
2	Revising program structure, course content based on the outcome of search conference(if required)	14/08/2016
3	Arranging Program-wise Board of studies meeting (PBOS) of all program for courses of all levels by respective Program.	Up to 24/08/2016
4	Suggestions in PBOS if any to be incorporated for getting approval from PBOS.	
5	Submission of curriculum of IV & V level courses (soft copy) by program head/ “coordinator – curriculum” of program, to I/C CDC.	31/08/2016
6	Finalizing/checking of curriculum of IV & V level courses of all program by Curriculum Revision Committee & submission to respective programs.	01/09/2016
7	Presentation of curriculum structure and courses in BOS meetings.	07/09/2016 08/09/2016
8	Presentation of curriculum structure and courses in G.B. meetings	Before Diwali Vacation

6.2.10 Analysis and Brain Storming at Program Level

As per the action plan, OBE philosophy, guidelines and outcomes of search conference faculties in the program develops the program Structure (PS) and curriculum of courses as a group task.

The draft program structure of Electrical Engineering (shown in table 6.15) and draft curriculum of Basic Electrical Engineering is developed (Described in chapter 7) by CDC as a model for development of various programs PS and curricula.

Table 6.15. Program Structure Level I (sample)

PROGRAM STRUCTURE												
Level I: General Studies												
DIPLOMA IN ELECTRICAL ENGINEERING												
Sr. No	Course Code	Course Title	Prerequisite courses/credits	Teaching Scheme (TH,TU,PR Hrs./Week)*			Total Credits*	Examination Scheme (Max. Marks)				
				TH	TU	PR		Theory		Practical		Total Marks
								TEE	CA	TEE	CA	
1	EN101E	English	Nil	03	00	02	04	70	30	50 [@]	25	175
2	EN102E	Communication Skills	Nil	03	00	02	04	70	30	50 [@]	25	175
3	MN101E	Industrial Organization & Management	Min.60 credits	04	00	00	04	70	30	Nil	Nil	100
4	EV101E	Environmental Science	Nil	01	01	00	02	70**	30	Nil	Nil	100
5	RD101E	Rural Development	Nil	00	00	02	01	Nil	Nil	50 [@]	25	75
Total				11	01	06	15	280	120	150	75	625

- Abbreviations:
TH – Theory ; PR- Practical; TU- Tutorial; TEE- Term End Examination; CA- Continuous Assessment
- *Credit Formula: 1 TH Hr. = 1 Credit; 1 TU Hr. = 1 Credit; 2 PR Hrs. = 1 Credit
- Symbolic Representation
** Online Examination, @ Internal Practical Examination, # External Practical Examination, \$ Award of class course.

6.2.11 Development of Vision, Mission and PEOs and Curriculum

Vision and Mission of the Institute is revised by the CDC in consultation with all the programs, industry experts, academic expert and alumni in search conference. Vision,

Mission, PSOs and PEOs of the programs are developed by program itself in consultation with industry experts, academic expert and alumni in search conference. Vision and Mission of the Institute is approved in BOS and PBOS and Vision, Mission, PSOs and PEOs of the programs are approved in PBOS, BOS and GB.

6.2.12 Approval from AB, PBOS, BOS and GB

Program Structure, Curriculum of Science, Maths and Humanities departments are approved in AB and program specific courses are approved in PBOS of individual departments, Science, Maths and Humanities courses are also put before the PBOS of each program for approval, the suggestions obtained in PBOS are carried out before put it to BOS and all approved courses are put before BOS for approval. The approved curricula are put before GB for final approval. Table shows the details of PBOS, BOS and GB meetings.

6.3 Curriculum Revision at a Glance

• No. of Programs	:	11
• No. of Courses	:	291
• No. of GB Meetings	:	2
• No. of BOS Meetings	:	3
• No. of PBOS Meetings	:	33
• No. of AB Meetings	:	4
• No. of ILC Meetings	:	5
• No. of SCC Meetings	:	4
• No. of Coordinators Meetings	:	5
• Trainings Workshops	:	3
• Individual Department Trainings	:	13
• Search Conference	:	1
• No. of Faculties Involved	:	108
• No. of outside Experts Involved	:	46
• Days Spent for Curriculum Editing	:	26

CHAPTER 7

Model Course Curriculum

Model Course Curriculum of Basic Electrical Engineering is framed by CDC of GPN and circulates among the programs for development of various curricula. The workshop is arranged to describe the contents in it. The details are described below.

7.1 Basic Information

Following introductory information related to course is given in each curriculum.

PROGRAMME : **DIPLOMA IN ELECTRICAL ENGG.**
LEVEL NAME : **ENGINEERING SCIENCES AND TECHNICAL ARTS COURSES**
COURSE CODE : **EE301E**

The unique method is developed for assigning course code for the various courses, which is described in Figure 7.1.

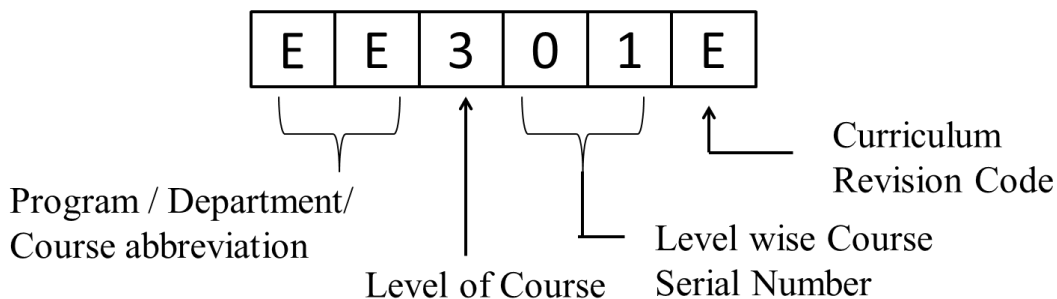


Figure 7.1. Course Code

COURSE TITLE : **BASIC ELECTRICAL ENGINEERING**
PREREQUISITE : **NIL**
TEACHING SCHEME: **TH: 04; TU: 00; PR: 02(CLOCK HRs.)**
TOTAL CREDITS : **05 (1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)**
TH. TEE : **03 HRs**
PR. TEE : **02 HRs (Internal)**
PT. : **01 HR**

7.2 Rationale

In rationale the importance of the course is described in brief.

7.3 Course Outcomes (COs)

COs are “Building Blocks” of OBE system. COs are measured at the end of the course. They are aligned with one or more POs and are closely related to the assessments. COs are measurable and assessable. Every course is having six COs.

Blooms taxonomy is important in higher education, where outcomes needs to be address the student ability to use information, not just recall, therefore all course outcomes are written in higher levels of learning. COs are based on all domains of learning to fulfill maximum POs and start with the action verb. The example of CO is given below showing domains of learning. CO1, CO2 and CO3 are in cognitive domain. CO4, CO5 and CO6 are in psychomotor domain. CO3 falls also under affective domain.

1. **Apply** electrical safety concept
2. **Use** principle and basic laws in electrical engineering for different applications
3. **Solve** simple electrical circuits.
4. **Connect** electrical measuring instruments in the circuit
5. **Record** the readings of various electrical meters.
6. **Operate** electrical equipment.

7.4 Course Details: Theory

Course content is limited to six units. Each unit is having topic and subtopic. Based on the content Specific Learning Outcomes (SLOs) in cognitive Domain are mentioned. Action verbs of Cognitive Domain in all levels of learning;

1. Knowledge,
2. Comprehension,
3. Application, Analysis, Synthesis, Evaluation.

These SLOs are in line levels of learning domains mentioned in specification table or vice versa. Table 7.1 shows example.

Table 7.1. Course Details Theory (sample)

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs
1. Electrical Safety	1. Apply electrical safety rules while working 2. Remove the electrocuted person from live conductor 3. Interpret electrical safety signs and symbols 4. Apply different methods of artificial respiration on electrocuted person 5. Select fire-fighting equipment on different types of fires.	1.1 Electrical Safety, Causes of accidents, General safety rules, Concept of electrical shock, Effect of electric shock, Method of removing electrocuted person, Safety signs and symbols. 1.2 Artificial respiration-schaefer's method, silvester's method, mouth to mouth respiration. 1.3 First Aid 1.4 Fire, Causes of Fire, Basic ways of extinguishing the fire Classification of fire, Class A, B,C, D, Fire fighting equipments, fire extinguishers, and their types .	06

7.5 Course Details Practical

All Specific Learning Outcomes (SLOs) are in psychomotor domain to develop the practical skills. Table 7.2 shows example.

Table 7.2. Course Details: Practical (sample)

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	Identify electrical measuring instruments, sources, ICDP/ITDP, switches, loads, wires and execute safety precautions in laboratory.	1. Electrical Safety	4
2	Connect voltmeter, ammeter and wattmeter in electrical circuit.	2. Fundamentals of electricity	2
3	Measure the current, voltage and resistance with the help of multi-meter or tong tester.		2
4	Find unknown resistance using ohms law.		2
5	Find temperature coefficient of materials.		2

Skill test is mandatory to assess the skills acquire during the course work before term end examination.

7.6 Specification Table

Specification table is a blue print for setting question paper. It is useful for designing a valid question paper. In OBE 2016 curriculum; specification table is provided for question paper setting (as well as for student); which shows the level wise cognitive process dimensions. The sample Specification table is shown on table

Table 7.3. Specification Table (sample)

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Electrical Safety	00(02)	04(00)	00(00)	04(02)
02	Fundamentals of Electricity	06(02)	08(08)	06(00)	20(10)
03	DC Circuits	02(00)	04(00)	06(06)	12(06)
04	Electrostatics	02(00)	06(04)	00(00)	08(04)
05	Magnetism and Electromagnetism	06(04)	04(08)	06(00)	16(12)
06	AC Fundamentals	02(00)	08(00)	00(06)	10(06)
	Total	18(08)	34(20)	18 (12)	70 (40)

R – Remember

U – Understand

A – Analyze / Apply

It is suggested that for:

- Basic Courses: R=30%; U=50%; A=20%
- Higher Level Courses: R=20%; U=50%; A=30%

7.7 Question Paper Profile (QPP)

Question paper profile (QPP) is the steps to words the step of e-governance. We can generate the question paper using computer program with the help of QPP and question bank on each bit of QPP. QPP is also the ready reckoner to the setter for setting questions on different levels of cognitive domain and topics. QPP reduces the process time of printed Question Paper for Examination.

Table 7.4. Question Paper Profile (sample)

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	2	R	2	3	R	2	4	R	2	5	R	2	6	R	2	1	R	2	5/7
	2	R	2																
02	2	R	4	1	U	4	2	U	4	2	U	4	2	U	4				3/5
03	5	R	4	2	U	4	3	U	4	4	U	4	5	U	4				3/5
04	5	U	4	6	U	4	6	U	4	5	U	4	5	R	4				3/5
05	4	U	6	2	A	6	3	A	6										2/3
06	3	A	6	5	A	6	6	A	6										2/3

2 Marks Bit- 5(2) = 7 Bits

4 Marks Bit- 9(6) = 15 Bits

6 Marks Bit- 4(2) = 6 Bits

T= Unit/Topic Number

L= Level of Question

M= Marks

R-Remember

U-Understand

A-Analyze/ Apply

7.8 Assessment and Evaluation Scheme

A detailed assessment and evaluation scheme is mentioned in curriculum in tabulated form as mentioned in table 7.5, which is self-explanatory.

Table 7.5. Assessment and Evaluation Scheme (Sample)

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	PT	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Scripts	1, 2, 3
		Class Room Assignments		Assignments	10	--	Assignment Book	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Scripts	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	ST	Students	One skill test at end of term	20	--	Practical Answer Scripts	4,5,6
		Journal Writing		Assignments	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Practical Answer Scripts	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First PT	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course Survey			End Of The Course	Questionnaires			

7.9 Scheme of Practical Evaluation

A detailed scheme of practical evaluation is mentioned in curriculum having practical examination in tabulated form, which is a guideline for development of rubrics for assessment purpose. A sample scheme of practical evaluation of EE301E is shown in table 7.6.

Table 7.6. Scheme of Practical Evaluation (Sample)

S.N.	Description	Max. Marks
1	Drawing circuit diagram, selection of equipment's. writing procedure etc.	10
2	Performance	20
3	Calculation, Result, Drawing Graphs (if any)	10
4	Viva voce	10
	TOTAL	50

7.10 Mapping of Course Outcomes with POs and PSOs

All developed curricula are mapped with POs and PSOs of the program. The POs and PSOs which fulfilled by the curriculum content are identified first. Individual course outcomes written previously are then mapped with the POs and PSOs. A sample mapping of EE301E is shown in table 7.7.

Table 7.7. Mapping of COs with POs and PSOs (Sample)

Course Outcomes (COs)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
CO1	3	3	-	-	-	-	1	-	-	-	3	3
CO2	3	3	-	-	-	-	-	-	-	-	3	3
CO3	3	3	-	-	-	-	-	-	-	-	3	3
CO4	3	3	2	2	-	-	-	2	2	2	3	3
CO5	3	3	2	2	-	-	-	2	2	2	3	3
CO6	3	3	2	2	-	-	-	2	2	2	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

7.11 Reference & Text Books

A reference and text books required as per the content of curriculum are mentioned as a reference for the student as well as faculties. Only standard books having ISBN numbers are given priority in the document. A sample of EE301E is shown in table 7.8.

Table 7.8. Reference & Text Books (Sample)

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Principle of Electrical Engineering and Electronics	V.K. Mehta, S. Chand & Company Ltd., Reprint, 1996	81-219-1053-6
2.	A Text Book Of Electrical Technology Vol-I	B.L.Theraja, A.K.Theraja, S. Chand & Co Ltd., Reprint,2006	81-219-2440-5
3.	Basic Electrical Engineering	V.N.Mittle, Arvind Mittal, The McGraw Hill Education Pvt. Ltd, Reprint, 2011	13: 978-0-07-059357-2
4.	Experiments in Basic Electrical Engineering	S.K.Bhattacharya and K.M.Rastogi., New Age International Publisher, Reprint, 2009.	978-81-224-1042-6
5.	A Text Book on laboratory courses in Electrical Engineering	S. G. Tarnekar and P. K. Kharbanda, S. Chand& Company Ltd., Third, 1990	13: 978-8121901048

7.12 E-References

E-references as per the content of curriculum are mentioned as a reference for the student as well as faculties. Standard e-references are given priority in the document. These references are useful for students learning. A sample of EE301E is shown below.

- <http://nptel.ac.in/courses/108108076/1> , assessed on 18th January 2016
- <http://www.electrical4u.com> , assessed on 18th January 2016
- <https://www.youtube.com/watch?v=A9KSGAnjo2U>, assessed on 18th January 2016

7.13 List of Major Equipment's/Instruments with Specification

The list of major equipment's/ instruments required for performing the practical to developed psychomotor skills is mentioned in the document. A sample list of EE301E is shown below.

1. Ammeter MI 0-5-10 A
2. Voltmeter MI 0-150-300 V
3. Wattmeter 0-3000 W
4. Digital Multi-meter
5. Rheostat assorted sizes
6. Variable Inductor

7.14 List of Experts & Teachers who Contributed for Curriculum

The list of experts & teachers who contributed for curriculum is mentioned in the document followed by the signature of chairman PBOS and member secretary of PBOS for the authenticity of the curriculum.

S.N.	Name	Designation	Institute / Industry
1.			
2.			

 Sign. _____
 (Member Secretary PBOS)

 Sign. _____
 (Chairman PBOS)

CHAPTER 8

Curriculum Document

Detailed curriculum document of Diploma in **Textile Manufactures** is given below.

8.1 Vision of Institute

To become a Center of Excellence, providing quality technical education and training

8.2 Mission of Institute

The mission of Government Polytechnic, Nagpur is-

1. To frame institutional policies for effective implementation of teaching learning process
2. To inculcate values and ethics for life-long learning through curricular, co-curricular and extra-curricular activities
3. To develop facilities and services for academic excellence
4. To enhance the skills of faculties and staff through industry institute collaboration.

8.3 Vision of Program

Vision of the Textile Manufactures Program:

To become a Centre of Excellence in imparting skill based Textile Technology Education

8.4 Mission of Program

Mission of the Textile Manufactures Program:

- M1:** To impart high quality Textile Technology education and professional ethics to students.
- M2:** To adopt the best pedagogical methods in order to maximize knowledge transfer.
- M3:** To have adequate mechanisms to enhance understanding implementation

of theoretical concepts in practice.

M4: To provide the best facility, infrastructure, and environment to the students and faculty members, creating an ambience conducive for excellence in Textile Technology education.

8.5 Program Educational Objectives (PEOs)

The Program Educational Objectives of (PEOs) Textile Manufactures Program are:

PEO1: To acquire a strong background in basic science, mathematics, engineering science and technical arts and ability to use these tools in Textile Technology process.

PEO2: To develop the ability to demonstrate technical competence in the field of Textile Technology process and develop solutions to the problems in Textile Technology process.

PEO3: To attain the qualities of professional leadership to deliver effectively in a multi disciplinary team and domains

PEO4: To produce technicians who ensures social responsibility and environmental concern.

PEO5: To attain professional excellence through life-long learning and produce technicians who ensure professional, ethical and moral behaviour.

8.6 Program Outcomes (POs)

PO1: Basic Knowledge: Ability to apply knowledge of basic Mathematics, Science and Engineering to solve the engineering problems

PO2: Discipline Knowledge: Ability to discipline specific knowledge to solve core and/or applied engineering problems

PO3: Experiments and Practice: Ability to plan and perform experiments and practices and use the results to solve engineering problems

- PO4: Engineering tools:** Apply appropriate technologies and tools with an understandings of limitations
- PO5: The Engineer and Society:** Demonstrate knowledge to assess the societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to engineering practice.
- PO6: Environment and Sustainability:** Understand the impact of engineering solutions in societal and environmental context, and demonstrate knowledge and need for sustainable development.
- PO7: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
- PO8: Individual and Team work:** Function effectively as an individual, and as a member or leader in diverse/ multidisciplinary teams.
- PO9: Communication:** An ability to communicate effectively.
- PO10: Life-long learning:** Recognise the need for, and have preparation and the ability to engage in independent and life-long learning in context of technological changes.

8.7 Program Specific Outcomes (PSOs)

- PSO1:** Select raw materials, machines, process parameters to impart desired quality of textile product and services at minimum cost.
- PSO2:** Apply new methods / management techniques to produce textile products.

8.8 Mapping of Vision, Mission, PEOs, POs, PSOs

8.8.1 Mapping of Vision and Mission

Table 8.1. Mapping of Vision-Mission

	Mission Statements			
	M1	M2	M3	M4
Vision Statement	✓	✓	✓	✓

8.8.2 Mapping of Mission and PEOs

Table 8.2. Mapping Mission-PEOs

Mission Statements	Program Educational Objectives (PEOs)				
	PEO1	PEO2	PEO3	PEO4	PEO5
M 1	✓	✓	-	-	✓
M 2	✓	✓	✓	✓	✓
M 3	✓	✓	✓	-	-
M 4	✓	✓	✓	✓	✓

8.8.3 Mapping of PEOs and POs- PSOs

Table 8.3. Mapping PEOs-POs & PSOs

PEOs	Program Outcomes (POs)										PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PSO 1	PSO 2
PEO1	✓											
PEO2		✓	✓	✓				✓				
PEO3		✓	✓	✓				✓		✓		
PEO4							✓	✓	✓			
PEO5					✓	✓						

8.9 Identified Skills in Search Conference

8.9.1 Technical skills for Textile Manufactures Diploma Students

- 1 Apply principles of Physics for solving textile processing related problems.
- 2 Apply principles of Chemistry for solving textile processing related problems.
- 3 Apply the basic Mathematical principles to solve basic textile calculations.
- 4 Apply the principles of mathematics to solve basic textile calculations and basic statistical control.
- 5 Prepare engineering drawings manually using prevailing drawing instruments
- 6 Prepare engineering drawings using CAD software related to textile processing.
- 7 Use basic principles of mechanical engineering to maintain textile manufacturing plants
- 8 Apply the basic principles of textile technology in manufacturing.
- 9 Use organic compounds in chemical engineering processes.
- 10 Use relevant man made and synthetic fibres
- 11 Use basic principles of electrical engineering to maintain textile processing plants
- 12 Use basic principles of electronics engineering to maintain textile processing plants

- 13 Operate and maintain devices related to mechanical engineering and material handling equipments related to textile processing.
- 14 Use different types of textile pre-treatment machines for further processing of yarn and related materials
- 15 Use relevant dyes, chemicals, dyeing and finishing equipment for natural fibres and fabrics
- 16 Use relevant printing inks, chemicals and fabric printing equipment for natural fibres and fabrics
- 17 Undertake finishing processes for cotton, silk, wool and synthetic textile materials for end use
- 18 Use relevant dyes, chemicals, dyeing and finishing equipment for synthetic fibres and fabrics
- 19 Use relevant printing inks, chemicals and fabric printing equipment for synthetic fibres and fabrics
- 20 Use principles of polymer science for relevant applications in textile processing
- 21 Prepare textile colour designs in wet processing using principles of colour science with computers.
- 22 Ensure quality during pre-treatment, dyeing, printing and finishing processes of fabrics
- 23 Undertake textile wet processing operations ethically using management principles, cost control, marketing and socially acceptable practices.
- 24 Apply principles of colour theory, chemical composition, structure, properties of dyes & other intermediates and their synthesis in textile processing
- 25 Evaluate various textile auxiliaries to use them for textile processing for quality production
- 26 Produce different technical textiles for relevant applications
- 27 Undertake processing of textile wet processing effluents to conserve water and energy
- 28 Use relevant dyes on fabrics based on the application and fabric properties of fibres.
- 29 Analyse composition of textile fibres, dyes and chemicals using analytical testing instruments and methods
- 30 Implement energy conservation and pollution reduction techniques for sustainable environment.

8.9.2 Generic skills for Textile Manufactures Diploma Holder

- 31 Communicate in English in oral and written form.
- 32 Use relevant soft skills (team work, leadership, time management, decision making, planning, conflict resolutions, counseling and others) effectively in different situations.
33. Use relevant management principles in industry.
34. Plan to establish 'start-up small textile unit'
35. Prepare tender documents and comparative statements.
36. Develop life-long learning skills through learning-to-learn strategies.
- 37 Apply TQM principles for assuring quality of products and services.
- 38 Follow safe practices in production, operation and maintenance.
- 39 Use computers for word processing, data analysis, presentations.

8.10 2011 Curriculum Mapping with Program Outcomes (POs)

The 2011 curriculum is mapped to identify Program strengths (attributes that are widely addressed) and Gaps (attributes that are addressed by only a few learning experiences). The mapping table is shown below.

Table 8.4. 2010 Curriculum Mapping with POs & PSOs

Course code	Course Name	PO1 Basic Knowledge	PO2 Discipline Knowledge	PO3 Experiments and Practice	PO4 Engineering tools	PO5 The Engineer and Society	PO6 Environment and Sustainability	PO7 Ethics	PO8 Individual and Team work	PO9 Communication	PO10 Life-Long Learning	PSO1 Select raw materials, machines, process	PSO2 Apply new methods / management
EN 111	Communication Skills	X	-	X	-	-	-	X	X	X	X	-	-
PH 111	Applied Physics	X	-	X	X	X	-	-	X	X	X	-	-
CH 111	Applied Chemistry	X	-	X	X	X	-	-	X	X	X	-	-
MH 111	Engg. Mathematics	X	-	-	-	-	-	-	-	-	X	-	-
WS 111	Workshop Practice	X	X	X	X	-	-	-	X	X	X	-	-
CM 111	IT Applications	X	-	X	-	X	-	-	X	X	X	-	-
EC 211	Electronics & Control	X	X	X	-	-	-	-	X	X	X	-	-
MH 211	Engineering Statistics & Calculus	X	-	-	X	-	-	-	-	X	-	-	-
ET 211	Electrical Technology	X	X	X	X	-	-	-	X	X	X	-	-
ME 211	Engineering Graphics	X	X	X	X	-	-	-	X	X	X	-	-
AM 311	Applied Mechanics	X	X	X	X	-	-	-	X	X	X	-	-
EN 311	Generic Skills	X		X	-	X	X	X	X	X	X	-	-
TX 401	Elements Of Textile Technology	-	X	X	X	-	-	-	X	X	X	X	X
TX 402	Yarn Forming-I	-	X	X	X	-	-	-	X	X	X	X	X
TX 403	Yarn Forming-II	-	X	X	X	-	-	-	X	X	X	X	X
TX 404	Yarn Forming-III	-	X	X	X	-	-	-	X	X	X	X	X

TX 706	Fabric Merchandizing	-	X	-	-	X	X	X	-	-	-	-	X
TX 707	Technology Of Clothing Manufacturing	-	X	X	-	-	-	-	X	X	X	X	-
TX 708	Spinning Of Long Staple Fibres	-	X	X	X	-	-	-	X	X	X	X	X

8.10.1 Identified Gaps in 2010 Curriculum

2010 curriculum mapping with Program Outcomes (POs) and Program Specific Outcomes (PSOs) are carried out. It is found that, the content in 2010 curriculum related to following POs are less related to other POs.

1. PO4:Engineering Tools
2. PO5: The Engineer and Society
3. PO6: Environment & Sustainability
4. PO7: Ethics
5. PO9: Communication

Therefore, to fulfill these gaps some common courses and program specific courses are suggested in curriculum

Common Courses:

1. Rural Development
2. Finishing school
3. Industrial Training / Industrial practices
4. Free Electives (Total twelve courses)

Program related courses:

1. Computer Aided Textile Designing
2. Enterprise Resource Planning

8.11 Courses Identification

Courses are formed based on identified skills in search conference, identified gaps in 2011 curriculum, AICTE guidelines and institute policy framed by ILC. The following table shows the identified skills and courses formed based on it.

Table 8.5. Courses Identification from Identified Skills

Identified Skills	Courses
To lay a strong foundation of English through grammar. To teach correct structure of word and sentences	1. English
To acquire skills to learn efficiently. To enable the students to have broader vision. To face problems with confidence.	2. Communication skills
Effective use of office tools for preparing documents ,worksheet & presentation Effective Use of internet facilities. Use computers for word processing, data analysis, presentations	3. Computer Applications
Use relevant management principles in industry Apply TQM principles for assuring quality of products and services	4. Industrial Organization & Management
Implement energy conservation and pollution reduction techniques for sustainable environment	5. Environmental Science
Develop life-long learning skills through learning-to-learn strategies	6. Rural Development
Apply principles of Physics for solving textile manufacturing related problems	7. Engineering Physics
Apply principles of Chemistry for solving textile manufacturing related problems	8. Applied Chemistry
Apply the basic mathematical principles to solve basic textile calculations	9. Engineering Mathematics
Apply the principles of mathematics to solve basic textile calculations and basic statistical control	10. Applied Mathematics
Prepare engineering drawings manually using prevailing drawing instruments Prepare engineering drawings using CAD software related to weaving machines	11. Engineering Graphics

Use basic mechanical tools, instruments and devices	12. Workshop Practice
Use basic principles of mechanical engineering to maintain textile manufacturing plants	13. Applied Mechanics
Use basic principles of electrical engineering to maintain textile manufacturing plants	14. Basic Electrical Technology
Use basic principles of electronics engineering to maintain textile manufacturing plants	15. Applied Electronics
Analyse basic fabric structures	16. Fabric Structure and Design
Apply design concepts of compound fabric structures	17. Advanced Fabric Structure \$
Maintain Gins and blow room system for Ginning and yarn manufacturing	18. Cotton Opening and Cleaning
Maintain Carding machine and draw frame system for yarn manufacturing Maintain Pre-combing and comber machine for yarn manufacturing	19. Sliver formation
Manufacture yarn on Speed frame, Ring frame and doubling machines	20. Roving and Yarn Formation
Undertake fabric weaving using principles of weaving technology	21. Yarn Preparation for Weaving
Maintain basic weaving machine for fabric manufacturing	22. Yarn Sizing and Loom
Undertake fabric production on Automatic and Jacquard Looms Maintain Automatic and Jacquard Looms for yarn manufacturing Supervise fabric production on Automatic and Jacquard Looms	23. Dobby, Jacquard and Auto Loom
Test fibres to take corrective actions during manufacturing Test yarns to take corrective actions during manufacturing	24. Fibre and Yarn Testing
Test fabrics to take corrective actions Analyse quality of woven and knitted fabric structures	25. Fabric Testing
Undertake dyeing and printing processes of fabrics	26. Textile Processing
Undertake production of knitted fabrics Produce knitted fabrics using advanced knitting technologies	27. Knitting Technology

Undertake synthetic yarn manufacturing process and heat setting Ensure quality and process control in weaving operations	28. Fibre Science and Technology
Ensure quality and process control in spinning operations	29. Process Control in Spinning
Ensure quality and process control in weaving operations	30. Process Control in Weaving
Select the appropriate machinery, manpower and process as per the product in Textile mill	31. Production Planning and Organization
Apply principles of aesthetics and colour theory for manual and computer-aided textile design	32. Textile CAD
Plan to establish 'start-up small textile unit' or modernise an existing textile plant Prepare tender documents and comparative statements	33. Enterprise Resource Planning
Select and perform project work in group	34. Industrial Project
Use computers for word processing, data analysis, presentations	35. Seminar
Follow safe practices in production, operation and maintenance	36. Industrial Training
Specify features of modern yarn spinning technology	37. Advanced Yarn Manufacturing
Apply principles of weft insertion by projectile , Rapier, Air jet , water jet method	38. Advanced Fabric Manufacturing
Undertake the production of quality garments Produce garments using advanced garment manufacturing technologies	39. Garment Technology
Identify various manufacturing process and web formation process for non woven fabrics	40. Non-Woven Manufacturing
Produce technical textiles using advanced manufacturing technologies	41. Technical Textiles
Plan the apparel merchandising process	42. Apparel Merchandizing
Use relevant soft skills (team work, leadership, time management, decision making, planning, conflict resolutions, counseling and others) effectively in different situations	43. Finishing School
Selection and care of fabrics.	44. Fabric Selection and Care

8.12 Program Structure

The program structure of the Textile Manufactures program is developed as described in chapter 6 previously and is given below.

8.12.1 Program Structure Level I: General Studies

Table 8.6. Program Structure Level I: General Studies

DIPLOMA IN TEXTILE MANUFACTURES												
Sr. No	Course Code	Course Title	Prerequisite courses/credits	Teaching Scheme (TH,TU,PR Hrs./Week)*			Total Credits*	Examination Scheme (Max. Marks)				
				TH	TU	PR		Theory		Practical		Total Marks
			TEE					CA	TEE	CA		
1	EN101E	English	Nil	03	00	02	04	70	30	50 [@]	25	175
2	EN102E	Communication Skills	Nil	03	00	02	04	70	30	50 [@]	25	175
3	MN101E	Industrial Management	Min.60 credits	04	00	00	04	70	30	Nil	Nil	100
4	EV101E	Environmental Science	Nil	01	01	00	02	70**	30	Nil	Nil	100
5	RD101E	Rural Development	Nil	00	00	02	01	Nil	Nil	50 [@]	25	75
Total				11	01	06	15	280	120	150	75	625

- No. of Compulsory Courses : 05
- No. of Optional Courses : Nil
- Abbreviations: TH – Theory ; PR- Practical; TU- Tutorial; TEE- Term End Examination; CA- Continuous Assessment
- 1TH Hr =1 Credit ; 1 TU Hr = 1 Credit ; 2 PR Hr = 1 Credit
- ** Online Examination
- @ Internal Practical Examination
- # External Practical Examination

8.12.2 Program Structure Level II: Basic Science Courses

Table 8.7. Program Structure Level II: Basic Science Courses

DIPLOMA IN TEXTILE MANUFACTURES												
Sr. No	Course Code	Course Title	Prerequisite courses/credits	Teaching Scheme (TH,TU,PR Hrs./Week)*			Total Credits*	Examination Scheme (Max. Marks)				
				TH	TU	PR		Theory		Practical		Total Marks
								TEE	CA	TEE	CA	
1	CA201E	Computer Applications	Nil	00	00	04	02	Nil	Nil	50 [#]	25	075
2	PH201E	Engineering Physics	Nil	04	00	02	05	70	30	50 [@]	25	175
3	CH204E	Applied Chemistry	Nil	04	00	02	05	70	30	50 [@]	25	175
4	MH201E	Engineering Mathematics	Nil	04	01	00	05	70	30	Nil	Nil	100
5	MH204E	Applied Mathematics	MH201E	04	01	00	05	70	30	Nil	Nil	100
Total				16	02	08	22	280	120	150	75	625

- No. of Compulsory Courses : 05
 - No. of Optional Courses : Nil
 - Abbreviations: TH – Theory ; PR- Practical; TU- Tutorial; TEE- Term End Examination; CA- Continuous Assessment
 - 1TH Hr =1 Credit ; 1 TU Hr = 1 Credit ; 2 PR Hr = 1 Credit
- ** Online Examination
 @ Internal Practical Examination
 # External Practical Examination

8.12.3 Program Structure Level III: Engineering Sciences and Technical Arts Courses

Table 8.8. Program Structure Level III: Engineering Sciences and Technical Arts Courses

DIPLOMA IN TEXTILE MANUFACTURES												
Sr. No	Course Code	Course Title	Prerequisite courses/credits	Teaching Scheme (TH,TU,PR Hrs./Week)*			Total Credits*	Examination Scheme (Max. Marks)				
				TH	TU	PR		Theory		Practical		Total Marks
								TEE	CA	TEE	CA	
1	ME302E	Engineering Graphics	Nil	02	00	04	04	Nil	Nil	50 [@]	25	075
2	WS301E	Workshop Practice	Nil	00	00	04	02	Nil	Nil	Nil	50	050
3	AM303E	Applied Mechanics	Nil	03	01	02	05	70	30	50 [@]	25	175
4	EE307E	Basic Electrical Technology	Nil	04	00	02	05	70	30	50 [@]	25	175
5	EC309E	Applied Electronics	Nil	04	00	02	05	70	30	50 [@]	25	175
6	TX301E	Fabric Structure and Design	Nil	02	00	04	04	Nil	Nil	50 [@]	25	075
7	TX302E	Advanced Fabric Structure ^{\$}	TX301E	03	00	04	05	70	30	50 [@]	25	175
Total				18	01	22	30	280	120	300	200	900

- No. of Compulsory Courses : 07
- No. of Optional Courses : Nil
- Abbreviations: TH – Theory ; PR- Practical; TU- Tutorial; TEE- Term End Examination; CA- Continuous Assessment
- 1TH Hr =1 Credit ; 1 TU Hr = 1 Credit ; 2 PR Hr = 1 Credit
- ** Online Examination
- @ Internal Practical Examination
- # External Practical Examination

8.12.4 Program Structure Level IV: Professional Courses

Table 8.9. Program Structure Level IV: Professional Courses

DIPLOMA IN TEXTILE MANUFACTURES												
Sr. No	Course Code	Course Title	Prerequisite courses/credits	Teaching Scheme (TH,TU,PR Hrs./Week)*			Total Credits*	Examination Scheme (Max. Marks)				
				TH	TU	PR		Theory		Practical		Total Marks
								TEE	CA	TEE	CA	
a) Core Courses												
1	TX401E	Cotton Opening and Cleaning	Nil	03	00	02	04	70	30	50 [@]	25	175
2	TX402E	Sliver formation	TX401E	03	00	04	05	70	30	50 [@]	25	175
3	TX403E	Roving and Yarn Formation	TX402E	03	00	04	05	70	30	50 [@]	25	175
4	TX404E	Yarn Preparation for Weaving	Nil	03	00	02	04	70	30	50 [@]	25	175
5	TX405E	Yarn Sizing and Loom	TX404E	03	00	02	04	70	30	50 [@]	25	175
6	TX406E	Dobby, Jacquard and Auto Loom	TX405E	03	00	04	05	70	30	50 [@]	25	175
7	TX407E	Fibre and Yarn Testing ^s	Nil	03	00	04	05	70	30	50 [#]	25	175
8	TX408E	Fabric Testing ^s	TX407E	03	00	04	05	70	30	50 [#]	25	175
9	TX409E	Textile Processing ^s	Nil	03	00	02	04	70	30	50 [@]	25	175
10	TX410E	Knitting Technology ^s	Nil	03	00	02	04	70	30	50 [@]	25	175
11	TX411E	Fibre Science and Technology	Nil	03	01	00	04	70 ^{**}	30	Nil	Nil	100
12	TX412E	Process Control in Spinning ^s	TX403E	03	00	04	05	70	30	50 [#]	25	175
13	TX413E	Process Control in Weaving ^s	TX406E	03	00	04	05	70	30	50 [#]	25	175
14	TX414E	Production, Planning and Organization ^s	TX403E and TX406E	03	00	04	05	70	30	50 [@]	25	175
Sub Total (a)				42	01	42	64	980	420	650	325	2375

8.12.5 Program Structure Level IV: Professional Courses (Project Courses)

Table 8.10. Program Structure Level IV: Professional Courses (Project Courses)

DIPLOMA IN TEXTILE MANUFACTURES												
Sr. No	Course Code	Course Title	Prerequisite courses/credits	Teaching Scheme (TH,TU,PR Hrs./Week)*			Total Credits*	Examination Scheme (Max. Marks)				
				TH	TU	PR		Theory		Practical		Total Marks
								TEE	CA	TEE	CA	
15	TX415E	Textile CAD	TX301E	00	00	04	02	NIL	NIL	50 [@]	50	100
16	TX416E	Enterprise Resource Planning	CA201E, and TX414E	00	00	04	02	NIL	NIL	50 [@]	50	100
17	TX417E	Industrial Project ^{\$}	60 credits	00	00	04	02	NIL	NIL	100 [#]	50	150
Sub Total (b)				00	00		06	Nil	Nil	200	150	350
c) Seminar and Industrial Training												
18	SE401E	Seminar	60 credits	00	00	02	01	NIL	NIL	50 [@]	50	100
19	ID403E	Industrial Training ^{\$}	60 credits	00	00	02	01	NIL	NIL	50 [@]	50	100
Sub Total (c)				00	00	04	02	Nil	Nil	100	100	200
Total (a) + (b) + (c)				42	01	58	72	980	420	950	575	2925

- No. of Compulsory Courses : 19
- No. of Optional Courses : 01
- Abbreviations: TH – Theory ; PR- Practical; TU- Tutorial; TEE- Term End Examination; CA- Continuous Assessment
- 1TH Hr =1 Credit ; 1 TU Hr = 1 Credit ; 2 PR Hr = 1 Credit
- ** Online Examination
- @ Internal Practical Examination
- # External Practical Examination

8.12.6 Program Structure Level V: Elective Courses

Table 8.11. Program Structure Level V: Elective Courses

DIPLOMA IN TEXTILE MANUFACTURES												
Sr. No	Course Code	Course Title	Prerequisite courses/credits	Teaching Scheme (TH,TU,PR Hrs./Week)*			Total Credits*	Examination Scheme (Max. Marks)				
				TH	TU	PR		Theory		Practical		Total Marks
								TEE	CA	TEE	CA	
a) Professional Electives												
1	TX501E	Advanced Yarn Manufacturing ^{\$}	TX403E	03	00	02	04	70	30	50 [@]	25	175
2	TX502E	Advanced Fabric Manufacturing ^{\$}	TX406E	03	00	02	04	70	30	50 [@]	25	175
(Any One from following)												
3	TX503E	Garment Technology	Nil	03	00	00	03	70	30	Nil	Nil	100
4	TX504E	Nonwoven Manufacturing	Nil	03	00	00	03	70	30	Nil	Nil	100
5	TX505E	Technical Textiles	Nil	03	00	00	03	70	30	Nil	Nil	100
6	TX506E	Apparel Merchandising	Nil	03	00	00	03	70	30	Nil	Nil	100
Sub Total (a)				09	00	04	11	210	90	100	50	450
b) Free Elective – Non-Technical												
1	FS501E	Finishing School	50 Credits	00	00	04	02	Nil	Nil	50	25	75
Sub Total (b)				00	00	04	02	Nil	Nil	50	25	75

8.12.7 Program Structure Level V: Elective Courses

Table 8.12. Program Structure Level V: Elective Courses

DIPLOMA IN TEXTILE MANUFACTURES												
Sr. No	Course Code	Course Title	Prerequisite courses/credits	Teaching Scheme (TH,TU,PR Hrs./Week)*			Total Credits*	Examination Scheme (Max. Marks)				
				TH	TU	PR		Theory		Practical		Total Marks
								TEE	CA	TEE	CA	
c) Free Electives Technical (Any one)				% Not offered for Program								
1	FE501E	Basic Building Drawing	Nil	00	00	04	02	Nil	Nil	50 [@]	25	75
2	FE 502E	RAC Maintenance	Nil	00	00	04	02	Nil	Nil	50 [@]	25	75
3	FE503E	Electrical Maintenance	Nil	00	00	04	02	Nil	Nil	50 [@]	25	75
4	FE504E	Hobby Electronics	Nil	00	00	04	02	Nil	Nil	50 [@]	25	75
5	FE505E	Basic Packaging Technology	Nil	00	00	04	02	Nil	Nil	50 [@]	25	75
6	FE506E	Industrial Metallurgical Practices	Nil	00	00	04	02	Nil	Nil	50 [@]	25	75
7	FE507E	Computer Network	Nil	00	00	04	02	Nil	Nil	50 [@]	25	75
8	FE508E	PC Architecture & Maintenance	Nil	00	00	04	02	Nil	Nil	50 [@]	25	75
	FE509E	Fabric Selection and Care %	Nil	00	00	04	02	Nil	Nil	50 [@]	25	75
9	FE510E	Two and Four Wheeler Technology	Nil	00	00	04	02	Nil	Nil	50 [@]	25	75
10	FE511E	Energy Conservation and Management	Nil	00	00	04	02	Nil	Nil	50 [@]	25	75
11	FE512E	Learning Ability Development	Nil	00	00	04	02	Nil	Nil	50 [@]	25	75
Sub Total				00	00	04	02	Nil	Nil	50	25	75
Total (a) + (b) + (c)				09	00	14	16	210	90	250	125	675

- No. of Compulsory Courses : 05 No. of Optional Courses : 13
- Abbreviations: TH – Theory ; PR- Practical; TU- Tutorial; TEE- Term End Examination; CA- Continuous Assessment
- 1TH Hr =1 Credit ; 1 TU Hr = 1 Credit ; 2 PR Hr = 1 Credit ** Online Examination @ Internal Practical Examination # External Practical

8.12.8 Program Structure Abstract

Table 8.13. Program Structure Abstract

		DIPLOMA IN TEXTILE MANUFACTURES										
Sr. No	Level	Course Title Prerequisite courses/credits	Teaching Scheme (TH,TU,PR Hrs./Week)*			Total Credits*	Credit Percentage (Approx.)	Examination Scheme (Max. Marks)				
			TH	TU	PR			Theory		Practical		Total Marks
								TEE	CA	TEE	CA	
1	I	General Studies	11	01	06	15	10%	280	120	150	75	625
2	II	Basic Science Courses	16	02	08	22	14%	280	120	150	75	625
3	III	Engineering Sciences and Technical Arts Courses	19	01	20	30	19%	350	150	300	200	1000
4	IV	Professional Courses	42	00	58	72	47%	980	420	950	575	2925
5	V	Elective Courses	09	00	12	15	10%	210	90	200	100	600
Total			96	05	106	154	100%	2030	870	1750	1025	5675

Above program structure is approved in PBOS meeting held on 06th April, 2016 for implementation from Academic session 2016-17.

8.13 Award of Class Courses

Table 8.14. Award of Class Courses

DIPLOMA IN TEXTILE MANUFACTURES												
Sr. No	Course Code	Course Title	Prerequisite courses/credits	Teaching Scheme (TH,TU,PR Hrs./Week)*			Total Credits*	Examination Scheme (Max. Marks)				
				TH	TU	PR		Theory		Practical		Total Marks
								TEE	CA	TEE	CA	
1	TX302E	Advanced Fabric Structure ^{\$}	TX301E	03	00	04	05	70	30	50@	25	175
2	TX407E	Fibre and Yarn Testing ^{\$}	Nil	03	00	04	05	70	30	50#	25	175
3	TX408E	Fabric Testing ^{\$}	TX407E	03	00	04	05	70	30	50#	25	175
4	TX409E	Textile Processing ^{\$}	Nil	03	00	02	04	70	30	50@	25	175
5	TX410E	Knitting Technology ^{\$}	Nil	03	00	02	04	70	30	50@	25	175
6	TX412E	Process Control in Spinning ^{\$}	TX403E	03	00	04	05	70	30	50#	25	175
7	TX413E	Process Control in Weaving \$	TX406E	03	00	04	05	70	30	50#	25	175
8	TX414E	Production Planning and Organization ^{\$}	TX403E and TX406E	03	00	04	05	70	30	50@	25	175
9	TX501E	Advanced Yarn Manufacturing ^{\$}	TX403E	03	00	02	04	70	30	50@	25	175
10	TX502E	Advanced Fabric Manufacturing ^{\$}	TX406E	03	00	02	04	70	30	50@	25	175
11	TX417E	Industrial Project ^{\$}	60 credits	00	00	04	02	Nil	Nil	100#	50	150
12	ID403E	Industrial Training ^{\$}	60 credits	00	00	02	01	Nil	Nil	50#	50	100
Total				30	0	38	49	700	300	650	350	2000

8.14 Curriculum at a Glance

Table 8.15. Curriculum at a Glance

SN	CRITERION	RESPONSE
1	Total No. of Courses in a Program	53
2	Total courses required	41
3	No. of courses having Theory papers	29
4	No. of courses having non Theory exam.	12
5	No. of General Studies Courses	5
6	No. of Basic Science Courses	5
7	No. of Engineering Science Courses	7
8	No. of Professional Core Courses	14
9	No. of Professional Elective Courses	3/6
10	No. of Professional Free Elective Courses	2/11
11	No. of Project Courses	3
12	No. of Seminar Courses	2
13	Total Credits (1 Th Hr = 1Credit & 2 Pr Hr = 1Credit)	154
14	Total Marks	5675
15	Proportion of Hours (Periods), Th : Pr	49:51 (approx.)
16	Proportion of Credits, Th : Pr	65:35 (approx.)
17	Proportion of Marks; Th : Pr	51:49 (approx.)
18	Total courses for Award of Class	12
19	Total theory paper courses for Award of Class	10
20	Total marks for Award of Class	2000

8.15 Course Flow Diagram

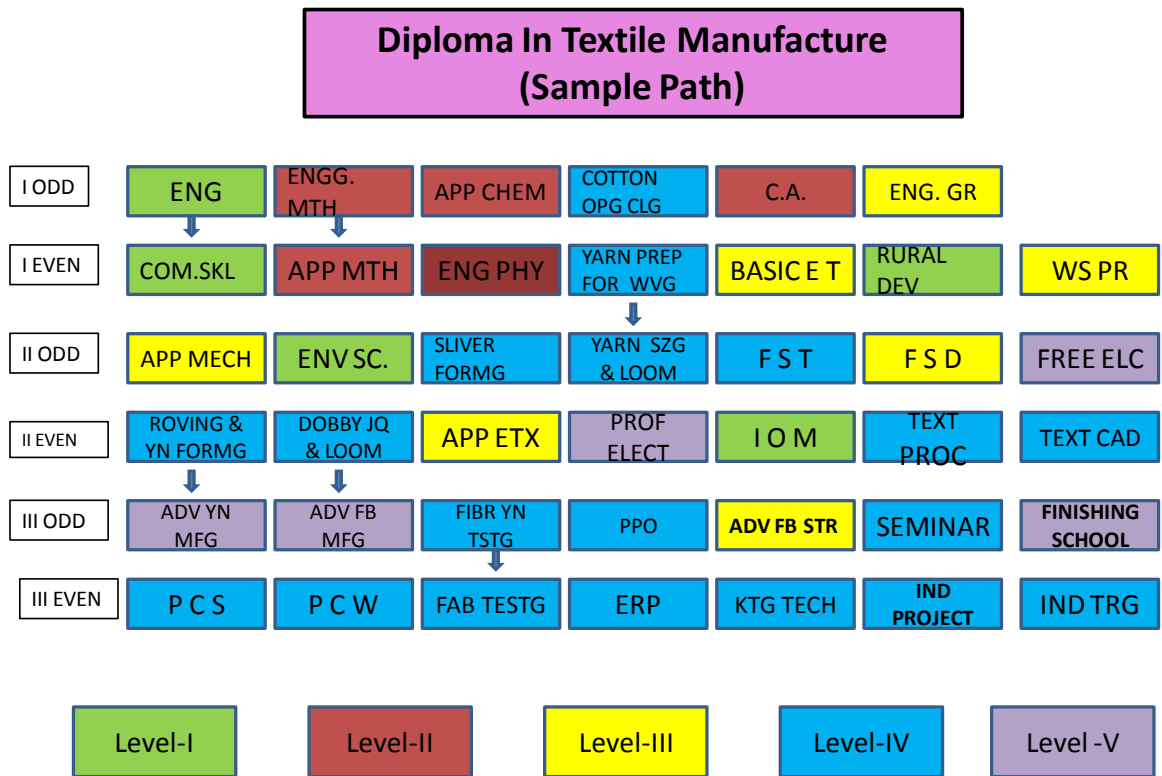


Figure 8.1. Course Flow Diagram

APPENDIX A

Curriculum

LEVEL - I

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN CE,ME,EE,EC,PK,MT,IT,AE,CM,TX,TR
LEVEL NAME	: GENERAL STUDIES
COURSE CODE	: EN101E
COURSE TITLE	: ENGLISH
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 03TU: 00; PR: 02(CLOCK HRs.)
TOTAL CREDITS	: 04(1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE	: 03 HRs
PR. TEE	: 02 HRs (Internal)
PT.	: 01 HR

❖ RATIONALE:

The basic structure of English through Grammar enhances Holistic development as an individual as well as their role in the world. While teaching this course, complete emphasis will be laid on enhancing expression of ideas in English by the students. Excellence in this language enables a technician to develop his professional career as well as a strong standing in society.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Construct grammatically correct sentences.
2. Express ideas effectively in oral and written form.
3. Enhance comprehending abilities.
4. Develop interest in and appreciate literature.
5. Use social skills and be conversant.
6. Speak sentences with correct intonations.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs
1. Application of Grammar	1. Identify grammatical rules to form correct sentences. 2. Use correct sentence pattern in writing and speaking. 3. Enrich vocabulary. 4. State and identify various tenses to be used in a situation.	1.1 Articles :Appropriate use of definite and indefinite articles 1.2 Prepositions: To use correct prepositions as per context. 1.3 Phrases: Combining words to form various phrases. 1.4 Tenses: Appropriate uses of tenses in given situations. 1.5 Voice: use of active and passive voice. 1.6 Narration: Conversion of direct and indirect speech.	12
2. Text	1. Present oral summary of topics read or heard. 2. Adjust speed of reading. 3. Follow oral instructions and interpret them to others 4. Present summary of topics read and heard.	2.1 Text: Learning to read fluently and to develop insight through prose and poetry. Selected prose and poetry prescribed in the text. 2.2 Prose: 1. Positive Thinking- By Stephen 2. Vision 2020- Dr. A.P.J. Abdul Kalam. 3.What India Wants: A.Our muddled Generation- DineshKumar. B. Employers want Employees not Exam results –Manish Sabharwal. 4. The Last Cab Ride- Kent Newburn 2.3 Poem: 1.Kalahandi-Jaganath Prasad Das 2.Money Madness-D.H. Lawrence 3. Where the mind is without fear- Rabindranath Tagore. 4. Voice of the unwanted Girl-Sujata Bhatt.	16
3. Success stories And Seen passages for Comprehension.	1. Take down lecture notes while listening. 2. Write single or multiple sentences. 3. Comprehend main ideas and reproduce them. 4. Ask pertinent question as well as to answer them.	3.1 Success stories:(selected Two success stories from text) 1."It happened in India" Kishor Biyani 2. Aditya Kumar Birla. 3.2 Comprehension: (Selected two passages from the text)	06

4. Vocabulary Building	1. Use word formation devices. 2. Use new words in sentences. 3. Read/write new words from various media. 4. Enrich vocabulary through reading.	4.1 Synonyms and Antonyms 4.2 One word substitution. 4.3 Using words and expressions appropriate to audience.(peers, superiors, subordinates and others)	04
5. Conversational Practice.	1. Use correct pronunciations 2. Pronounce the words correctly. 3. Speak sentences with correct intentions. 4. Use correct accent/stress for the words.	Sample situations for conversational practice. 5.1 Introducing yourself and others. 5.2 Meeting and parting. 5.3 Requests 5.4 Inquiries and information. 5.5 Asking, Giving and Refusing Permission. 5.6 Apologizing.	04
6 Writing Techniques.	1. Expand ideas into paragraphs 2. Prepare speeches as per situations 3. Connect multiple sentences.	6.1 Paragraph writing: Elaborate and expand ideas. 6.2 Speech writing: Welcome speech, Farewell speech, Introducing the guests and vote of thanks.	06
Total Hrs.			48

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practical's	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	Tense Busters -All levels(To be performed in language lab)	Application of Grammar)	04
2.	Reading and making notes	Prose	02
3.	Summarizing poems	Poetry	02
4.	Reading and making notes	Short stories	02
5	Reading and making notes	Prose	02
6	Comprehending passage	Comprehension passage	02
7	Issues in English(to be performed in language lab)	Vocabulary building	06
8	Formal conversations-Telephonic ,Video conferencing	Conversation practice	02
9	Introducing –self and others	Conversation practice	02
10	Observation of oratory speeches of renowned speakers	Conversation practice	02
11	Preparing speech and presenting	Writing techniques	02
12	Writing a paragraph on given topic	Writing techniques	02
Skill Assessment			02
Total Hrs.			32

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Application of Grammar	06(04)	06(04)	00(00)	16(12)
02	Text	04(04)	16(04)	06(00)	26(08)
03	Short stories	04(04)	08(04)	00(00)	08(04)
04	Vocabulary Building	04(00)	04(04)	00(00)	08(04)
05	Conversational Practice	00(00)	00(00)	06(06)	06(06)
06	Writing Techniques	00(00)	00(00)	06(06)	06(06)
	Total	18(12)	34(16)	18 (12)	70 (40)

R – Remember

U – Understand

A – Analyze / Application

❖ QUESTION PAPER PROFILE FOR THEORY PAPER:

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	U	2	1	U	2	1	U	2	1	U	2	1	U	2	1	U	2	5/7
	1	R	2																
02	2	U	4	2	R	4	2	R	4	2	U	4	2	U	4				3/5
03	3	U	4	3	U	4	2	R	4	2	R	4	3	U	4				3/5
04	4	R	4	4	A	4	1	R	4	1	R	4	1	U	4				3/5
05	5	A	6	5	A	6	5	U	6										2/3
06	6	A	6	6	A	6	6	U	6										2/3

T= Unit/Topic Number

L= Level of Question

M= Marks

R-Remember

U-Understand

A-Analyze/ Apply

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Performance	05
2	Overall presentation of given assignment	05
3	Viva voce	10
4	Activity	05
	TOTAL	25

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	3	-	3	-	-	-	-	-	3	3	-	-
2	3	-	3	-	-	-	-	-	3	-	-	-
3	-	-	3	-	-	-	-	-	3	3	-	-
4	-	-	3	-	-	-	-	-	-	-	-	-
5	-	-	3	-	-	-	1	1	3	3	-	-
6	3	-	3	-	-	-	-	1	3	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1	Positive Thinking	Stephen, Inspirational Stories ,June 2011	-
2	Vision 2020	Dr.A.P.J. Abdul Kalam 'Prism', Macmillan Publication.	1403928282
3	What India Inc-	Dinesh Kumar, Manish Sabharwal, Golden Harvest,	9788125059523
4	The Last Cab Ride	'Life',by Stephen	-
5	Kalahandi	Jaganath Prasad Das, Reflection on vital issues', by P.J.George	9788125041764
6	Money Madness	D.H.Lawrence by P.J.George Orient Blackswan 2010	9788125041764
7	Where the mind is without fear	Rabindranath Tagore Prism, Macmillan Publication	1403928282

8	Voice of the unwanted girl	Sujata Bhatt Prism, Macmillan Publication	1403928282
9	High School English Grammar and Composition	Wren and Martin Revised by Dr.N.D.V. Prasada Rao, S.Chand Publication.	81-219-0009-3
10	Business communication	Urmila Rao Himalaya Publication, 2011	81-8318-438-3
11	Contemporary English Grammar-structure and composition	David Green Revised Edition,2004 Himalaya Publication	033392183-6
12	Interactive English	S.K.Gangal, Revised Edition 1997 Allied Publishers	81-7023-678-9
13	Applied English Grammar and composition.	Dr. P.C. Das, 2013, New Central Book Agency.	978-81-7381-542-3
14	English for Practical Purposes	Z. N. Patil, B.S. Valke	033935098

❖ **E-REFERENCES:**

www.talkenglish.com-grammar , assessed on 12th March, 2016

www.edufind.com-englishgrammar ,assessed on 12th March, 2016

www.perfect-english-grammar.com, assessed on 12th March, 2016

www.yosuccess.com, assessed on 13th March, 2016

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Dr. Sadiya Raza	Lecturer in English & Coordinator	Government Polytechnic, Nagpur.
2.	Dr. Nutan Chotai	Expert, Head of Dept.	LAD College, Nagpur.
3.	Mrs. K.N. Deshmukh	Expert, Head of Humanities	SDMP, Nagpur.
4.	Dr. Shilpa Sarode	Expert, Asst. Professor	LAD, Nagpur
5.	Mrs. M.M. Machale	Lecturer in English	Government Polytechnic, Nagpur.
6.	Ms. Humeera Quraishi	Visiting Lecturer in English	Government Polytechnic, Nagpur.
7.	Ms. Marlyn Fernandes	Visiting Lecturer in English	Government Polytechnic, Nagpur.
8.	Ms. Nazish Ahmed	Visiting Lecturer in English	Government Polytechnic, Nagpur.

(Member Secretary PBOS)

(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA INCE,ME,EE,EC,PK,MT,IT,AE,CM,TX,TR
LEVEL NAME	: GENERAL STUDIES
COURSE CODE	: EN102E
COURSE TITLE	: COMMUNICATION SKILLS
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 03 TU: 00; PR: 02(CLOCK HRs.)
TOTAL CREDITS	: 04(1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE EXAM.	: 03 HRs
PR. TEE EXAM	: 02 HRs (Internal)
PT. EXAM	: 01 HR

❖ RATIONALE:

In this present competitive scenario, proficiency in communication skills is one of the basic needs of technical students. A diploma holder is therefore expected to meet the challenges of communicating with his peers, superiors, subordinates and clients. Communication skills will help him towards achievement of perfection.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Apply concepts of communication in the given situation.
2. Modify language skills.
3. Execute requisite qualities as per industry requirements.
4. Compose official documentation.
5. Participate in and conduct group discussions and meetings effectively
6. Use correct pronunciations and intonations.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs
1. Communication	1. Identify modern concept of communication. 2. Breaks down barriers to communicate effectively. 3. Modify appropriate body language. 4. Derive confidence while conversing.	1.1 Definition, Process, Types: Verbal-Non Verbal, Formal-Informal, Upward-Downward, Horizontal. 1.2 Barriers of communication: Physical, Mechanical, Psychological, Language, Status . Ways to overcome barriers. 1.3 Selection of proper channels of communication. 1.4 Non-verbal communication in detail: Body language, Eye contact, Dress and appearance, color, sound, Gestures, Postures, Pictorial representations.(Maps, Charts ,Graphs)	14
2. Inculcation of various generic skills.	1. Identify their receptive skills to strengthen their productive skills. 2. Derive listening abilities. 3. Use detailed write-ups 4. Participate in conversations.	2.1 Listening and reading skills- Importance of listening skills, levels of listening, Types of reading, Phonetics, IPA 2.2 Speaking and writing – Importance of Pronunciation, Importance of Debate.	08
3. Areas of self-Development.	1. Identify strengths and weakness. 2. Classify different types of motivation in one's life. 3. Plan presentations properly. 4. Modify leadership qualities.	3.1 Aims of self-development, self-awareness with respect to strength and weakness, How to overcome weakness for acquiring self-confidence. 3.2 Motivation –Introduction, Definition, Types with example. 3.3 Presentation skills – Parameters, Appearance, use of body language, Eye contact, content preparation, Depiction of interest of audience. 3.4 Time management- Importance, Process of time planning. 3.5 Team Building and Leadership qualities.	10
4. Development of	1. Plan group discussion. 2. Relate behavior during and post	4.1 Interview Techniques: Preparation, Behavior during interview, post interview. 4.2 Group discussion: Being the first	06

soft skills.	interview. 3. State and justify one's abilities.	member, how to make a general discussion, to give a concrete shape to discussion, purpose.	
5. Business correspondence	1. Identify various types of letters. 2. List down one's qualities by writing resume. 3. Use various reports to express ideas effectively in English	5.1 Letters: Job application and Resume writing Leave letter, Sales letter, Enquiry letter, order letter, complaint letter. 5.2 Report writing: Progress, Accident, Trouble, Feasibility. 5.3 Notices, circular, Memorandum-mail messages.	10
Total Hrs.			48

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practic al's	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	Master the skill of face -to -face communication	Communication	02
2.	Sharpen one's body language while communicating with the help of Extempore/Impromptu.		02
3.	Demonstrate through role-play skills of a good communicator like RJ, News reader, commentator.		04
4.	Master the art of reading, writing, listening skill(to be performed in Language lab using software)	Inculcation of various Generic skills	06
5	Execute the art of Debate		02
6	Transcribe the given words phonetically		02
7	Master the skill of oral presentation by presenting a topic through PowerPoint presentation.	Areas of self-development.	02
8	Demonstrate leadership qualities		02
9	Manipulate Group Discussion by active participation	Development of soft skills	02
10	Build interview techniques through Mock Interview		02
11	Implement the art of writing E-mails and reports	Business correspondence	02
12.	Implement the art of writing Formal drafting's by preparing resume, letters.		02
Skill Assessment			02
Total Hrs.			32

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Communication	06(06)	04(04)	06(04)	16(14)
02	Inculcation of various Generic skills among future engineers	02(00)	08(10)	00(06)	10(16)
03	Areas of self Development	06(00)	06(06)	06(00)	18(06)
04	Development of soft skills	02(04)	08(00)	00(00)	10(04)
05	Business Correspondence	00(00)	08(04)	08(00)	16(00)
	Total	20(08)	30(20)	20 (12)	70 (40)

R – Remember

U – Understand

A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER:

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	2	R	2	3	R	2	4	R	2	5	A	2	3	U	2	5/7
	1	R	2																
02	1	R	4	1	R	4	2	U	4	2	U	4	5	U	4				3/5
03	3	R	4	4	R	4	2	U	4	3	U	4	5	U	4				3/5
04	1	U	4	5	U	4	4	U	4	1	A	4	4	U	4				3/5
05	2	A	6	3	A	6	3	U	6										2/3
06	1	A	6	5	A	6	2	U	6										2/3

T= Unit/Topic Number

L= Level of Question

M= Marks

R-Remember

U-Understand

A-Analyze/ Apply

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Performance	05
2	Overall presentation of given assignment	05
3	Viva voce	10
4	Activity	05
	TOTAL	25

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	2	-	3	-	-	-	-	3	3	3	-	-
2	-	-	3	-	-	-	-	-	3	-	-	-
3	-	-	3	-	-	-	-	3	3	3	-	-
4	2	-	3	-	-	-	-	-	3	3	-	-
5	-	-	3	-	-	-	-	3	3	3	-	-
6	-	-	-	-	-	-	-	3	3	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Professional Communication skills	S.R.Pravin, S.Chand Publications	81-219-2092-02
2.	Developing Communication skills	Macmillan Publications, Revised Edition, 2011	0333929195
3.	Business communication and Soft skills.	G.S.R.K , Himalaya Publication, First Edition, 2009	978-81-8488-596-5
4.	Secret of face to face communication.	Peter Urs, Bender, Macmillan Publication	0333937139
5.	Technical communication principles and practices	Meenakshi Raman, Prakash Singh, Oxford University Press,	0-19-567695-5
6	Effective English Communication	Krishna Mohan, Raman Tata McGraw Hills,	13978-0-19-566804-9
7	Modern Commercial Correspondence	R.S.Pillai, Bhagwati, S.Chand & Co.	812190519-2

❖ **E-REFERENCES:**

www.mindtools.com.au, assessed on 12th March, 2016

www.interviewbest.com, assessed on 12th March, 2016

www.skillsyouneed.com-presentationskills, assessed on 12th March, 2016

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Dr. Sadiya Raza	Lecturer in English&Coordinator	Government Polytechnic, Nagpur.
2.	Dr. Nutan Chotai	Expert, Head of Dept.	LAD College, Nagpur.
3.	Mrs. K.N. Deshmukh	Expert, Head of Humanities	SDMP, Nagpur.
4.	Dr. Shilpa Sarode	Expert, Asst.Professor	LAD, Nagpur
5.	Mrs. M.M. Machale	Lecturer in English	Government Polytechnic, Nagpur.
6	Ms. Humeera Quraishi	Visiting Lecturer in English	Government Polytechnic, Nagpur.
7.	Ms. Marlyn Fernandes	Visiting Lecturer in English	. Government Polytechnic, Nagpur.
8.	Ms. Nazish Ahmed	Visiting Lecturer in English	Government Polytechnic, Nagpur.

(Member Secretary PBOS)

(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN ME/EE/EC/CM/IT/AE/MT/PK/TX
LEVEL NAME	: GENERAL STUDIES
COURSE CODE	: MN101E
COURSE TITLE	: INDUSTRIAL MANAGEMENT
PREREQUISITE	: 50 Credits
TEACHING SCHEME:	TH: 04; TU: 00; PR: 00
TOTAL CREDITS	: 04 (1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE	: 03 HRs
PR. TEE	: NIL
PT.	: 01 HR

❖ RATIONALE:

Managing personnel and scarce resources in any organization is one of the primary & most challenging functions in industries. Scientific Management studies have evolved techniques for the same. The success of an enterprise depends upon how effectively the manpower is organized to work. The students of engineering who will be joining as technicians in the industrial organization are expected to have preliminary information about these said procedures

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Illustrate various forms of organization and its necessity and different aspects of entrepreneurship.
2. Analyze different sources of finance for industry to fulfill capital needs.
3. Interpret principles of human resource management, safety engineering and supervisory management along with various industrial acts
4. Illustrate various functions of marketing management and inventory control.
5. Calculate various cost of production, selling price of a product and its depreciation.
6. Analyze concept of TQM and modern techniques of quality control.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1.Introduction to Management & Entrepreneurship	1. Define Management, Organization, Administration and Entrepreneurship. 2. Compare Management, Organization, Administration. 3. Interpret appropriate type of ownership. 4. Carry out different methods of selection of organization. 5. Define Function of Management. 6. Describe Entrepreneurial qualities/traits. 7. Acquire industrial work culture 8. Describe successful entrepreneurs 9. Select Government subsidies	1.1 Definitions: Management, Organization, Administration and Entrepreneurship. Forms of ownership: Proprietorship, Partnership, Joint stock co. 1.2 Co-operative sector, Public sector, Government Undertaking, Advantages, limitations & Application of each type, comparison between different forms 1.3 Types of Organization: Line, Functional, line & staff organization, Advantages, limitations & Applications of each type, comparison between different types. 1.4 Functions of Management: - Forecasting, Planning, Organizing Directing, Motivating, Controlling, Coordinating, Decision-making, 1.5 Principles of management, Levels of management - Function of each level. 1.6 Entrepreneurship: Concept, Types of Entrepreneur, Characteristics of Entrepreneur, Women entrepreneurship, problem faced by women entrepreneur. 1.7 Case studies on successful entrepreneurs 1.8 Government subsidies for entrepreneur: Expert lecture on it. (No questions should be asked on the subtopic 1.7 & 1.8)	12
2.Financial Management	1. State the need and sources of finance. 2. Define and differentiate Shares and debentures. 3. Construct Break Even point in an Industry. 4. Analyse Break even point 5. Calculate E.O.Q. 6. Compare types of capital. 7. Acquire basics & financial Management techniques.	2.1 Need of Finance and Sources of finance for enterprises -Short term, Medium term and long term sources. 2.2 Shares, debentures, types of shares and Comparison between shares & debentures 2.3 Break Even Analysis- Importance of Breakeven point, E.O.Q. (numerical on EOQ) 2.4 Types of capital: fixed and working capital	10

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
3. Human Resource Management	1. State Concept, aim,& objectives of HRM. Describe Functions of HRM. 2. Interpret the need of welfare & safety, Industrial Hygiene. 3. Define functions of Supervisors. 4. Identify&/choose proper style of supervision. 5. Describe industrial act	3.1 Concept, aim , & objectives of HRM. 3.2 Functions of HRM: planning, organizing, staffing, recruitment, education & training- need, methods of training, , Motivation, controlling, compensation, integration and maintenance. Labour welfare , Industrial relations 3.3 Safety engineering: need, organization, committee, programme, instructions & training. Accidents: causes & prevention. 3.4 Characteristics of supervisors, functions of supervisors and styles of supervision& its advantages and limitations. 3.5 Industrial act: Need, Factory act 1948, ESI act, Workmen compensation act only	10
4. Marketing and inventory management	1. Describe the activities of Marketing Management. 2. State inventory management technique. 3. Use marketing strategies. 4. Select sales promotion and media	4.1 Definition of Market, Functions of Marketing Department 4.2 Marketing strategies, Marketing environment, Consumer behavior, Market research, Market survey, marketing mix. 4.3 Sales forecasting, Sales promotion, advertising, media selection. 4.4 Definition of inventory & inventory control. 4.5 Types of inventory items in industries, ABC and VED analysis only	12
5. Estimation and Costing	1. Define & calculate various cost and expenses involving in Product manufacturing. 2. Calculate the selling price of product. 3. Describe balance sheet. 4. Define& compare depreciation and obsolescence. 5. Describe& Calculating depreciation.	5.1 Product cost determination, Direct Cost and Indirect Cost, Material Cost And Labour Cost, Expenses- Factory and Overheads. 5.2 Determination of Selling Price of product- Profit and Loss Statement, Balance sheet description. 5.3 Depreciation &, Obsolescence- Concept and Comparison. 5.4 Methods of Calculating depreciation- straight line, reducing balance, annuity, sinking fund & sum of the digit methods. (Simple Numericals on subtopic 5.1, 5.2 & 5.4)	10

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
6. Total Quality Management	1. Define terms related to TQM 2. Describe various quality control techniques. 3. Interpret importance of quality circle and ISO 9000 4. Compare ISO9000 and TQM	6.1 Concept and definition of Quality, Quality Control, Quality Conformance and Quality Assurance. 6.2 TQM- Concept and Objectives, Process 6.3 Quality control techniques: Lean Manufacturing -JIT,5”S”, Six sigma, Kaizen, BPR 6.4 Quality Circle and ISO 9000, ISO 14000, ISO 9001: 2015, ISO 14001: 2015, Difference between ISO9000 and TQM,	10
Total Hrs.			64

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
Nil			

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01.	Management	04(04)	10(04)	00(00)	14(08)
02.	Financial Management	04(00)	04(06)	04(00)	12(06)
03.	Human Resource Management	02(00)	04(06)	06(00)	12(06)
04.	Marketing And Inventory Management	04(04)	06(00)	00(04)	10(08)
05.	Estimation And Costing	06(04)	04(02)	02(00)	12(06)
06.	Total Quality Management	04(04)	06(00)	00(02)	10(06)
	Total	24(16)	34(18)	12 (06)	70(40)

R – Remember U – Understand A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER:

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	1	R	2	2	R	2	2	R	2	3	R	2	1	A	2	5/7
	1	R	2																
02	1	U	4	2	A	4	2	U	4	1	A	4	4	A	4				3/5
03	4	R	4	3	U	4	5	R	4	4	U	4	5	U	4				3/5
04	5	A	4	5	U	4	6	R	4	6	U	4	6	A	4				3/5
05	3	A	6	4	U	6	2	U	6										2/3
06	1	U	6	6	U	6	3	A	6										2/3

T= Unit/Topic Number

L= Level of Question

M= Marks

R-Remember

U-Understand

A-Analyze/ Apply

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3, 4,5,6
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3, 4,5,6
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3, 4,5,6
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	--	--	--	--
		Journal Writing		Continuous	--	--	--	--
				TOTAL	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
	Nil	

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:****For Mechanical Engineering Program:**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	3	–	–	–	–	–	–	–	–	3	3	–
2	3	–	–	–	–	–	–	–	–	3	3	–
3	3	–	–	–	3	2	3	–	–	3	3	–
4	3	–	–	–	3	–	3	–	–	3	3	–
5	3	–	–	–	3	–	3	–	–	3	3	2
6	3	–	–	–	3	2	3	–	–	3	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

For Other than Mechanical Engineering Program:

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	3	–	–	–	–	–	–	–	–	3	–	–
2	3	–	–	–	–	–	–	–	–	3	–	–
3	3	–	–	–	3	2	3	–	–	3	–	–
4	3	–	–	–	3	–	3	–	–	3	–	–
5	3	–	–	–	3	–	3	–	–	3	–	–
6	3	–	–	–	3	2	3	–	–	3	–	–

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Industrial Engineering & Management	T.R.Banga & S.C.Sharma, Khanna Publishers, Edition-25, 20142	10: 81-7409-078-9 13:978-81-7409-078-9
2.	Industrial Engineering And Management	O.P. Khanna, Dhanpat Rai, New Delhi, 1980	81-885-9777-5
3.	Industrial organization and management	Lawrence L Bethel & James L Riggs, New York, McGraw-Hill [1971], 6 th , 1979	09-322-3849-1
4.	Industrial Management	I.K.Chopde & A.M.Sheikh, S.Chand & Co. Ltd, Delhi, 2 nd , 1999	81-219-1480-9
5.	Industrial engineering: Organization and management	Tara Chand, Publisher: Nem Chand, 5 th , 1982	B0007BSSB0
6.	Engineering Economics	Tara Chand, Publisher: Nem Chand, 14 th , 2014	81-85240-82-5
7.	Entrepreneurial Development	S.S.Khanka, S.Chand & Co. Ltd, Delhi, 1 st , 1999, reprint 2006	81-219-1801-4

❖ **E-REFERENCES:**

- <http://www.free-management-ebooks.com/index.htm> , assessed on 22th March 2016 .
- <https://www.youtube.com/watch?v=oQ1OTaJ9Sfc&list=PLB628C837430CB736&index=3> assessed on 23th March 2016
- <https://www.youtube.com/watch?v=2PkrT1ko3Yk&list=PLB628C837430CB736&index=10> assessed on 24th March 2016
- <http://www.slideworld.com/pptslides.aspx/industrial-management> assessed on 24th March 2016
- http://www.powershow.com/view/e4cd2mMwY/Industrial_Organization_I_powerpoint_ppt_presentation assessed on 25th March 2016

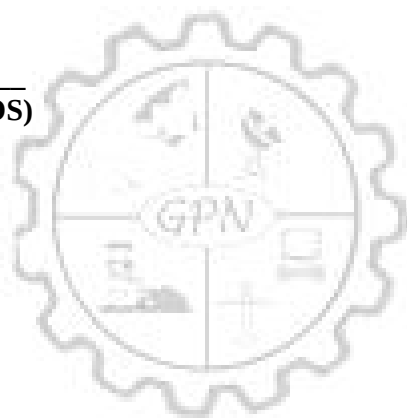
❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

Nil

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. V.S Ikhar	Lecturer in Mechanical Engineering	Government Polytechnic, Nagpur.
2.	Mrs. R A Gadekar	Lecturer in Mechanical Engineering	Government Polytechnic, Nagpur.
3.	Mr. G. H. Dahole	Lecturer in Mechanical Engineering	Government Polytechnic, Nagpur.
4.	Er. A.M.Onkar	Chief Executive Officer	Onkar Furnitures, MIDC, Nagpur
5.	Shri. G.F.Potbhare	Principal	NIT, Polytechnic, Nagpur
6.	Dr.S.S.Baraskar	Lecturer in Mechanical Engineering	Govt. Polytechnic, Arvi

(Member Secretary PBOS)



(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN CE/ME/EE/EC/CM/IT/AE/PK/MT/TX/TR
LEVEL NAME	: GENERAL STUDIES
COURSE CODE	: EV101E
COURSE TITLE	: ENVIRONMENTAL SCIENCE
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 01; TU: 01; PR: 00 (CLOCK HRs.)
TOTAL CREDITS	: 02 (1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE	: 01 Hr. (Objective Type Online Examination)
PR. TEE	: NIL
PT.	: 15 MINUTES (Objective Type offline Examination)

❖ RATIONALE:

The world today is facing the biggest challenge of survival. Degradation of ecosystem, depletion of natural resources, increasing levels of pollution, poses major threat to the survival of mankind. The need of the hour, therefore, is to concentrate on the area of environmental science, which shall provide an insight into various environment related issues.

Environmental science is an interdisciplinary academic field that integrates physical and biological sciences, with the study of the environment. It provides an integrated, quantitative, and interdisciplinary approach to the study of environmental systems & gives an insight into solutions of Environmental problems

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Define the terms related to Environmental Studies.
2. Identify natural resources and resolve problems associated with them.
3. Identify alternate energy resources and use them efficiently during their engineering practices.
4. Develop habits which will cause less harm to environment
5. Analyze key issues about environment and create public awareness about those environmental issues.
6. Follow environmental ethics as lifelong learning.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs .
1. Earth Systems and Resources	1. Name the historical events of earthquakes, volcanoes, Tsunami, cyclone & landslides in the world. 2. Identify problems associated with soil, water 3. Define weather and climate. 4. Analyze the global water problems.	1.1 Earth Science: Concepts of Geologic time scale; earthquakes, volcanoes , Tsunami , cyclone & landslides 1.2 The Atmosphere: Weather and climate; the Coriolis Effect 1.3 Global Water Resources and Use: Present scenario, surface and groundwater issues; global problems; and its conservation. 1.4 Soil : soil erosion and other soil problems; methods of soil conservation	02
2. Concept of Biodiversity	1. Define Biodiversity 2. List Levels of biodiversity 3. Define and list the biodiversity hotspots 4. List the endangered species 5. Prepare a report on value of Biodiversity 6. Suggest methods /steps for Biodiversity conservation	2.1 Definition of Biodiversity 2.2 Levels of biodiversity 2.3 Value of biodiversity 2.4 Threats to biodiversity, loss of biodiversity (biodiversity hotspots) 2.5 Conservation of biodiversity (modern methods of biodiversity conservation)	02
3. Energy Resources and Consumption	1. Match the energy forms projects 2. List various forms of energy 3. State advantages and disadvantages of forms of energy 4. Select appropriate solutions of Efficient Use energy 5. Utilize techniques for energy consumption to reduce impact on environment.	3.1 Energy Consumption history 3.2 Present global energy use, Future energy needs 3.3 Energy forms:(conventional and non conventional) 3.4 Energy Conservation 3.5 Renewable Energy: Solar energy; solar electricity; biomass; wind energy; ocean waves and tidal energy; geothermal	03
4. Pollution	1. Define pollution and pollutants 2. List the types of pollutants. 3. Identify the Pollutants and their sources 4. Develop habits to reduce pollution 5. State the standard / limiting/ controlling values	4.1 Definition of pollution. 4.2 Air pollution: Definition, Classification, sources, effects, Prevention and ambient air quality standards. 4.3 Water Pollution: Definition, Classification, sources effects, Prevention And WHO and BIS water quality standards.	04

	of various types of pollution.	4.4 Soil Pollution/land pollution: Definition, sources, effects, prevention 4.5 Noise Pollution: Definition, sources, effects, prevention. 4.6 Biomedical Waste and E-Waste -- Origin, Effects and control Measures. 4.7 CPCB and MPCB norms and roles and responsibilities.	
5 Social Issues and Environment	1. Define sustainable development 2. Evaluate sources of Green house effect, acid rains, Global warming 3. List the incidences of Nuclear Accidents,	5.1 Concept of development, sustainable development 5.2 Watershed management , rain water harvesting 5.3 Global Warming, greenhouse effect; ozone depletion, relevant laws and treaties 5.4 Nuclear Accidents and Holocaust: Basic concepts and their effect on climate, , relevant laws and treaties	03
6. Environmental Education	1. Differentiate between formal and non formal education 2. List the various acts and their provisions 3. Develop awareness about environment.	6.1 Formal and non-formal education 6.2 Role of Govt. and Non-Govt. Organization 6.3 Indian constitutional provisions regarding the environment. Brief description of the following acts and their provisions: Environmental Protection Act and Prevention of Water, air and noise Pollution Act. 6.4. Concept EIA and environmental Ethics	03
Total Hrs.			16

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Prepare report on Loss of biodiversity, its conservation and also describe biodiversity hotspots.	Concept Of Biodiversity	4
2	Prepare report on use of various renewable energy sources.	Energy Resources And Consumption	4
3	Group discussion and Assignment on article collection from news papers, magazines and internet on local environmental pollution.	Pollution	4
4	Prepare report on case study of Industrial/Nuclear/any other Disaster in India.	Social Issues And Environment	4

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Earth Systems And Resources	02(00)	04(00)	02(00)	08(00)
02	Concept Of Biodiversity	04(00)	08(00)	02(00)	14(00)
03	Energy Resources And Consumption	04(00)	08(00)	04(06)	16(00)
04	Pollution	04(00)	10(04)	06(00)	20(04)
05	Social Issues And Environment	02(00)	04(00)	00(00)	16(12)
06	Environmental Education	02(00)	02(00)	02(00)	06(00)
	Total	18(00)	36(00)	16 (00)	70 (00)

R – Remember

U – Understand

A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER:

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			Bit 7		
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M
01 To 35	1	R	2	2	R	2	3	R	2	4	R	2	1	U	2	2	R	2	1	U	2
	3	U	2	2	A	2	1	A	2	2	U	2	3	R	2	4	U	2	2	U	2
	4	A	2	4	U	2	4	U	2	5	R	2	2	U	2	3	U	2	4	R	2
	2	U	2	3	U	2	5	R	2	4	U	2	3	U	2	5	U	2	3	A	2
	4	U	2	3	A	2	4	A	2	6	R	2	6	U	2	6	U	2	4	A	2

T= Unit/Topic Number

L= Level of Question

M= Marks

R-Remember

U-Understand

A-Analyze/ Apply

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3, 4,5,6
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3, 4,5,6
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Online Examination Report	1, 2, 3, 4,5,6
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	--	--	--	--
		Journal Writing		Continuous	--	--	--	--
				TOTAL	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

Nil

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (COs)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	3	--	--	--	3	3	3	3	--	3	-	-
2	3	--	--	--	--	3	--	--	--	3	-	-
3	3	--	--	--	3	3	--	--	--	3	-	-
4	3	--	--	--	3	3	3	3	--	3	-	-
5	--	--	--	--	3	3	3	3	2	3	-	-
6	--	--	--	--	3	--	3	3	2	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Environmental studies	Oxford University Press, New Delhi. 2011	0-19-807228-2
2.	Environmental Science	Y.K. Singh, New Age International, New Delhi	8122418481, 9788122418484
3.	A Text Book Of Environmental Science	Arvind Kumar, APH Publishing, New Delhi	817648590X, 9788176485906
4.	Environmental Engg	A Kamla & D.L.Kanth Rao, Tata Mc Graw-Hill, New Delhi	0-07-451708-2
5.	A Textbook of Environmental Studies	Shashi Chawla, Tata Mc Graw-Hill, New Delhi	9781259006388

❖ **E-REFERENCES:**

1. https://en.wikipedia.org/wiki/Lists_of_nuclear_disasters_and_radioactive_incident_s, accessed on 20 January 2016
2. www.legalserviceindia.com/articles/noip.htm accessed on 18 March 2016
3. <https://prezi.com/8mnz--ldkybc/apes-unit-1-earth-systems-resources/> accessed on 23 March 2016
4. <http://www.conserve-energy-future.com/AlternativeEnergySources.php>, 18 March 2016

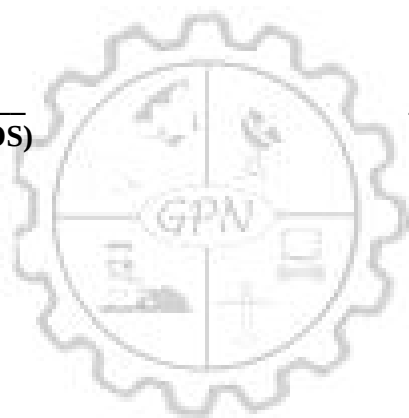
❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

Nil

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1	Dr. S J Patil	Head of Civil Engineering, (I Shift)	Government Polytechnic, Nagpur.
2	R N Giradkar	Head of Civil Engineering, (II Shift)	Government Polytechnic, Nagpur.
3	N. U Sulbhewar	Lecturer in Civil Engineering	Government Polytechnic, Nagpur.
4	B. R. Ambade	Lecturer in Civil Engineering	Government Polytechnic, Nagpur.
5	D. A. Khandare	Lecturer in Civil Engineering	Government Polytechnic, Nagpur.
6	Mr. M. R. Shelote	Consultant Engineer	M R Associates, Nagpur
7	Dr. R. N. Khapre	Associate Professor	Ramdeobaba College of Engineering and Management, Nagpur
8	Mr. A. J. Fulzele	Assistant Secretary (Tech.)	MSBTE, RO, Nagpur

(Member Secretary PBOS)



(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN CE/ME/EE/EC/CM/IT/AE/PK/MT/TX/TR
LEVEL NAME	: GENERAL STUDIES
COURSE CODE	: RD101E
COURSE TITLE	: RURAL DEVELOPMENT
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 00; TU: 00; PR: 02 (CLOCK HRs.)
TOTAL CREDITS	: 01(1TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE	: NIL
PR. TEE	: 02 HRs (Internal)
PT.	: NIL

❖ RATIONALE:

India is a rural developing country. About 70 percent of the total inhabitants are living in rural area. The development of India as a whole cannot be possible without development of the rural areas. The Central and state Governments tried to develop rural area through various welfare, health, economic, and social schemes. But it is the moral duty of each urban person to think about the development of rural area.

Young students are said to be new Nation. Therefore, this subject has been introduced so that the students should aware about the rural scenario in India. They should think and work for the overall rural development as per the development indicators prescribed at International level. They should write, and work for the Rural – Urban Linkage to upgrade the rural level.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Interpret Indian development indicators with International level.
2. Use and record questionnaire for rural survey.
3. Apply engineering knowledge for rural economy.
4. Suggest suitable scheme for rural development.
5. Prepare sustainable development plan for rural development.
6. Create suitable environment in rural area for development of every individual.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
NIL			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Write report of Development, Indicators of development, Rank of India in various development indexes (Individual task). Report includes: • Development, Modern Concepts, Indicators of development, • Importance, Scope and Objectives of RD. • Agriculture development, Agricultural allied development, Social and Human Development. • Rank of India in Human development index, Water and Sanitation Index, Shelter index, Education to all indexes, Health and wellness index.	Overview of Rural Development	04
2	Write report related to particular village (Group of 10 students). Survey, observe and evaluate Educational issues, Occupational issues, Agricultural issues, irrigation issues, migration issues, landless issues, Water supply and sanitation issues, Health issues, Poverty issues, Nutrition issues, Unemployment issues, Economy issues, Market for agriculture products issues, in Rural Development. Report includes: • Social structure of Rural India, Educational issues, Occupational issues, Agricultural issues, irrigation issues, migration issues, landless issues, Water supply and sanitation issues, Health issues, Poverty issues, Nutrition issues, Unemployment issues, Economy issues, Market for agriculture products issues, etc	Issues of Rural Development	06
3	Write report related to particular village (Group of 10 students). Survey, observe, evaluate and propagate Rural Development programmes (Sarva Shiksha Mission, Jal Swarajya Scheme, Water shed Management, Gobar Gas Scheme, Water Harvesting, MNREGA etc.) Run by Central and State Govt, according to directive principles in Indian Constitution. Report includes: • Constitutional provisions for Rural Development, Directive Principles. • Schemes of Central and State Govt. for Rural Development. • Role of GOs and NGOs. • Empowerment –Social, Educational, Economic, Women and Human. • Private Public Partnership (PPP), its advantages and disadvantages.	Constitutional Provisions and Programs for Rural Development	06

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
4	Write report related to particular village (Group of 10 students). Survey, observe and propagate Modern Technology (Rural Housing, Non Conventional Energy, Rural Water Supply and Sanitation, Agricultural allied industries etc.) in Rural Development. Report includes: • Low cost housing. • Rural water supply and sanitation, • Water conservation and Water shed management, • Non-conventional energy. • Computer application and Management Information system, Info – literacy, Global village • Solid waste management.	Technology for Rural Development	06
5	Write report related to particular village (Group of 10 students). Survey issues and challenges in Rural Development programs and suggest Rural – Urban link for social change in rural development and Nation Building. Report includes: • Basic micro-economic theories and concepts, Growth, Income, Employment, Finance. • Rural resources – Land, Forest, Water, Human, Capital and Market. • Rural Economy - Agriculture Reforms, Rural Finance, Rural Urban linkage. • Understanding BUDGET of Central and State Govt. • Corporate Social Responsibilities. • SEZ, Advantages and disadvantages on rural development.	Economical Developments	06
6	Present a report on Rural Development experiences of the same village, challenges, opportunities, suggestions. Presentation includes: • Success stories of rural development in India, Asia and other countries.	Rural Development Success Stories	04
Total			32

Note – The students shall select any one village and perform all practical based on experiences in that village.

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	--	--	--	--
		Journal Writing		Continuous	25	10	Journal	1, 2, 3, 4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	1, 2, 3, 4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Writing skills, Data collection from internet, Writing references, etc.	05
2	Survey skills, Preparation of questionnaire, Gathering information through interviews, etc.	10
3	Knowledge of rural development schemes, its salient features, its role in rural development, etc.	10
4	Knowledge of modern technology, Tech terms, its need in rural area, rural development through technology, etc.	10
5	Rural urban linkage, sustainable human development, global village, etc.	05
6	Presentation and viva-voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (COs)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	3	3	-	-	-	-	-	1	-	3	-	-
2	3	3	-	3	-	-	-	3	3	3	-	-
3	3	3	-	3	-	-	2	3	3	3	-	-
4	3	3	2	3	3	-	3	3	3	3	-	-
5	3	3	2	3	3	2	1	3	3	3	-	-
6	3	3	2	3	1	-	1	-	3	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Micro Enterprise & Rural Development In India,	Subrata Kumar Ray, Neha Publishers & Distributors.	9788183875752
2.	Rural Development Indian Context,	Expert Panel Of GPH, Publisher: GPH.	9789382688976
3.	Rural Development Planning And Management,	Expert Panel Of GPH, Publisher: GPH	9789382688990
4.	RURAL DEVELOPMENT, Concept and Recent Approaches, ,	A. Thomas William and A.J. Christopher, Edition – 2011.	9788131602652,
5.	Rural Development & Policies	Dr. B.D. Sharma,	9789381385418

6	Empowering Rural Development Through Panchayats.	Dr. H.K. Lal, Publisher: Neha Publishers & Distributors	9788174456250
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❖ **E-REFERENCES:**

- www.un.org/esa/agenda21/natlinfo/countr/israel/ruraldevelopment.pdf , assessed on 5th March 2016
- rural.nic.in/sites/downloads/NewReleases/Greening_RD_Report.pdf , assessed on 5th March 2016
- planningcommission.nic.in/plans/stateplan/sdr_punjab/sdrpun_ch5.pdf, assessed on 5th March 2016
- jica-ri.jica.go.jp/IFIC_and_JBICI-Studies/english/.../pdf/chapter4.pdf. assessed on 5th March 2016
- www.fao.org/3/a-ah885e.pdf, assessed on 5th March 2016
- [yojana.gov.in/CMS/\(S\(y4dqr55g1m1qhnd4soqih45\)\)/pdf/.../January.pdf](http://yojana.gov.in/CMS/(S(y4dqr55g1m1qhnd4soqih45))/pdf/.../January.pdf), assessed on 5th March 2016
- <https://www.youtube.com/watch?v=LXgyAfnBgWo>, assessed on 5th March 2016
- <https://www.youtube.com/watch?v=jCpEh78M4xE> assessed on 5th March 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

Not Applicable

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Dr. S.J. Patil	Head of Civil Engineering	Government Polytechnic, Nagpur.
2.	Mr. B. R. Ambade	Lecturer in Civil Engineering	Government Polytechnic, Nagpur.
3.	Mr. T. K. Rangari	Lecturer in Civil Engineering	Government Polytechnic, Nagpur.
4.	Ms. D. A. Khandare	Lecturer in Civil Engineering	Government Polytechnic, Nagpur.
5.	M. R. Shelote	Consultant	M.R. Associates, Nagpur
6.	Dr. R. N. Khapre	Associate Professor	RCOEN, Nagpur
7.	A. J. Fulzele	Assistant Secretary (Tech)	MSBTE, RO, Nagpur

(Member Secretary PBOS)

(Chairman PBOS)

LEVEL - II

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME : DIPLOMA IN CE/ME/EE/EC/AE/MT/PK/TX
LEVEL NAME : BASIC SCIENCE COURSES
COURSE CODE : CA201E
COURSE TITLE : COMPUTER APPLICATIONS
PREREQUISITE : NIL
TEACHING SCHEME : TH: 00; TU: 00; PR: 04(CLOCK HRs.)
TOTAL CREDITS : 02(1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE : NIL
PR. TEE : 02 HRs (Internal)
PT. : NIL

❖ RATIONALE:

Engineering students should know the basics of handling the computers. This course describes the basics of word processing, table handling, and power point presentations for the understanding of elementary knowledge related to IT applications. It also describes basics of problem solving using C language, for the understanding of elementary knowledge related to logic development. It is very useful course for understanding the higher level knowledge in the field of IT applications and software engineering.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Use various formatting tools available in word processor.
2. Handle spread sheets.
3. Prepare presentation.
4. Draw block diagrams, figures.
5. Use LATEX for writing project report
6. Create static website using HTML

❖ COURSE DETAILS:

A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
NIL			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	• Create new document , open existing document and perform various operations on text like Font setting , delete, select, insert, copy- paste, cut- paste, find and replace.	WORD PROCESSING	2
2	• Perform various page setup operations like paragraph setting, page margin, size, orientation, watermark, page borders.		2
3	• Insert and remove Picture/ Image, Tables, Hyperlink, page break, Headers-Footers, bulleted lists in document.		2
4	• Perform Mail merge operation.		2
5	• Open blank /existing worksheet and perform operations like select, delete, insert, copy- paste, cut- paste, find & replace text / data in cell and range of cells. • Perform various formatting operations like, Data Alignment, Wrap text, merge / unmerge cells, change column width, row height, setting page margin, size, orientation, print area.	SPREADSHEET	2
6	• Insert and remove Picture/ Image, Hyperlink, page break, Headers-Footers, in worksheet. Insert and remove cells, rows, columns. Draw various types of graphs / charts.		2
7	• Perform various Functions like sum, average, count, countif, countblank, min, max, upper, lower, len, trim, left, right, mid, date, day, today, month, year, abs, int, exp, floor, sign, sum, sumif, sqrt and formulae like calculating simple interest, compound interest etc. on data in a worksheet.		4
8	• Sort data in ascending and descending order, on one and more than one field. • Apply Filter and obtain desired information.		2
9	• Create new presentation, add /delete slides, insert / delete tables, word Art, header/footer ,slide number, cliparts, images in slide, hyperlink.	PRESENTATION	2
10	• Apply various slide transition methods; apply animation effect, setup slide show, for selected slides.		2
11	• Draw diagrams in a slide, using various available shapes, insert / modify/ delete charts in slide.	PRESENTATION	2
12	• Draw block diagrams, circuit diagrams etc. • Save diagrams in jpg/ TIFF formats • Insert saved diagrams in documents	DRAWING TOOL	4

13	• Open LATEX document • Write simple mathematical equations in LATEX document • Insert figures and tables in in LATEX document • Generate the reports using templates	LATEX	4
14	• Create HTML document by using different tags, elements and attributes (any four) • Create HTML document by using various formatting tags (text level and paragraph level). (any four) • Design webpage using nesting list. (using OL, UL and DL)	HTML	4
15	• Add images, tables and text links in created document. • Insert multimedia in webpage using various techniques		4
16	• Set various attributes of tables. • Set various attributes of images. • Create hyperlink to text, image, table content and email.		4
17	• Create HTML document by using frame and frameset tags (any two)		2
18	• Create HTML document by using frame and frameset tags along with various attributes.		2
19	• Create HTML document by using form and its elements (any two)		2
20	• Create login form and set password.		2
21	• Create static website using all above HTML facilities. (MINI PROJECT)		8
Skill Assessment			4
Total Hrs			64

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Nil

❖ QUESTION PAPER PROFILE FOR THEORY PAPER:

Nil

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	1, 2, 3, 4,5,6
		Journal Writing		Continuous	05	--	Journal	1, 2, 3, 4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Printouts	1, 2, 3, 4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Activities	20
2	Performance	20
3	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	3	-	3	3	-	-	-	3	3	3	-	-
2	3	-	3	3	-	-	-	3	3	3	-	-
3	3	-	3	3	-	-	-	3	3	3	-	-
4	3	-	3	3	-	-	-	3	3	3	-	-
5	3	-	3	3	-	-	-	3	3	3	-	-
6	3	-	3	3	-	-	-	3	3	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	World wide web designing with HTML	C. Xavir	13: 9780074639719
2.	HTML5 for Publishers	Sanders Kleinfeld	10/ASIN: B005ISQ7JM
3.	HTML5 for Web Designers	Jeremy Keith	10/ASIN: 0984442502

❖ **E-REFERENCES:**

<http://www.w3schools.org.in>, accessed on 11th April, 2016
<https://www.tug.org/twg/mactex/tutorials/ltxprimer-1.0.pdf> accessed on 11th April, 2016
<https://www.latex-tutorial.com/tutorials/> accessed on 11th April, 2016
<http://www1.maths.leeds.ac.uk/LaTeX/TableHelp1.pdf> accessed on 11th April, 2016
http://www.tutorialspoint.com/html/html_frames.htm accessed on 21st April, 2016
showmedo.com/videotutorials/openoffice accessed on 29th April, 2016
www.tutorialsforopenoffice.org accessed on 29th April, 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

1. Computer (Dual CORE and above)
2. Network printer.
3. Office Suite.
4. LATEX.

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. S.P. Lambhade	Head of Computer Engineering	Government Polytechnic, Nagpur.
2.	Dr. Mrs. A.R. Mahajan	Head of Information Technology	Government Polytechnic, Nagpur.
3.	V.A. Raje	Lecturer in Computer Engineering	Government Polytechnic, Nagpur.
4.	Dr. A.R. Mahajan	Head of Information Technology	Government Polytechnic, Nagpur.
5.	L.D. Vilhekar	Lecturer in Information Technology	Government Polytechnic, Nagpur.
6	Shri. Atul Upadhyay	CEO	Vista Computers , Ram Nagar, Nagpur
7	Shri. N. V. Chaudhari	Asst. Professor (CSE)	DBACEO, Wanadongri, Nagpur
6	Shri. Manoj Jethawa	HOD Computer Science	Shri Datta Meghe Polytechnic, Nagpur

 (Member Secretary PBOS)

 (Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN CE/ME/EE/EC/IT/CM /MT/PK/AE/TX
LEVEL NAME	: BASIC SCIENCE COURSES
COURSE CODE	: PH201E
COURSE TITLE	: ENGINEERING PHYSICS
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 04; TU: 00; PR: 02(CLOCK HRs.)
TOTAL CREDITS	: 05 (1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE	: 03 HRs
PR. TEE	: 02 HRs (Internal)
PT.	: 01 HR

❖ RATIONALE:

Engineering physics is an essential part of the educational system and of an advanced society, therefore this course essentially required for engineering courses. The different streams of physics provides fundamental facts, principals and laws are very helpful in having better understanding of the other technology courses which contributes to the technological infrastructure and provides trained personnel needed to take advantage of scientific advances and discoveries. Physics is an exciting intellectual adventure that inspires young people and expands the frontiers of our knowledge about Nature.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Apply the principal and laws of Physics on physically observable things to their respective disciplines.
2. Illustrate broad ideas about different physical phenomena.
3. Apply fundamental physics in various Engineering fields.
4. Select proper measuring instruments on the basis of range and least count to measure the physical quantities.
5. Calibrate different measuring instruments.
6. Handle instruments carefully to avoid any type of devastation.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1. General Properties of solids	1. Relate Deformation in bodies by the action of external forces. 2. Identify least count and range of instruments. 3. State hook's law of elasticity. 4. Define different terms related to elasticity. 5. Differentiate accuracy and precision. 6. Describe the types of modules of elasticity. 7. Illustrate the Searle's apparatus. 8. Solve the numerical based on Elasticity.	1.1 Elasticity, Plasticity, Rigidity. Deformation in bodies by the action of external forces, Stress and Strain with their types, Elastic Limit, Hook's Law, yield point, factor of safety, breaking stress, ultimate stress. Applications of elasticity. Types of modulus of Elasticity with relation between them. 1.2 Searle's method to find out Young's modulus of elasticity. Least count and range of instruments: Vernier caliper, outside micrometer screw gauge, Travelling microscope. (Numerical based on above)	06
2. General Properties of liquids	1. Define the terms related with general properties of liquid. 2. State the factors affecting surface tension and viscosity. 3. Select the laws of viscosity to find the coefficient of viscosity of freely falling body. 4. Classify the types of flow of liquid with significance of Reynold's number. 5. Illustrate the phenomenon of Capillarity and angle of contact of liquid and glass. 6. Solve the numerical based on general properties of matter.	2.1 Surface Tension, Factors affecting surface tension, Molecular force, cohesive and adhesive force, Angle of contact with its significance and capillary action (no derivation), Effect of impurity and temperature on surface tension. Application. (Numerical based on above) 2.2 Viscous force, Definition of viscosity, Newton's law of viscosity, Reynolds's number and its significance, critical velocity, streamline flow, turbulent flow, Stoke's law, statement and formula (no derivation), Coefficient of viscosity and S.I. unit. Application. (Numerical based on above)	08
3. Transmission of heat and Gas laws	1. List the modes of transmission of heat. 2. Define the terms related to expansion of solid due to heat. 3. State the laws related to gas and specific heat. 4. Describe Mayor's relation. 5. Apply the adiabatic and isothermal expansion for bulk modulus of elasticity. 6. Solve the numerical related to gas laws and heat.	3.1 Heat: Three modes of transmission of heat- conduction, convention, radiation. Good and bad conductor of heat with examples, Law of thermal conductivity and S.I. units, Coefficient of linear, aerial and cubical expansion, relation between them (no derivation). (Numerical based on above) 3.2 Boyles law, Charle's law, Gay Lussac's law, absolute zero temperature, Kelvin scale of temperature, General gas equation (statement only), two specific heats	10

		of gases, relation between them, Mayer's relation. . Isothermal process and adiabatic process(Numerical based on above)	
4. Wave motion and Acoustics	1. Define different terms related to Acoustics. 2. Reproduce the formula for velocity of sound with end correction. 3. Classify the different types of wave by their characteristics. 4. Recognize sound absorbing textile material. 5. Describe the phenomenon of resonance with examples. 6. Describe the Doppler effect and Sabine's formula. 7. Implement the conditions for good acoustics in auditorium. 8. Solve the numerical related to wave motion and acoustics.	4.1 Definition of wave motion, amplitude, period, frequency & wavelength, relation between velocity, frequency & wavelength. Progressive wave, Stationary waves, longitudinal and transverse wave. Node, Antinode. forced and free vibration, definition of resonance with example, procedure to find resonance with the help of tuning fork. Formula for velocity of sound with end correction, various factors which depends on it.(Numerical based on above) 4.2Introduction to Doppler Effect and its applications. Echo, Reverberation, Reverberation Time. Absorption coefficient of material, Sabine's formula for reverberation time, Factors affecting the Reverberation of time and acoustics of building. Sound absorbing materials. (Numerical based on above)	14
5. Modern Physics	1. Define the terms related to topics in modern physics. 2. List the properties applications of LASER. 3. State the characteristics of photo electric effect. 4. State the applications related to X-ray, LASER, and photo cell. 5. Implement the photoelectric effect to develop photocell. 6. Illustrate the construction and working of Ruby LASER 7. Describe the production of X-rays. 8. Solve the numerical base on Photo-electricity and X-rays.	5.1 Photon, properties of photons, Planck's hypothesis, Threshold frequency, threshold wavelength and work function, Photoelectric effect with characteristics properties. Principle, Construction and working of Photoelectric cell with applications. Einstein's photoelectric equation. (Numerical based on above) 5.2 Properties of laser, Types of laser, absorption, spontaneous and stimulated emission. Definition of Pumping and its type, Population inversion, Metastable state. Ruby laser: Principle, construction and working. Applications of LASER in Engineering and biomedical Engineering. 5.3Introduction to X-rays, Properties of X-rays, production of X-ray using Coolidge tube. Formula for Minimum wavelength of X-rays, Applications of X-rays in Engineering, medical and scientific field.(Numerical based on above)	18

6. Optical Fiber and Nanotechnology	1. Define the terms related to Optical fiber and nanotechnology. 2. Draw the diagram for inner structure of optical fiber. 3. State the applications of Optical fiber and nanotechnology. 4. Clarify the properties of nanoparticles are different than other particles. 5. Describe the principle of optical fiber. 6. Solve the numerical based on optical fiber.	6.1 Optical fiber, Material of Optical fiber. Structure of optical fiber and its types. Principle of Optical fiber-total internal reflection. Acceptance angle, Numerical aperture. Applications of Optical Fiber.(Numerical problems) 6.2 Definition of nanoscale, nanometer, nanoparticle, nanostructured materials with examples, Application of nanotechnology in Engineering and Technology, medical, cosmetics, environmental, space and defense.	08
Total Hrs.			64



B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Pract-icals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Identify the various instruments used in Physics laboratory and follow precautionary measures.	General Properties of solids	2
2	Determine least count and range of Vernier Caliper, Outside micrometer screw gauge and calculate its zero error.		2
3	Calculate the diameter of a small spherical body by Outside micrometer screw gauge.		2
4	Measure the outer diameter of a cylindrical body by Vernier Caliper.		2
5	Calculate the value of Young's modulus of elasticity of given wire and identify the type of material from standard value.		2
6	Find rise of liquid in capillary tube and compute surface tension of liquid.	General Properties of liquids	2
7	Compose the relation between terminal velocity and radius of spherical body with different materials passing through the liquid.		2
8	Find the most viscous fluid from given fluids by calculating coefficient of viscosity.		2
9	Analyze the effect of volume on pressure at constant temperature.	Transmission of heat and gas laws	2
10	Calculate mechanical equivalent of heat, J by electrical method.		2
11	Determine inner diameter of resonance tube using Vernier Caliper.	Wave Motion and Acoustics	2
12	Find the velocity of sound with the help of resonance tube. OR Determine the unknown frequency of tuning fork by sonometer.		2
13	Measure the angle of divergence of Laser.	Modern Physics	2
14	Find total internal reflection of light by pin method. OR Calculate the surface area (SA), volume (V) and SA/V of an object and measure dimensions required for it.	Optical Fiber and Nanotechnology	2
Skill Assessment			4
Total Hrs.			32

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	General Properties of solids	06(00)	00(04)	00(00)	06(04)
02	General Properties of liquids	02(00)	08(06)	00(00)	10(06)
03	Transmission of heat and gas laws	02(00)	04(04)	06(04)	12(08)
04	Wave Motion and Acoustics	04(04)	04(02)	06(00)	14(06)
05	Modern Physics	02(04)	10(04)	06(00)	18(08)
06	Optical fiber and Nanotechnology	02(02)	08(00)	00(06)	10(08)
	Total	18(10)	34(20)	18(10)	70 (40)

R – Remember

U – Understand

A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER:

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	2	R	2	3	R	2	5	R	2	6	R	2	6	R	2	5/7
	4	U	2																
02	1	R	4	2	U	4	2	U	4	1	U	4	3	U	4				3/5
03	3	U	4	4	R	4	4	U	4	4	R	4	3	A	4				3/5
04	6	U	4	5	U	4	6	U	4	5	R	4	5	U	4				3/5
05	5	A	6	4	A	6	2	U	6										2/3
06	5	U	6	3	A	6	6	A	6										2/3

T= Unit/Topic Number

L= Level of Question

M= Marks

R-Remember

U-Understand

A-Analyze/ Apply

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Drawing circuit diagram/figure, selection of equipment's.	10
2	Performance	20
3	Calculation, Result, Drawing Graphs (if any)	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	3	-	-	-	-	-	-	-	-	2	-	-
2	3	-	-	-	-	-	-	-	-	2	-	-
3	3	-	-	-	-	-	-	-	-	2	-	-
4	3	-	2	2	-	-	-	2	-	2	-	-
5	3	-	2	2	-	-	-	2	-	2	-	-
6	3	-	2	2	-	-	-	2	-	2	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Modern Physics	B.L. Thereja, S.Chand & Company Ltd 5 th Edition, 2014	13:978-8-12-190163-5
2.	Engineering Physics	V.Rajendran, The McGraw Hill Education Pvt. Ltd, 1 st Edition, 2010	13: 978-0-07-107014-0
3.	Conceptual Physics	P.G.Hewitt, San Francisco Addison Wesley- 10 th Edition, 2006	13: 9780321909107
4.	Engineering Physics	R.K.Gaur And S.L.Gupta, Dhanpatrai Publication New Delhi, 1987	97-8-18-992822-3

❖ **E-REFERENCES:**

<https://www.youtube.com/watch?v=7vT-988yH3M> , assessed on 5th march 2016
https://www.youtube.com/watch?v=XMWcQ4Fn_3I , assessed on 4th march 2016
<https://www.youtube.com/watch?v=6L3Y6UnWe6M> , assessed of 5th march 2016
https://www.youtube.com/watch?v=KjUIKF6_4LI , assessed on 2nd march 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

1. Vernier Caliper (Least count= 0.01 cm and range= 0 to 12 cm)
2. Screw gauge (Least count= 0.001 cm and range= 0 to 2.5 cm)
3. Young' Modulus- Searle's pattern with micrometer reading 0.001 cm.
4. Travelling microscope vertical and horizontal scales with range 0- 15 cm with least count 0.001 cm
5. resonance apparatus with glass tube and metal reservoir (L= 0- 100 cm)
6. sonometer teak wood with length 1m.
7. Tuning fork -256, 320, 384, 428, 480, 512 Hz.
8. Boyle's apparatus iron base double steel rod, 25 ml fitted with leveling screw on base
9. Stoke's apparatus with glass tube 50 cm.
10. Stop watch GEM 1/10 sec.
11. Ammeter (DC, 0-5 Amp)
12. Millimeter (DC, 0-1 Amp. G.E. type D 50)
13. Voltmeter (DC, 0-3V)
14. Rheostat single tube of 6.5 cm dia., 30 cm length, 5 Amp, 18 ohm, provided with Bakelite slider with phosphor, bronze contacts.
15. Joule's calorimeter with mass 198 cal/gms.
16. Laser

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	M. K. Malke	I/C Physics Department	Government Polytechnic, Nagpur.
2.	Dr. K. S. Moon	Associate Professor	Dharampeth M P Deo Memorial Science College, Nagpur
3.	Mrs. Farheen Baig	Assistant Professor	Priyadarshini College of Engineering, Nagpur
4.	Mrs. M.B. Mahaley	HOD, Physics Department	SDMP, Nagpur
5.	Dr. S. B. Raut	Lecturer	Government Polytechnic, Nagpur.
6	Mrs. S.B. Adulkar	Lecturer	Government Polytechnic, Nagpur.

 (Member Secretary PBOS)

 (Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURE
LEVEL NAME	: BASIC SCIENCE COURSES
COURSE CODE	: CH 204E
COURSE TITLE	: APPLIED CHEMISTRY
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 04; TU: 00; PR: 02(CLOCK HRs.)
TOTAL CREDITS	: 05 (1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE	: 03 HRs
PR. TEE	: 02 HRs (Internal)
PT.	: 01 HR

❖ RATIONALE:

Applied Chemistry is a basic science subject which is essential to textile course. It gives knowledge of engineering materials, their properties, related applications & selection of materials for engineering applications. The contents of this curriculum provide knowledge of fiber types, polymers and compounds used in textile. This subject will generate curiosity of carrying out some chemical reactions in Textile field.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Interpret important organic compounds used in textile industry.
2. Select proper organic and inorganic compounds in textile.
3. Calculate water hardness.
4. Detect functional groups present in organic and inorganic compounds.
5. Analyze water sample and organic, inorganic compounds used in textile field.
6. Synthesis polymers with representation of bond formation in compounds.

❖ COURSE DETAILS:

A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1. Water	1. Reproduce impurities present in natural water. 2. Outline different disadvantages of hard water in different area. 3. Describe hard and soft water concept. 4. Summaries difference with chemical reactions. 5. Interpret hardness types, its measurement units. 6. Review hardness removal methods. 7. Report Municipal water treatment process. 8. Solve problems related to hardness.	1.1 Common impurities present in natural water(colloidal, suspended, dissolve and biological), 1.2 Concept of hard and soft water. 1.3 Causes of hard water. Types of hardness, and its measurement, Numerical based on hardness calculation and unit's conversion. 1.5 Disadvantage of hard water in textile industry and domestic use (Drinking, washing, cooking, bathing). 1.6 Removal of hardness by ion exchange process, 1.7 Municipal water treatment process (sedimentation, coagulation, filtration(sand filter and pressure filter), sterilization (chlorination))	12
2. Inorganic Compounds	1. State different types of compounds. 2. Describe solvent concept. 3. Relate properties of inorganic compounds. 4. Predict uses of inorganic compounds. 5. Use acid, base and salts. 6. Solve problems related to H_2O_2 .	2.1 Definition of atom, Difference in atomic number and atomic weight, orbit and orbital. Orbital electronic configuration of elements up to 20, using aufbau's principle and hund's rule. 2.2 Types of compounds and their formation- electrovalent (MgO , $CaCl_2$, $AlCl_3$) and covalent (CO_2 , O_2 , C_2H_2). 2.3 Definitions of acids and bases (on the basis of Arrhenius, Lawry and bronsted, lewis concept). 2.4 Concept of pH- Definition of pH and pOH, Relationship between pH and pOH. Numerical based on pH. 2.5 Concept of oxidation and reduction- definition, oxidizing and reducing agent, Calculation of oxidation number or oxidation state of $K_2Cr_2O_7$ and $KMnO_4$. Use of $K_2Cr_2O_7$ and $KMnO_4$ in textile	15

		industry. 2.6 Properties and uses of H_2O_2. Calculation of strength of H_2O_2. Properties and uses of Na_2CO_3 and CaOCl_2.	
3. Organic Compounds	1. Recall IUPAC and common names of organic compounds. 2. Classify organic compounds. 3. Indicate properties of organic compounds. 4. Relate names of organic compounds. 5. State use organic compounds for different applications. 6. Compare organic and inorganic compounds. 7. Identify the compounds.	3.1 Importance of organic compounds (textile industry) and general characteristics of organic compounds. 3.2 Classification of organic compounds based on structure. 3.3 IUPAC nomenclature of organic compounds and aromatic compounds (alkane, alkenes, alkynes, alkyl halide, alcohols, aldehyde, ketones, ethers, carboxylic acids, esters- up to 5 carbon chain) 3.4 Properties and uses of alkane (chlorination), alkenes (markownikoffs rule and peroxide rule) and alkynes. 3.5 Alcohols: classification on basis of number of hydroxyl group, properties (oxidation) and uses of alcohols. Aldehyde and ketones: Structure of carbonyl functional group. Properties (oxidation and reduction) and uses of formaldehyde and acetone. Carboxylic acids: properties (etherification) and uses of formic and acetic acid. 3.6 Aromatic compounds-important characteristics of aromatic compounds, types of aromatic compounds. Properties (substitution reactions) and uses of Benzene, Phenol and Aniline.	15
4. Polymers	1. List out different step growth polymers. 2. State different addition polymers. 3. Predict polymeric type used in textile. 4. Relate different polymeric types. 5. Synthesis some polymers like Nylon6, Nylon 66.	4.1 Definition of polymer, monomer. Classification of polymers- based on source, structure of polymer, polymerization process and molecular forces. 4.2 Differentiate Thermoplastic and Thermosetting polymers. 4.3 Preparation of some step growth polymers like Nylon 6, Nylon 66, polyester (Terylene or Dacron).	15

		4.4 Preparation of addition polymers like Polyacrylonitrile (PAN), poly vinyl chloride (PVC) and Teflon.	
5. Soaps and Dyes	1. Define terms like oil, soaps, detergents, dyes and pigment. 2. State types of detergents. 3. Differentiate soaps and detergents. 4. Relate detergents suitability with fiber.	5.1 Cleansing agents Soaps and detergents, Definition, Types of detergents (ionic, nonionic, and neutral), manufacture of soap. 5.2 Mechanism of Cleansing action of Soap. 5.3 Definition of Dyes, Pigments, Classification of dyes, Coupling reaction (azo coupling reaction) 5.4 Importance of diazonium salts.	07
Total Hrs.			64



B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practical	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Explore Chemistry laboratory	Water	2
2	Determine total hardness (Temporary and Permanent) of given water sample by Ethylene diamine tetraacetic acid (EDTA).		2
3	Determine alkalinity of given water sample.		2
4	Determine pH value of given solution by using pH paper, universal indicator and pH meter.		2
5	Determine available chlorine content in bleaching powder.	Inorganic Compounds	2
6	Determine % of Fe content in alloy using oxidizing agent KMnO_4		2
7	Detect nitrogen element from given sample compound by Lassaigne's test. (OR) Detect sulphur element from given sample compound by Lassaigne's test.		2
8	Detect halogen element from given sample compound by Lassaigne's test.		2
9	Detect alcoholic functional group present in given sample. (OR) Detect acidic functional group present in given sample.	Organic Compounds	2
10	Detect aldehydic functional group present in given sample.		2
11	Identify different textile fibers by physical and chemical testing.	Polymers	2
12	Prepare phenol formaldehyde polymer.		2
13	Determine cleaning effect of detergents on different fabric material	Soaps And Dyes	2
14	Identify of various classes of dyes in powder form.		2
	An Industrial visit optional to three experiments.	Skill Assessment	4
Total Hrs.			32

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Water	02(04)	04(04)	06(06)	12(14)
02	Inorganic Compounds	02(02)	08(04)	06(00)	16(06)
03	Organic Compounds	02(02)	14(04)	00(00)	16(06)
04	Polymers	02(00)	08(04)	06(06)	16(10)
05	Soaps and Dyes	02(00)	08(04)	00(00)	10(04)
	Total	10(08)	42(20)	18(12)	70(40)

R – Remember

U – Understand

A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER:

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	2	R	2	3	R	2	4	R	2	5	R	2	2	R	2	5/7
	3	R	2																
02	3	U	4	4	U	4	5	U	4	1	R	4	2	U	4				3/5
03	1	U	4	2	U	4	5	U	4	3	U	4	4	U	4				3/5
04	2	U	4	3	U	4	4	U	4	1	U	4	5	U	4				3/5
05	1	A	6	2	A	6	4	A	6										2/3
06	3	U	6	4	A	6	1	A	6										2/3

T= Unit/Topic Number

L= Level of Question

M= Marks

R-Remember

U-Understand

A-Analyze/ Apply

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
End Of Course		End Of The Course		Questionnaires				

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Drawing diagram, writing chemical reactions, writing observation table etc.	10
2	Performance	20
3	Calculation/Conclusion/ Result/ Drawing Graphs(if any)	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES :**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	3	3	-	-	3	-	-	-	-	3	-	-
2	3	3	-	-	3	-	-	-	-	3	-	-
3	3	-	-	-	-	-	-	-	-	3	-	-
4	3	-	2	-	3	-	-	1	-	3	-	-
5	3	3	2	-	3	-	-	2	-	3	-	-
6	3	-	2	-	-	-	-	3	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1	Engineering Chemistry	Jain and Jain , Dhanpat Rai publishing company(P) ltd.16 th Edition reprint 2015	978-93-437-07-3
2	Textbook of Organic Chemistry	P.L.Soni, H.M. Chawla, Sultan Chand & Sons Educational Publication, New delhi.	81-7014-614-3
3	A Text book of Engineering Chemistry	S. S. Dara ,S. Chand Publication,15 th Edition	9788121903592
4	Industrial Chemistry	B.K.Sharma, Goel Publication, 8 th Edition	8187224002, 9788187224006
5	Practical Organic Chemistry	Frederick George Mann, and Bernard Charles Saunders, The English language Book Society and Long man Group Limited, 4 th Edition.	-
6	A Text Book of Experimental and Calculation in Engineering Chemistry	Dr.S.S.Dara, S. Chand & Company Ltd, 2013	8121908647 9788121908641

❖ E-REFERENCES:

<https://www.edumedia-sciences.com/en/node/357-chemical-reactions> , assessed on 9th march, 2016

<https://www.edumedia-sciences.com/en/node/88-structure-of-matter> , assessed on 9th march, 2016

<http://www.chem1.com/acad/webtext/states/polymers.html> , assessed on 9th march, 2016

❖ LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION

1. Digital balance (High accuracy) LG electro cap.300 gms.
2. pH meter model 111
3. Digital Multi-meter
4. Oven standardizing electrically heated V= 240, W= 1450.

❖ LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:

S.N.	Name	Designation	Institute / Industry
1.	Dr.P.J.Sondawale	I/C, Chemistry Department	Government Polytechnic, Nagpur.
2.	Dr. S.A.Petkar	Lecturer in Chemistry	Government Polytechnic, Nagpur.
3.	Dr.M.S.Rathod	Lecturer in Chemistry	Government Polytechnic, Nagpur.
4.	Dr.M.I.Ahmed	Lecturer in Chemistry	Government Polytechnic, Nagpur.
5.	Mr. S.R.Gaidhar	Lecturer in Chemistry	Government Polytechnic, Gadchiroli.
6	Prof.S.Z.Jadhav	Professor in Chemistry	Institute of Science, Nagpur.
7	Dr. K.A.Nandekar	Professor in Chemistry	G.H.Raisoni Polytechnic, Nagpur.

(Member Secretary PBOS)

(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN CE/ME/AU/PK/MT/EE/EC/IT/CM/TX
LEVEL NAME	: BASIC SCIENCE COURSES
COURSE CODE	: MH201E
COURSE TITLE	: ENGINEERING MATHEMATICS
PREREQUISITE	: NIL
TEACHING SCHEME	: TH:04; TU: 01; PR:00 (CLOCK HRs.)
TOTAL CREDITS	: 05 (1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE	: 03 HRs
PR. TEE	: NIL
PT.	: 01 HR

❖ **RATIONALE:**

The subject is classified under basic sciences and intends to teach students basic facts, concepts and principles of Mathematics as a tool to analyze Engineering problems. Mathematics lay- down the foundation for understanding core Technology subjects.

❖ **COURSE OUTCOMES:**

After completing this course students will be able to–

1. Develop logical thinking which is useful in comprehending the principles of all other subjects.
2. Use concept of allied angle, compound angle, multiple, and sub multiple angle to solve engineering problems.
3. Use measures of central tendency and measures of dispersion in decision making.
4. Apply matrix method to solve simultaneous equations in two and three variables.
5. Develop intellectual skill by using mathematical concept.
6. Apply laws of logarithm to solve engineering problems.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs
1. Logarithm	1. Identify natural and common logarithm 2. Apply laws of logarithm in solving examples	1.1 Definition of logarithm 1.2 Definition of natural & common logarithm 1.3 Laws of logarithm & change of base formula	04
2. Partial fractions	1. Define rational function, proper and improper fraction. 2. Factorize quadratic and cubic polynomial 3. Resolve proper and improper fraction into partial fraction.	2.1 Definition of rational function , proper ,improper fraction and partial fraction 2.2 Resolving proper fraction into partial fraction. 2.2.1 Denominator containing non repeated linear factors 2.2.2 Denominator containing repeated linear factors 2.2.3 Denominator containing irreducible non repeated quadratic factors 2.3 Resolving improper fraction into partial fraction.	06
3. Determinant and Matrix	1. Memorize expansion formula of determinant of order 2 and 3. 2. Find the value of determinant of order 2 and 3. 3. Define various types of matrices. 4. Perform all algebraic operations on matrices. 5. Solve simultaneous equations in two and three variables	3.1 Definition of determinant , order of determinant 3.1.1 Expansion of determinant of order 2 and 3 3.2 Definition of matrix 3.2.1 Types of matrices 3.2.2 Algebra of matrices 3.2.3 Transpose of matrix , ad-joint of matrix and inverse of matrix 3.2.4 Solution of system of linear equations two and three variables by inverse matrix method	14
4. Trigonometry	1. Define allied angle and compound angle. 2. State the formula of multiple angle (2θ and 3θ) sub-multiple angle ($\frac{\theta}{2}$). 3. Verify trigonometric identities. 4. Solve examples using allied angle, compound angle, multiple	4.1 Trigonometric ratios of any angle 4.2 Fundamental identities 4.3 Trigonometric ratios of allied angles 4.4 Trigonometric ratios of compound angles 4.5 Trigonometric ratios of multiple and sub-multiple angles 4.6 Factorization and de-factorization formulae	22

	and sub-multiple angle formula. 5. Solve examples using factorization and de-factorization formula.		
5. Inverse trigonometric functions	1. Define inverse trigonometric functions. 2. Find principle values of inverse trigonometric functions 3. Solve examples of inverse trigonometric functions.	5.1 Definition of inverse trigonometric functions 5.2 Principle values of inverse trigonometric functions 5.3 Relation between inverse trigonometric functions	06
6. Statistics	1. Define mean of data. 2. Memorize formula of mean, combined mean, mean deviation and standard deviation. 3. Find mean and combined mean. 4. Find the range, mean deviation, standard deviation and variance. 5. Find coefficient of variation and compare the consistency	6.1 Measures of central tendency (mean only) 6.2 Combined mean 6.3 Measures of dispersion 6.4 Range, mean deviation, standard deviation 6.5 Variance and coefficient of variation 6.6 Comparison of two sets of observations	12
Total Hrs.			64

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practical	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Solve examples using laws of logarithm	Logarithm	01
2	Find partial fraction of proper fraction.	Partial fraction	01
3	Find partial fraction of improper fraction.		01
4	Expand determinant of order 2 and 3.	Determinant and Matrix	01
5	Perform all algebraic operations on matrices		01
6	Find transpose , ad-joint and inverse of matrix		01
7	Solve simultaneous equations in two and three variables		01
8	Verify trigonometric identities.	Trigonometry	01
9	Use allied angle and compound formulae		01
10	Use multiple and sub-multiple angle formulae		01
11	Apply factorization formula to solve examples.		01
12	Apply de-factorization formula to solve examples.		01
13	Find principle values of inverse trigonometric functions and verify formulae	Inverse trigonometric functions	01
14	Find mean of any data and combined mean oftwo sets ofdata.	Statistics	01
15	Find the range, mean deviation, standard deviation and variance.		01
16	Find coefficient of variation and compare the consistency		01
Total Hrs.			16

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Logarithm	00(02)	04(00)	00(00)	04(02)
02	Partial fraction	00(00)	08(06)	00(00)	08(06)
03	Determinant and Matrix	02(00)	08(04)	06(04)	16(08)
04	Trigonometry	06(00)	14(08)	04(04)	24(12)
05	Inverse trigonometric functions	02(00)	04(04)	00(00)	06(04)
06	Statistics	00(02)	12(00)	00(06)	12(08)
	Total	10(04)	50(22)	10(14)	70 (40)

R – Remember

U – Understand

A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER:

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	3	R	2	4	R	2	4	R	2	4	R	2	5	R	2	1	R	2	5/7
	6	R	2																
02	1	U	4	2	U	4	2	U	4	3	U	4	3	A	4				3/5
03	3	U	4	3	U	4	4	U	4	4	U	4	4	A	4				3/5
04	4	U	4	5	U	4	4	A	4	5	U	4	4	U	4				3/5
05	6	U	6	4	U	6	2	U	6										2/3
06	6	U	6	3	A	6	6	A	6										2/3

T= Unit/Topic Number

L= Level of Question

M= Marks

R-Remember

U-Understand

A-Analyze/ Apply

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3, 4,5,6
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3, 4,5,6
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3, 4,5,6
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	--	--	--	--
		Journal Writing		Continuous	--	--	--	--
				TOTAL	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ SCHEME OF PRACTICAL EVALUATION:

S.N.	Description	Max. Marks
	NIL	

❖ MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	3	3	2	-	-	-	2	3	-	3	-	-
2	3	3	2	3	-	-	2	3	-	3	-	-
3	3	3	2	3	-	-	2	3	-	3	-	-
4	3	3	2	3	-	-	2	3	-	3	-	-
5	3	3	2	-	-	-	2	3	-	3	-	-
6	3	3	2	3	-	-	2	3	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ REFERENCE & TEXT BOOKS:

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Higher Algebra	Hall & Knight, Publisher: Arihant, 5 th Edition 2015	9352030605
2	Plane Trigonometry	S L Loney, Publisher: Arihant, 5 th Edition 2015	9352030540
3.	Basic Statistics	B L Agarwal, Publisher: Anshan	1848290675
4.	Engineering Mathematics	S.S .Shastry, Prentice Hall Of India, 4 th Edition 2008	978-81-203-3616-2
5.	Fundamental of Statistics	S C Gupta, Himalaya Publishing House, 7 th Edition 2015	9789350517697

❖ E-REFERENCES:

<https://www.khanacademy.org/math/algebra>, assessed on March 3, 2016

<https://www.khanacademy.org/math/trigonometry>, assessed on March 3, 2016

<https://www.youtube.com/watch?v=BiLIcCtXmm0>, assessed on March 3, 2016

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. S.M. Sayyed	I/C Mathematics Dept.	Govt. Polytechnic Nagpur
2.	Mr. P.T. Khobragade	Lecturer	Govt. Polytechnic Nagpur
3.	Mr. G.R. Dewalkar	Lecturer	Govt. Polytechnic Nagpur
4.	Dr. K. C. Deshmukh	Professor	R. T. M. Nagpur University
5.	Dr. P. B. Bahatkar	Professor	Y. C. C. E. Nagpur
6	Mr. Nasir Khan	Lecturer	Anjuman Polytechnic Nagpur

(Member Secretary PBOS)

(Chairman PBOS)



GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURE
LEVEL NAME	: BASIC SCIENCE COURSES
COURSE CODE	: MH204E
COURSE TITLE	: APPLIED MATHEMATICS
PREREQUISITE	: MH201E
TEACHING SCHEME	: TH: 03; TU: 01; PR:00 (CLOCK HRs.)
TOTAL CREDITS	: 04 (1 TH/TU CREDIT = 1 CLOCK HR.)
TH. TEE EXAM.	: 03 HRs
PR. TEE EXAM	: NIL
PT. EXAM	: 01 HR

❖ RATIONALE:

Statistics has become an integral part of every branch of engineering. The knowledge of statistics is indispensable in modern world. It develops a skill of taking wise decision by analyzing the data in a scientific manner. Quality control of industrial products is one of the important contributions of statistics.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Develop logical thinking which is useful in comprehending the principles of all other subjects.
2. Apply probability theory in everyday life in the risk assessment and in trade on financial markets.
3. Use statistical methods in the monitoring and maintaining of the quality of products and services.
4. Develop skills in choice of control chart, computation of control limits, plotting of chart, observations and conclusion.
5. Understand the relationship of two variables.
6. Apply the knowledge of probability to solve problems related to the production process.

❖ COURSE DETAILS:

A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1. Functions	1. Identify various types of functions. 2. Find the value of any given function.	1.1 Definition of function. 1.2 Value of a function. 1.3 Types of functions. 1.4 Even and odd function	06
2. Limits	1. Memorize the limit formula $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = n a^{n-1}$ 2. Evaluate limits of algebraic functions. 3. Evaluate limits of trigonometric functions. 4. Evaluate limits of exponential and logarithmic functions.	2.1 Concept of limit. 2.2 Algebra of limits. 2.3 Limits of algebraic functions. 2.4 Limits of trigonometric functions. 2.5 Limits of exponential & logarithmic functions.	10
3. Elements of probability theory	1. Define permutation and combination, factorial notation. 2. Define probability. 3. State addition theorem of probability. 4. Find probability using addition theorem of probability 5. Find probability using multiplication theorem of probability.	3.1 Mathematical preliminaries – Algebra of sets, Sub set, Null set, Intersection, Complement of set. Permutation and combination, factorial notation. 3.2 Definition of Random experiments, sample space, simple event, Probability of occurrence of an event, complement of an event, Theorem on probabilities on complementary events. 3.3 Definition of compound events – sum of two events, product of two events, addition theorem of probability, mutually exclusive events, conditional events, conditional probability, independent and dependent events, multiplication theorem of probability. 3.4 Definition of variable – discrete, continuous random variables. Expected value of random variable.	12
4. Probability distribution	1. Define Binomial, Poisson's and Normal distribution. 2. Solve examples based on Binomial, Poisson's and Normal distribution.	4.1 Binomial distribution, Mean, Standard deviation of a binomial distribution. 4.2 Poisson's distribution, Mean Standard deviation of a Poisson's distribution. 4.3 Normal distribution. 4.4 Inter relationship of the probability distributions.	12

5. Tests of statistical significance	1. State Chi-square test for independence for attributes. 2. Solve examples based on Chi-square test for independence for attributes. 3. Solve examples based on Chi-square test for population variance. 4. Memorize formulae of 't' test, 'Z' test and 'F' test. 5. Solve examples based on students 't' test. 6. Solve examples based on 'Z' test. 7. Solve examples based on 'F' test for equality population variances.	5.1 Definition of population parameter, sample, statistic, Definitions of a null hypothesis, an alternative hypothesis, type I error, type II error, level of significance, test of significance, test statistic, critical value, two sided alternative hypothesis, one sided alternative hypothesis. 5.2 Problem on large sample – One tailed, two tailed test for single proportion, test of significance for a single mean, test of significance for difference of mean. 5.3 Chi-square test - Chi-square test of goodness of fit, critical values, condition for the validity of chi-square test. Chi-square test for independence for attributes degrees of freedom for $r \times s$ contingency table, $2 \times k$ contingency table, Chi-square test for population variance. 5.4 Students 't' distribution: definition, properties, application, test for single mean, assumptions for students't' test, 't' tests for difference of mean. 5.5 'Z' test – assumptions for difference of means test, examples. 5.6 'F' distribution – 'F' statistics, critical values, applications, 'F' test for equality population variances.	14
6. Quality control	1. Memorize formulae for control limits of various charts. 2. Find control limits for various charts. 3. Draw P-chart, Np-chart, C-chart, X-chart and R-chart. 4. Draw conclusion.	6.1 Definition of quality, statistical quality control, control limits – upper, lower, central, 3-Sigma limits, Warning limits. 6.2 Control charts for attributes – P-chart, Np-chart, and C chart. 6.3 Control charts for variables – X-chart and R-chart	10
Total Hrs.			64

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practical	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Find value of any given function.	1. Functions	01
2	Find limits algebraic functions.	2. Limits	01
3	Find limits trigonometric functions.		01
4	Find limits exponential functions.		
5	Solve examples based on permutation and combination, factorial notation.	3. Elements of probability theory	01
6	Find probability using addition theorem of probability.		01
7	Find probability using multiplication theorem of probability		01
8	Solve examples based on conditional probability.		01
9	Solve examples based on Binomial Distribution.	4. Probability distribution	01
10	Solve examples based on Poisson's distribution.		01
11	Solve examples based on Normal distribution.		01
12	Solve examples based on Chi-square (χ^2) test.	5. Tests of statistical significance	01
13	Solve examples based on students 't' test and 'Z' test.		
14	Solve examples based on 'F' test for equality population variances.		
15	Find control limits and plot P-chart, Np-chart, C-chart and draw conclusion.	6. Quality control	01
16	Find control limits and plot mean-chart and range chart and draw conclusion.		01

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Functions	04(00)	04(04)	00(00)	08(04)
02	Limits	02(00)	08(08)	00(00)	10(08)
03	Elements of probability theory	02(00)	12(04)	00(04)	14(08)
04	Probability distribution	00(02)	04(04)	08(00)	12(06)
05	Tests of statistical significance	02(02)	06(06)	06(00)	14(08)
06	Quality control	00(00)	06(00)	06(06)	12(06)
	Total	10(04)	40(26)	20(10)	70 (40)

R – Remember

U – Understand

A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER:

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	1	R	2	2	R	2	3	R	2	5	R	2	4	R	2	5/7
	5	R	2																
02	1	U	4	2	U	4	2	U	4	1	U	4	2	U	4				3/5
03	3	U	4	3	U	4	3	U	4	2	U	4	3	U	4				3/5
04	4	U	4	4	A	4	4	A	4	3	A	4	4	U	4				3/5
05	5	U	6	5	A	6	5	U	6										2/3
06	6	U	6	6	A	6	6	A	6										2/3

T= Unit/Topic Number

L= Level of Question

M= Marks

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3, 4,5,6
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3, 4,5,6
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3, 4,5,6
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	--	--	--	--
		Journal Writing		Continuous	--	--	--	--
				TOTAL	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ SCHEME OF PRACTICAL EVALUATION:

S.N.	Description	Max. Marks
NIL		

❖ MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	3	3	2	-	-	-	2	3	-	3	-	-
2	3	3	2	3	-	-	2	3	-	3	-	-
3	3	3	2	3	-	-	2	3	-	3	-	-
4	3	3	2	3	-	-	2	3	-	3	-	-
5	3	3	2	-	-	-	2	3	-	3	-	-
6	3	3	2	3	-	-	2	3	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ REFERENCE & TEXT BOOKS:

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Calculus of one variable	IA Maron, Publisher: Arihant, 5 th edition 2015	9352030559
2.	Probability & Statistics	Murray R Spiegel, Publisher: Tata Mcgraw Hill, 3 rd edition	0070151547
3.	Fundamental of Probability	Prem Kant Mishra, Pragun Publications	8183295681
4.	Fundamental of Probability: A first course	Das Gupta, Himalaya Publishing House, Edition 2010	9781441957795
5.	Fundamental of Statistics	S C Gupta, Himalaya Publishing House, 7 th edition 2015	9789350517697

❖ E-REFERENCES:

<https://www.khanacademy.org/math/probability>, assessed on March 3, 2016

<http://www.britannica.com/topic/statistical-quality-control>, assessed on March 3, 2016

<https://en.wikibooks.org/wiki/Calculus>, assessed on March 3, 2016

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. M. SAYYED	I/C HOD, MATHS DEPTT.	GOVT. POLYTECHNIC NAGPUR
2.	Mr. T. KHOBRAGADE	LECTURER	GOVT. POLYTECHNIC NAGPUR
3.	Mr. R. DEWALKAR	LECTURER	GOVT. POLYTECHNIC NAGPUR
4.	Dr. K. C. DESHMUKH	PROFESSOR	R. T. M. NAGPUR UNIVERSITY
5.	Dr. P. B. BAHATKAR	PROFESSOR	Y. C. C. E. NAGPUR
6	Mr. NASIR KHAN	LECTURER	ANJUMAN POLYTECHNIC NAGPUR

(Member Secretary PBOS)



(Chairman PBOS)

LEVEL - III

GOVERNMENT POLYTECHNIC, NAGPUR
(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN EE/EC/CM/IT/MT/TX
LEVEL NAME	: ENGINEERING SCIENCES AND TECHNICAL ARTS COURSES
COURSE CODE	: ME302E
COURSE TITLE	: ENGINEERING GRAPHICS
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 02; TU: 00; PR: 04 (CLOCK HRs.)
TOTAL CREDITS	: 04 (1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE	: NIL
PR. TEE	: 02 HRs (Internal)
PT. EXAM	: NIL

❖ **RATIONALE:**

Engineering graphics is the language of engineers. It describes the fundamentals, facts, concepts, principles and techniques of Engineering Graphics. The course illustrates techniques of drawing in an engineering field. The concepts of graphical language are used in expressing the ideas, conveying the instructions, which are used in carrying out the jobs on the sites, shop floor etc. It helps to develop the idea of visualizing the actual object or part on the basis of drawings and blue prints. This course is useful in developing drafting and sketching skills of the student. This preliminary course aims at building a foundation for the further course in drawing and other allied courses.

COURSE OUTCOMES:

After completing this course students will be able to–

1. Draw geometrical figures, curves, sketches etc.
2. Construct the views of an object by using principles of orthographic projection.
3. Visualize three dimensional objects and draw isometric projections.
4. Apply various drawing codes, conventions and symbols as per IS SP-46
5. Interpret various engineering curves
6. Draw free hand sketches of mechanical elements

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1. Principles of drawing	1. Use of instruments for drawing, scales, lines and their applications. 2. Use of IS SP-46. 3. Loci of points from given data.	1.1 Use of different drawing instruments and equipment 1.2 Types of letters and numbers (single stroke vertical and numbers only) 1.3 Conventions of lines, 1.4 Dimensioning technique as per IS: SP -46 1.5 Scales (reduced, enlarged and full size)- Plain scale, diagonal scale. 1.6 Redrawing 1.7 Loci of points	05
2. Engineering curves.	1. Draw conic sections. 2. Draw involute, cycloid and state their applications 3. Draw helix, spiral from given data.	2.1 To draw an ellipse by- i) Arcs of circles method ii) Concentric circles method 2.2 To draw parabola- I) Rectangle method 2.3 To draw hyperbola by- I) Passing through a given point with reference to given asymptotes 2.4 To draw involutes of circle and polygon of maximum six sides 2.5 To draw cycloid, epi-cycloid and hypo-cycloid	08
3. Orthographic projections.	1. Visualize, interpret and draw orthographic views from given pictorial views. 2. Use of IS SP-46 for dimensioning technique.	3.1 Introduction to orthographic projections 3.2 First angle and Third angle method of projections 3.3 Conversion of simple pictorial views into orthographic views and dimensioning techniques as per IS SP-46	07
4. Isometric projections	1. Visualize, interpret and draw Isometric views from given orthographic views	4.1 Isometric scales 4.2 Isometric views of simple object (plane surfaces, slanting surfaces, and Rectangular, V, Trapezoidal slots)	07

5. Free hand sketches	1. Prepare proportionate freehand sketches of given machine elements 2. Describe functions and use of machine element.	5.1 Types of threads profile – Vee and square, acme, buttress, seller, BA threads, knuckle threads. Types of screws 5.2 Bolts – square and hexagonal bolts, eye bolt 5.3 Types of nuts : square, hexagonal, wing 5.4 Foundation bolts: Eye foundation bolt, Rag foundation bolt, Lewis foundation bolt 5.5 Single and double Riveted Lap and Butt joints	05
Total Hrs.			32

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	Draw types of lines, lettering, numbers are to be drawn on sketch book only and one problem from each subtopics 1.5 ,1.6 and 1.7 of chapter 1 (01 Sheet)	1.Principles of drawing	12
2	Draw Engineering Curves, one problem from each subtopic of chapter 2. (01 Sheet)	2. Engineering Curves	12
3	Draw two problem using first angle method of projection (01 Sheet)	3 Orthographic Projections	14
4	Draw one problem with plane surfaces & other with slot, slanting surfaces (using natural scale and isometric scale) (01 Sheet)	4. Isometric Projections	14
5	Draw Free Hand Sketches – any ten sketches covering all the topics under chapter 6 (01 Sheet)	5. Free Hand Sketches	12
Total Hrs.			64

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Nil

❖ QUESTION PAPER PROFILE FOR THEORY PAPER:

Nil

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics, Assessment Sheets &b Drawing Sheets	4,5,6
		Drawing Portfolio		Continuous	05	--	Drawing Portfolio	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Drawing Answer Sheets	1, 2, 3, 4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Drawing of scale, redrawing, and loci of point, line work, neatness ,cleanliness and accuracy	10
2	Drawing two Engineering Curves, line work, neatness ,cleanliness and accuracy	10
3	Drawing of orthographic projections , line work neatness ,cleanliness and accuracy	10
4	Drawing of isometric projections, line work neatness ,cleanliness and accuracy	10
5	Drawing of Free Hand Sketches , line work neatness ,cleanliness and accuracy	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	3	–	–	–	–	–	3	3	–	3	–	–
2	3	–	3	3	–	–	3	3	3	3	–	–
3	3	–	3	3	–	–	3	3	3	3	–	–
4	3	–	3	3	–	–	–	3	–	3	–	–
5	3	–	3	3	–	–	–	3	3	3	–	–
6	3	–	3	3	–	–	–	3	3	3	–	–

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Engineering Drawing Practice for Schools and Colleges IS: SP-46	Bureau of Indian Standards, Third Reprint, October 1998	81-7061-091-2
2.	Engineering Drawing	N.D. Bhatt Charotar Publishing house 2010	978-93-80358-17-8
3.	Machine Drawing	N.D. Bhatt &V. M Panchal, Charotar Publishing house, 2010	978-93-80358-11-6
4	Engineering Drawing	D.A. Jolhe Tata McGrawHill Edu.2010	978-0-07-064837-1

5.	Engineering Drawing	R. K. Dhawan , S..Chand & co. 2001	81-219-1431-0
6	Engineering Drawing	P. J Shah. S.Chand&co.2008	81-219-2964-4

❖ **E-REFERENCES:**

- <https://www.youtube.com/watch?v=TJ4jGyD-WCw>, assessed on 25th March 2016
- https://www.youtube.com/watch?v=dmt6_n7Sgcg, assessed on 25th March 2016
- https://www.youtube.com/watch?v=_MQScnLXL0M, assessed on 26th March 2016
- <https://www.youtube.com/watch?v=3WXPanCq9LI>, assessed on 26th March 2016
- <https://www.youtube.com/watch?v=fvj7k7PlxAuo>, assessed on 27th March 2016
- <http://www.me.umn.edu/courses/me2011/handouts/engg%20graphics.pdf> , assessed on 27th March 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

- 1) Drawing Board with drawing instruments
- 2) Mini-drafter

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. O. V. Sarode	I/C, Head of Mechanical Engineering	Government Polytechnic, Nagpur.
2.	Mr. M.G. Thote	Lecturer in Mechanical Engineering	Government Polytechnic, Nagpur.
3.	Mr. G.H. Dahole	Lecturer in Mechanical Engineering	Government Polytechnic, Nagpur.
4	Er. Ritesh Jain	Deputy Manager	Mahindra and Mahindra Ltd. Nagpur
5	Er. A.M.Onkar	Chief Executive Officer	Onkar Furnitures, MIDC, Nagpur
6	Mr. G.F.Potbhare	Principal	NIT, Polytechnic, Nagpur
7	Dr. S.S.Baraskar	Lecturer in Mechanical Engineering	Govt. Polytechnic, Arvi

(Member Secretary PBOS)

(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME : DIPLOMA IN CE/ME/EE/EC/AE/PK/MT/TX
LEVEL NAME : ENGINEERING SCIENCES AND TECHNICAL ARTS COURSES
COURSE CODE : WS301E
COURSE TITLE : WORKSHOP PRACTICE
PREREQUISITE : NIL
TEACHING SCHEME : TH: 00; TU: 00; PR: 04(CLOCK HRs.)
TOTAL CREDITS : 02 (1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE : Nil
PR. TEE EXAM : Nil
PT. EXAM : Nil

❖ RATIONALE:

Workshop Practice is an engineering science course. The knowledge of this course is essential for technician industry to perform his/her duties. Working in workshop develops the attitude of groups working and safety awareness. This course provides industrial environment in the educational institute.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Adapt safety precautions in workshop
2. Read and interpret job drawing
3. Use hand tools for various operations
4. Apply basic techniques in manufacturing processes
5. Operate different equipments/machineries used in basic shops
6. Perform jobs according to drawing

❖ COURSE DETAILS:

A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
NIL			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	Observe the demonstration of hand tools, machine Tools and equipments used in Carpentry Shop. Draw the sketches; write specifications, details, applications and safety rules of above tools.	Carpentry	2
2.	Prepare utility job involving related carpentry operations. (Job to be prepared by group of 2 to 4 students depending on volume of work)		8
3.	Observe the demonstration of hand tools, machine Tools and equipments used in Welding Shop. Draw the sketches; write specifications, details, applications and safety rules of above tools.	Welding	2
4.	Prepare utility job involving related Welding operations. (Job to be prepared by group of 2 to 4 students depending on volume of work)		8
5.	Observe the demonstration of hand tools, machine Tools and equipments used in Fitting Shop. Draw the sketches; write specifications, details, applications and safety rules of above tools.	Fitting	2
6.	Prepare One individual job involving related Fitting operations.		8
7.	Observe the demonstration of hand tools, machine Tools and equipments used in Smithy Shop. Draw the sketches; write specifications, details, applications and safety rules of above tools.	Smithy	2
8.	Prepare One individual job involving related Smithy operations.		8
9.	Observe the demonstration of hand tools, machine Tools and equipments used in Plumbing Shop. Draw the sketches; write specifications, details, applications and safety rules of above tools.	Plumbing	2
10.	Prepare One individual job involving related Plumbing operations.		8
11.	Observe the demonstration of hand tools, machine Tools and equipments used in Sheet Metal Shop. Draw the sketches; write specifications, details, applications and safety rules of above tools.	Sheet Metal	2
12.	Prepare utility job involving related Sheet Metal Shop operations. (Job to be prepared by group of 2 to 4 students depending on volume of work)		8
Skill Assessment			4
Total Hrs.			64

Note: Jobs should be Programme specific.

❖ **SPECIFICATION TABLE FOR THEORY PAPER:**

Nil

❖ **QUESTION PAPER PROFILE FOR THEORY PAPER:**

Nil

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	40	--	Jobs, Rubrics & Assessment Sheets	1, 2, 3, 4,5,6
		Record		Continuous	10	--	Journals	1, 2, 3, 4,5,6
				TOTAL	50	20		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF JOB EVALUATION:**

S.N.	Description	Max. Marks
1	Job Drawing	5
2	Handling Tools, machineries and its operations	10
3	Dimension Accuracy	20
4	Overall finishing of Job	5
Total		40

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:****For Mechanical Engineering:**

Course Outcomes (COs)	Program Outcomes (POs)										PSO	PSO
	1	2	3	4	5	6	7	8	9	10	1	2
1	3	-	3	3	-	-	3	3	-	3	3	-
2	3	-	3	3	-	-	-	3	3	3	3	-
3	3	-	3	3	-	-	-	3	3	3	3	-
4	3	-	3	3	-	-	-	3	-	3	3	-
5	3	-	3	3	-	-	3	3	-	3	3	-
6	3	-	3	3	-	-	3	3	3	3	3	-

For Other Programs:

Course Outcomes (COs)	Program Outcomes (POs)										PSO	PSO
	1	2	3	4	5	6	7	8	9	10	1	2
1	3	-	3	3	-	-	3	3	-	3	-	-
2	3	-	3	3	-	-	-	3	3	3	-	-
3	3	-	3	3	-	-	-	3	3	3	-	-
4	3	-	3	3	-	-	-	3	-	3	-	-
5	3	-	3	3	-	-	3	3	-	3	-	-
6	3	-	3	3	-	-	3	3	3	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	A Course in Workshop Technology	B.S. Raghuwanshi; Dhanpat Rai sons, New Delhi ; 2006, 2011	10-0000017108
2.	Elements of Workshop Technology	Hajra; Choudhary; Media Promoters & Publishers Mumbai, 2009	10-8185099146
3.	A Textbook of Manufacturing Process (Workshop Tech.)	Gupta J.K., R.S. Khurmi S.Chand & Co. New Delhi	81-219-3092-8
4.	Workshop Practice Manual For Engineering Diploma & ITI Students	R K Hegde, Sapna Book House, 2012	13: 9798128005830

❖ **E-REFERENCES:**

<http://books.google.co.oin/books/isbn=9380026757> , assessed on 17th March 2016

<http://www.asnu.com.au/profile/our-process.aspx> , assessed on 17th March 2016

<https://www.youtube.com/watch?v=swnEQ17cQW>, assessed on 17th March 2016

<https://www.youtube.com/watch?v=c-FN4M77qyA>, assessed on 17th March 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

1. Welding Transformer (Air Cooled) Single Phase
2. Welding Transformer (Oil Cooled) Three Phase
3. Gas Welding Set
4. Bench Drilling Machine
5. Hydraulic Power Saw Machine
6. Bench Grinder
7. Bench Vise
8. Wood Turning Lathe Machine
9. Circular Saw Machine
10. Portable Wood Cutting Machine
11. Portable Drilling Machine
12. Carpentry Vice
13. Pipe Bending Machine
14. Pipe Vice
15. Pipe Cutter
16. Black smith Hearth
17. Anvil
18. Swage Block
19. Sheet Bending Machine
20. Sheet Cutting Machine
21. Brazing Equipment
22. All Hand Tools and Measuring Tools use in Carpentry Shop, Fitting Shop, Welding Shop, Plumbing Shop, Smithy Shop and Sheet Metal Shop,

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	D. C. Satadeve	Workshop Superintendant	Government Polytechnic, Nagpur.
2.	Dr. S. W. Rajurkar	Lecturer in Mechanical Engineering	Government Polytechnic, Nagpur.
3.	Er. A.M.Onkar	Chief Executive Officer	Onkar Furnitures, MIDC, Nagpur
4.	Shri. G.F.Potbhare	Principal	NIT, Polytechnic, Nagpur
5.	Dr.S.S.Baraskar	Lecturer in Mechanical Engineering	Govt. Polytechnic, Arvi

(Member Secretary PBOS)

(Chairman PBOS)



GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: ENGINEERING SCIENCES AND TECHNICAL ARTS COURSES
COURSE CODE	: AM303E
COURSE TITLE	: APPLIED MECHANICS
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 03; TU: 01; PR: 02 (CLOCK HRs.)
TOTAL CREDITS	: 05 (1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
PREREQUISITE	: NIL
TH. TEE	: 03 HRs
PR. TEE	: 02 HRs (Internal)
PT.	: 01 HR

❖ **RATIONALE:**

Textile manufacture students should know the facts, concepts and working principles of various machines used in Textile mills. This course describes concepts and principles of force and friction which is involved in working of machines. This course also provides basic elementary knowledge about working of lifting machines used in mills as well as properties of materials used for machines. It is also useful in understanding effects of forces, Simple Harmonic motion and mechanism of various types of belts.

❖ **COURSE OUTCOMES:**

After completing this course students will be able to–

1. Apply concept of engineering mechanics in textile field.
2. Analyze effect of force, friction and simple harmonics motion.
3. Calculate tension Belt and Gear drive.
4. Prove simple laws of equilibrium of forces.
5. Find mechanical advantage, velocity ratio, efficiency and law of machine for various lifting machines.
6. Test metals for different mechanical properties.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs
1. Force	1. Define terms related to force. 2. State different theorems. 3. State system of forces. 4. Resolve forces 5. Find resultant force. 6. Apply conditions of equilibrium.	1.1 Concept of force, definition of force and its unit. 1.2 System of forces (coplanar, concurrent, non-concurrent, parallel forces). 1.3 Varignon's theorem of moment and its applications. 1.4 Composition and resolution of forces. 1.5 Condition of Equilibrium (analytical). 1.6 Lami's Theorem-definition, conditions, simple numerical.	8
2. Friction	1. Define terms related to friction. 2. Recall advantages and disadvantages of friction. 3. State laws of friction. 4. Find frictional force; pull required on horizontal and inclined surfaces.	2.1 Concept of friction and its importance in engineering, types of friction, Laws of friction, limiting equilibrium, limiting friction, coefficient of friction, angle of friction, angle of repose, relation between co-efficient of friction and angle of friction. 2.2 Equilibrium of bodies on level surface and inclined surfaces subjected to parallel and inclined forces.	6
3. Simple harmonic motion (SHM)	1. Recall important terms related to SHM. 2. State conditions of SHM. 3. Calculate velocity and acceleration of a particle moving with SHM.	3.1 Introduction. 3.2 Important terms: amplitude, oscillation, beat, periodic time, frequency. 3.3 Conditions of SHM. 3.4 Velocity and acceleration of particle moving with SHM.	6
4. Simple lifting machine	1. Define terms related to simple lifting machine. 2. Calculate V.R. for various lifting machines. 3. Compute mechanical advantage, velocity ratio and efficiency of simple lifting machines. 4. Draw graphs between load and effort, load and mechanical advantage, load and efficiency.	4.1 Concept of simple lifting machine, uses of machine, definition of load, effort, mechanical advantage, velocity ratio, efficiency of machines, reversible and non-reversible machines. 4.2 Ideal machine, friction in machine, law of machine, maximum mechanical advantage and max. Efficiency. 4.3 Velocity ratios of simple axle and wheel, differential axle and wheel, Single purchase and double purchase crab, simple screw jack,	5

		Weston's differential pulley block, geared pulley block, two sheave and three sheave pulley block, worm and worm wheel	
5. Stress-strain and Elastic constants	1. Define terms related to stress, strain. 2. State Hooks law. 3. Calculate stress strain for homogeneous materials. 4. Calculate linear strain, lateral strain, Poisson's ratio, modulus of elasticity, modulus of rigidity and Bulk's modulus.	5.1 Definition of stress, strain, modulus of elasticity. 5.2 Hooks law 5.3 Definition of lateral strain, Poisson's ratio, Bulk modulus, volumetric strain, modulus of rigidity. 5.4 Volumetric strain and change in dimensions due to uniaxial, biaxial and triaxial stresses. 5.5 Relation between modulus of elasticity, modulus of rigidity and bulk modulus.	8
6. Transmission of Power	1. State types of Belt and Belt drives (open and cross). 2. Calculate Velocity Ratio and length of belts in Belt drives. 3. Calculate ratio of tension in Belts and power transmitted by Belts. 4. State advantages and disadvantages of different drives. 6. Compute power transmitted by a belt and ratio of tensions.	6.1. Types of Belts- flat, V, Circular. 6.2. Velocity ratio of simple Belt drive. 6.3. Types of Belt drives (open and cross). 6.4. Length of the Belt – Open and Cross belt drive. 6.5. Power transmitted by a belt and ratio of tensions. 6.6. Rope drive- Advantages. 6.7. Gear drive- Advantages, disadvantages, Velocity ratio and power transmitted by simple gear drives. 6.8. Epicyclical gear train- definition. Velocity ratio, speed and power transmitted by epicyclical gear train (compound- sun and planet wheel, Bevel wheels) using Tabular and Algebraic method.	15
Total Hrs.			48

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Prove Lami’s theorem.	Force	02
2	Verify the conditions of equilibrium for coplanar concurrent forces.		02
3	Compare co-efficient of friction between different surfaces.	Friction	02
4	Find Mechanical advantage, Velocity ratio, Efficiency and Law of Machine for Differential axle and wheel.	Simple Lifting Machines	02
5	Find Mechanical advantage, Velocity ratio, Efficiency and Law of Machine for Worm and worm wheel		02
6	Find Mechanical advantage, Velocity ratio, Efficiency and Law of Machine for Simple Screw Jack.		02
7	Find Mechanical advantage, Velocity ratio, Efficiency and Law of Machine for Single purchase crab		02
8	Find Mechanical advantage, Velocity ratio, Efficiency and Law of Machine for Double purchase crab		02
9	Find Mechanical advantage, Velocity ratio, Efficiency and Law of Machine for Two sheave pulley block		02
10	Find Mechanical advantage, Velocity ratio, Efficiency and Law of Machine for Three sheave pulley block		02
11	Identify the parts of Universal Testing Machine and write their functions.	Stress-strain	02
12	Identify the parts of Compression Testing Machine and write their functions		02
13	Perform Tension Test on mild steel bar		02
14	Perform Tension test on HYSD steel bar		02
15	Perform Shear Test on different metals.		02
Skill Assessment			02
Total Hrs.			32

C. TUTORIALS:

Sr. No.	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Resultant of concurrent & non concurrent forces.	Force	02
2	Equilibrium for concurrent & non concurrent forces.		02
3	Friction between different surfaces.	Friction	02
4	Velocity & acceleration of particle subjected to simple harmonic motion..	Simple Harmonic Motion	02
5	Mechanical advantage, Velocity ratio, Efficiency and Law of Machine for Simple Lifting Machines.	Simple Lifting Machines	02
6	Stress, strain, module of elasticity of materials	Simple Stress and Strain	04
7	Power transmitted by the belt and ratio of tensions.	Transmission of Power	02
Total Hrs.			16

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Force	08(02)	04(04)	00(00)	12 (06)
02	Friction	02(00)	00(04)	06(00)	08(04)
03	Simple harmonic motion	02(00)	08(00)	00 (06)	10(06)
04	Simple lifting machine	02(00)	04(08)	04(00)	10(08)
05	Stress-strain and Elastic constants	04(04)	04(04)	04(00)	12(08)
06	Transmission of Power by Belt, Rope and Gear.	00(02)	06(00)	12 (06)	18(08)
	Total	18(08)	26(20)	26 (12)	70 (40)

R – Remember

U – Understand

A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER:

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	2	R	2	3	R	2	4	R	2	5	R	2	5	R	2	1	R	2	5/7
	6	R	2																
02	1	R	4	1	U	4	2	U	4	2	U	4	1	U	4				3/5
03	1	R	4	4	U	4	5	A	4	4	U	4	4	U	4				3/5
04	4	A	4	3	U	4	5	U	4	5	U	4	5	R	4				3/5
05	2	A	6	6	A	6	6	U	6										2/3
06	6	A	6	6	A	6	3	A	6										2/3

T= Unit/Topic Number

L= Level of Question

M= Marks

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Drawing free body diagram, selection of equipment's. writing procedure etc.	20
2	Calculation, Result, Drawing Graphs(if any)	10
3	Viva voce	20
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	3	-	-	-	-	-	-	-	-	-	-	-
2	3	-	-	-	-	-	-	-	-	-	-	-
3	3	-	-	-	-	-	-	-	-	-	-	-
4	3	-	3	3	-	-	-	3	2	-	-	-
5	3	-	3	3	-	-	-	3	2	-	-	-
6	3	-	3	3	-	-	-	3	2	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE AND TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	A Textbook of Engineering Mechanics	R.S. Khurmi, S. Chand Publishing, 20 th Edition, 2008	8121926165
2.	Strength of Materials	R.S. Khurmi, S. Chand Publishing, 24 th Edition,	9788121928229
3.	Engineering Mechanics: Part One, Statics	F.L. Singer, Harper and Row, Publishers, 1975	10: 0060462329 13: 9780060462321
4.	Strength of Materials	S. Ramamrutham, Dhanpat Rai Publishing Company Ltd. Pvt, 2004	10: 818743354X
5.	Engineering Mechanics	Sunil S. Deo, Nirali Prakashan, 2013	10: 9381595550

❖ **E REFERENCE:**

- <https://www.youtube.com/watch?v=-JG9IEqRzQ4>
- <https://www.youtube.com/watch?v=4VIhh6sGkrI>
- <https://www.youtube.com/watch?v=EcPGKLUe04I>
- <http://nptel.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Machine%20design1/pdf/mod13les1.pdf>

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

1. Differential axle and wheel (wall mounted unit with the wheel of 40 cm diameter and axles are in steps of 20 cm and 10 cm reducing diameter giving a ratio of 1:2:4 ; with common axis and supported on ball bearings in iron brackets. With necessary slotted weights, hanger and thread)
2. Worm and worm wheel (wall mounted unit with threaded spindle, load drum, effort wheel; With necessary slotted weights, hanger and thread)
3. Simple screw Jack (Table mounted metallic body , screw with a pitch of 5mm carrying a double flanged turn table of 20 cm diameter fitted on steel base and complete with two adjustable pulleys, cords and hooks.)
4. Single Purchase Crab winch (Table mounted heavy cast iron body. The effort wheel is of C.I. material of 25 cm diameter mounted on a shaft of about 40mm dia. On the same shaft a geared wheel of 15 cm dia shall be mounted. The teeth of this pinion wheel shall mesh with another (spur) toothed wheel of 30 cm diameter. This spur wheel shall be mounted on another axle to which a load drums of about 7.5 cm diameter. With necessary slotted weights, hanger and thread)
5. Double Purchase Crab winch (Having assembly same as above but with double set of gearing arrangement.)
6. Universal Force Table (Consists of a circular 40 cm dia. Aluminum disc, graduated into 360 degrees. Complete with leveling screws clamping devices to fix the table at any desired angle, six sliding clamp pulleys, control ring, string and six sets of iron nickelled slotted weights)
7. Universal Testing machine of capacity 400kN, 600 kN/1000kN, analog type/digital type with all attachments and accessories.
8. Compression testing machine of capacity 2000KN, analog /digital type having facility to measure deformation with all attachments and accessories.

❖ **LIST OF EXPERTS AND TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Y.K. Chandarana	Head of Applied Mechanics Dept.	Government Polytechnic, Nagpur.
2.	H.L.Wahane	Lecturer in Applied Mechanics	Government Polytechnic, Nagpur.
3	M. R. Shelote	Consultant	M. R. Associates, Nagpur
4.	Dr. R. N. Khapre	Associate Professor	RCOE, Nagpur
5.	A. J. Fulzele	Assistant Secretary (Tech.)	MSBTE, RO, Nagpur

 (Member Secretary PBOS)

 (Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: ENGINEERING SCIENCES AND TECHNICAL ARTS COURSES
COURSE CODE	: EE 307E
COURSE TITLE	: BASIC ELECTRICAL TECHNOLOGY
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 04; TU: 00; PR: 02 (CLOCK HRs.)
TOTAL CREDITS	: 05(1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE EXAM	: 03 HRs
PR. TEE EXAM	: 02 HRs (Internal)
PT. EXAM	: 01 HR

❖ RATIONALE:

Textile Manufacture students should know basics of electrical technology. This course describes the basic facts, concepts & principles for the understanding of basic elementary knowledge related to electrical area. In routine work of textile supervisor's deals with the electrical machineries and installations, therefore they should know the operation and maintenance of electrical machines and installations. This course describes the basic features of electrical safety, fundamentals of electricity, DC/AC machines, measurement and electrical installations in textile industries

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Interpret electrical circuit diagram & wiring layout diagrams.
2. Apply principle and basic laws in electrical engineering.
3. Solve simple electrical circuits
4. Connect electrical measuring instruments and electrical motors.
5. Record the readings of various electrical meters.
6. Use various motors for different applications.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1. Electrical Safety	1. Recall electrical safety rules. 2. Remove the electrocuted person from live conductor 3. Interpret electrical safety signs and symbols 4. Carry out different methods of artificial respiration on electrocuted person 5. Use fire-fighting equipment on different types of fires. 6. Classify various types of earthing. 7. State the need of earthing.	1.1 Electrical Safety, Causes of accidents, General safety rules, Concept of electrical shock, Effect of electric shock, Method of removing electrocuted person, Safety signs and symbols. 1.2 Artificial respiration-Schaefer's method, Silvestre's method, mouth to mouth respiration. 1.3 First Aid 1.4 Fire, Causes of Fire, Basic ways of extinguishing the fire Classification of fire, Class A, B,C, D, Fire fighting equipments, fire extinguishers, and their types . 1.5 Earthing-Necessity of earthing,, methods of reducing earth resistance.	6
2. Fundamentals of electricity	1. Define the various electrical parameters 2. Select the different types of materials for particular applications. 3. State various laws and its applications. 4. Calculate the temperature coefficient of resistance of conductor.	2.1 Concept of electric charge, current, voltage drop, EMF, potential difference, Direction of current and their SI units. 2.2 Various effect of electric current- heating effect and magnetic effect, Applications of Heating Effect of Electric Current, Joule's law(numerical based on it) 2.3 Resistance, unit of resistance, Law of resistance (Factors affecting resistance), Effect of temperature on resistance, temperature coefficient of resistance, Ohms law. (Numerical problems based on 2.3) 2.4 Conductors, insulators, semiconductors used in electrical system. 2.5 Work, power, energy definition and their SI units, Relation between H.P and watts, Kwh and Kcal.	12
3. AC Fundamentals	1. Define terms related to AC fundamentals 2. Compare terms time period and frequency, angular velocity and frequency, frequency and speed. 3. Compare single phase and three-phase AC circuits. 4. State types of load.	5.1 Generation of alternating voltage- single phase and three-phase. 5.2 Equation of sinusoidal alternating voltage and current, important terminology such as- waveform, instantaneous value, cycle, time period, frequency, amplitude, Relation between time period and frequency, angular velocity and frequency, frequency and speed. 5.3 Single- phase and three-phase AC	10

	5. Draw connection diagram for measurement of power in single phase and three phase circuits.	circuits there comparison. 5.4 Types of loads 5.5 Measurement of voltage, current and power in Single- phase and three-phase circuit.	
4. Transformer	1. State Law of electromagnetic induction 2. Solve problems related to transformer. 3. Describe the concept of transformation ratio, KVA rating of transformer, 4. Classify the different types of transformer. 5. Compare shell type and core type transformer	4.1 Single phase Transformer – Introduction, Principle of operation, 4.2 types of transformer, shell type and core type, their construction, comparison, and applications 4.3 EMF equation (No derivation), transformation ratio, KVA rating of transformer, (Simple Numerical problem based on emf equation and transformation ratio only).	8
5 DC and AC Motors	1. Classify different types of AC & DC motors. 2. Select the particular motor for particular application in metallurgical process. 3. Describe construction and principle of AC machines. 4. Draw connection diagrams of different motors.	5.1 Broad classification of A.C & D.C motor. 5.2 DC Motor- General working principle, types, application. Connection diagrams with starters, reversible direction of rotation. 5.3 AC Motor-Three phase induction motors, types, working principle, application and selection for different applications. Connection diagrams with starters, reversible direction of rotation. 5.4 Single-phase induction motors- principle of operation, their types, connection diagrams, applications, and reversible direction of rotation.	6
6. Illumination and Wiring	1. Define terms related to illumination 2. State laws of Illuminations. 3. Solve simple problems on calculation of number of lamps 4. Identify different types of wiring accessories. 5. Select different accessories for particular type of installation. 6. Classify different types of wires. 7. Draw wiring layouts.	6.1 Terms used in illumination 6.2 Laws of Illumination 6.3 Lux levels in different shops in textile industry 6.4 Calculation of number of lamps (simple problems) 6.5 Wiring accessories- test lamp, switches, Fuses, ICDP, ICDB, ICTP, MCB, ELCB, their selection, rating and application. 6.6 Wires – types, Specification and selection for particular use. 6.7 Wiring connections-One point control from one place, two places, three places and go-down wiring.	6
Total Hrs.			48

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Use firefighting equipment on fire and execute safety precautions in laboratory	Electrical safety	2
2	Measure the unknown resistance using ohms law.	Fundamentals of Electricity	2
3	Analyze the current and voltage relationship in series and parallel DC circuit.		2
4	Use test lamps for testing single-phase and three – phase supply. Use of test lamp for earth continuity. Use of tester on single-phase supply		2
5	Measure the current, voltage and power in single phase AC circuit.	AC Fundamentals	2
6	Measure the current, voltage and power in three phase AC circuit.		2
7	Find voltage transformation ratio of single-phase transformer.	Transformer	2
8	Perform different test on electric motor such as continuity test, earth fault test, insulation resistance test using Megger.	Drives	2
9	Start DC shunt motor and to reverse the direction of rotation.		2
10	Start single-phase capacitor start induction motor and to reverse the direction of rotation.		2
11	Start three-phase induction motor using starters and to reverse the direction of rotation.		2
12	Identify different electrical accessories like switches, socket outlets, ELCB, MCB, ICTP, ICDP, fuses etc.	Wiring	2
13	Perform conduit wiring on board (any one circuit)		2
14	Connect single phase energy meter, ICDP, DBto the electrical circuit.		2
15	Measure the lux level using lux meter for different luminaries.		2
Skill Assessment			2
Total Hrs			32

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Electrical Safety	02(00)	08(00)	00(06)	10(06)
02	Fundamentals of electricity	02(02)	08(00)	06(06)	16(08)
03	AC Fundamentals	02(04)	08(04)	06(00)	16(08)
04	Transformer	02(02)	04(04)	06(00)	12(06)
05	AC & DC Motors	04(00)	04(08)	00(00)	08(08)
06	Illumination & Wiring	02(00)	00(04)	06(00)	08(04)
	Total	14(08)	32(20)	24(12)	70(40)

R – Remember

U – Understand

A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER:

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	2	R	2	3	R	2	4	R	2	6	R	2	2	R	2	5/7
	4	R	2																
02	1	U	4	1	U	4	2	U	4	3	R	4	3	U	4				3/5
03	2	U	4	3	U	4	3	U	4	4	U	4	5	U	4				3/5
04	5	R	4	4	U	4	5	U	4	5	U	4	6	U	4				3/5
05	2	A	6	3	A	6	1	A	6										2/3
06	4	A	6	6	A	6	2	A	6										2/3

T= Unit/Topic Number

L= Level of Question

M= Marks

R-Remember

U-Understand

A-Analyze/ Apply

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Drawing circuit diagram/ selection of equipment's/ writing procedure etc.	10
2	Performance	20
3	Calculation/Result/ Drawing Graphs (if any)	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	3	-	-	-	-	-	1	-	-	-	-	-
2	3	-	-	-	-	-	-	-	-	-	-	-
3	3	-	-	-	-	-	-	-	-	-	-	-
4	3	-	2	2	-	-	-	2	-	2	-	-
5	3	-	2	2	-	-	-	2	-	2	-	-
6	3	-	2	2	-	-	-	2	-	2	-	-

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Principle of Electrical Engineering and Electronics	V.K.Mehta, S.Chand& Company Ltd., Reprint, 1996	81-219-1053-6
2.	A Text Book Of Electrical Technology Vol-I	B. L. Theraja, A. K. Theraja, S. Chand & Co Ltd., Reprint,2006	81-219-2440-5
3.	Basic Electrical Engineering	V. N. Mittle, Arvind Mittal, The McGraw Hill Education Pvt. Ltd, Reprint, 2011	13: 978-0-07-059357-2
4.	Experiments in Basic Electrical Engineering	S. K. Bhattacharya and K. M. Rastogi., New Age International Publisher, Reprint, 2009.	978-81-224-1042-6
5.	A Text Book on laboratory courses in Electrical Engineering	S. G. Tarrekar and P. K. Kharbanda, S. Chand& Company Ltd., Third, 1990	13: 978-8121901048

❖ **E-REFERENCES:**

- <http://nptel.ac.in/courses/108108076/1> , assessed on 18th January 2016
- <http://www.electrical4u.com> , assessed on 18th January 2016
- <https://www.youtube.com/watch?v=A9KSGAnjo2U>, assessed on 18th January 2016

- www.learnerstv.com/Free-engineering-Video-lectures-ltv059-Page1.htm assessed on 28th Feb 2016
- www.studyaaar.com/index.../11-basic-electrical-a-electronics-engineerin assessed on 28th Feb 2016
- www.faadooengineers.com/.../448-BASIC-ELECTRICAL-ENGINEERIN assessed on 28th Feb 2016.

❖ LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION

1. Ammeter MI 0-5-10 A
2. Voltmeter MI 0-150-300 V
3. Wattmeter 0-3000 W
4. Digital Multi-meter
5. Rheostat assorted sizes
6. DC Shunt Motor
7. Three Phase squirrel cage Induction Motor
8. Single-phase capacitor start induction motor
9. Lux Meter

❖ LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:

S.N.	Name	Designation	Institute / Industry
1.	Dr. C.S.Thorat	Principal	Government Polytechnic, Nagpur.
2.	Mrs. K. M. Gaidhane	I/C, Head of Electrical Engineering	Government Polytechnic, Nagpur.
3.	Mr. R. I. Kamble	Lecturer in Electrical Engineering	Government Polytechnic, Nagpur.
4.	Mrs. S. P. Thote	Lecturer in Electrical Engineering	Government Polytechnic, Nagpur.
5.	Dr. R. S. Surjuse	Lecturer in Electrical Engineering	Government Polytechnic, Nagpur.
6	Mr. G. V. Gotmare	Lecturer in Electrical Engineering	Government Polytechnic, Nagpur.
7	Mr. H, N. Kharkar	Lecturer in Electrical Engineering	Government Polytechnic, Nagpur.
8	Mr. N. H. Adkine	Lecturer in Electrical Engineering	Government Polytechnic, Nagpur.
9	Mrs. A. P. Gandhi	Lecturer in Electrical Engineering	Government Polytechnic, Nagpur.
10	Mr. R. Y. Ghormade	HOD, Electrical Engineering	Dharampeth Polytechnic, Nagpur
11	Mr. B. P. Bale	Dy. Engineer.	MSDCL, Nagpur
12	Dr. S. S. Bharatkar	Lecturer in Electrical Engineering	Government Polytechnic, Amravati

(Member Secretary PBOS)

(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURING
LEVEL NAME	: ENGINEERING SCIENCE AND TECHNICAL ART COURSES
COURSE CODE	: EC309E
COURSE TITLE	: APPLIED ELECTRONICS
PREREQUISITE	: NIL
TEACHING SCHEME:	TH: 04; TU: 00; PR: 02 (CLOCK Hrs.)
TOTAL CREDITS	: 05 (1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE	: 03 HRs
PR. TEE	: 02 HRs (Internal)
PT.	: 01 HR

❖ RATIONALE:

Modern equipment have electronic devices. Understanding the principles of electronic devices is therefore essential for diploma technicians. This course contemplates identification and testing of components, their principles of working of various electronic devices and signal conditioning. This subject also introduces the concepts of mechatronics and PLC.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Identify different electronic components.
2. Illustrate working of electronic circuits.
3. Verify truth tables of combinational and sequential circuits.
4. Assemble simple electronic circuits used in textile field.
5. Test electronics components and circuits.
6. Interpret various parameters of electronic circuits

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs
1 Solid State Devices and Diode Circuits	1. Draw symbols of various components. 2. Describe the working principle 3. List out applications of electronic devices. 4. Sketch the circuit diagram with relevant waveforms for rectifiers and filters.	1.1 <u>Solid State Devices:</u> Definition of active and passive device. Schematic symbols, working principle and applications and specifications of 1.1.1 Resistors, Inductors, Capacitors 1.1.2 PN junction diode, Zener Diode 1.1.3 BJT, SCR 1.1.4 Photo-devices – LDR, Photodiode, 1.1.5 Displays – 7-segment Display, 1.1.6 Switches –Toggle, SPDT,DPDT,SPST,DPST 1.1.7 Relays – Electromagnetic, Dry reed 1.1.8 Optocouplers (No Constructional details) 1.2 <u>Diode Circuits:</u> Circuit Diagram, Working Principle & Waveforms of – 1.2.1 Half wave Rectifier 1.2.2 Full wave Rectifier 1.2.3 Bridge Rectifier 1.2.4 Comparison of all above 1.2.5 Filter Circuits –CLC(PI)	15
2 Digital Electronics	1. Draw the symbol for various logic gates. 2. Write the truth table for various logic gates and combinational circuits. 3. Differentiate between combinational and sequential logic circuits. 4. Describe features of microprocessor.	2.1 Number Systems: 2.1.1 Decimal Number System 2.1.2 Binary Number System 2.1.3 Conversion of Decimal to Binary and vice versa 2.2 Logic Gates: Symbol, truth table and logical expression of 2.2.1 Basic Gates: AND, OR, NOT 2.2.2 Universal Gates: NAND, NOR 2.2.3 Exclusive Gates: XOR, XNOR 2.3 Combinational Circuits (block diagram and truth table, working) (K-map and relisation	14

		using gates are not expected.) 2.3.1 Half Adder 2.3.2 Half Subtractor 2.3.3 Multiplexer (4:1), Demultiplexer(1:4) 2.4 Sequential Circuits (block diagram and truth table, working) (conversion and excitation table not expected.): 2.4.1 Flip-Flops – RS, Applications 2.4.2 Decade Counter 2.4.3 Shift register 2.5 Introduction to Microprocessors 2.5.1 Concept of Bus, clock, ALU, Bit, Byte, Nibble, flowchart, algorithm, programming, compiler. (Definition only) Block diagram, features and applications of 8085 microprocessors	
3 Transducers and Signal Conditioning	1. Define different terms related to transducers. 2. Classify different types of transducers. 3. Describe operation of ADC and DAC. 4. Draw waveforms 5. Describe the process of AC and DC signal conditioning.	3.1 Transducers 3.1.1 Definition 3.1.2 Classification – Active/Passive, Primary/Secondary, Electrical, Mechanical, Optical and their examples 3.1.3 LVDT 3.1.4 Strain Gauge 3.1.5 Bourdon Tube 3.1.6 RTD, Thermistors 3.1.7 Photovoltaic cell 3.1.8 Tachometers 3.2 Signal Conditioning 3.2.1 Need of Signal Conditioning 3.2.2 Block diagram of AC and DC signal conditioning 3.2.3 Block diagram, Working and applications of Operational amplifier • Virtual ground concept, • Inverting, Non inverting amplifier, • Integrator, Differentiator, • Block diagram of Instrumentation amplifier. 3.2.4 AC and DC bridges, Wheatstone bridge- working principle and applications. 3.3 Data Converters	15

		3.3.1 Block diagram and working of successive approximation ADC 3.3.2 Block diagram and working of R-2R DAC	
4 Introduction of Control System	1. Describe the basic control system. 2. Differentiate between different control systems. 3. Select a particular control system as per the need. 4. Describe the function of a position control systems.	4.1 Definitions of Control system 4.2 Classification of control system 4.3 Block diagram of control system 4.4 Operating Principle, Advantages, disadvantages of open loop & closed loop control systems 4.5 Transfer function of open loop and closed loop control system 4.6 Principle of DC position control system and AC position control system	08
5 Fundamentals Of Mechatronics	1. State the meaning, need and basic concept of mechatronics. 2. Enlist the features of real time mechatronics. 3. State the advantages, disadvantages of mechatronics.	5.1 Concept of mechatronics 5.2 Basic elements of mechatronics 5.3 Overview of mechatronics design 5.4 Concept of Process modelling and simulation	06
6 Programmable Logic Controller	1. Describe the basic PLC architecture. 2. Describe the working of PLC. 3. Enlist the specification of PLC. 4. Select PLC for particular application	6.1 Basic arrangement of PLC system 6.2 Principle of PLC 6.3 Mechanical parts of PLC system 6.4 Selection of PLC 6.5 PLC applications 6.6 Commercial specifications of PLC	06
Total Hrs.			64

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practical's	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Use Digital Multimeter for followings- 1. DC and AC voltage measurement. 2. DC and AC current measurement. 3. Different resistance measurement. 4. Component testing.(diode, capacitor, transistor) & continuity tester	Introduction	04
2	Operate Function generator for followings functions- 1. Different function selection. 2. Amplitude & Frequency changing with course and fine control. 3. Effect of DC shift		04
3	Operate Cathode Ray Oscilloscope for followings- 1. Specifications & list of applications. 2. Front panel controls & their functions. 3. Observing different waveforms. 4. Measurement of amplitude and frequency		04
4	Identify and test different electronics components, packages and draw symbols.	Solid state Devices and Diode circuits	02
5	Assemble the circuit for rectifier(half wave / full wave / bridge rectifiers) and observe its waveforms.		02
6	Observe and verify the truth table for AND/OR/NOT logic gates.	Basics of Digital Circuits	02
7	Observe and verify the truth table for combinational circuits. (Adder /Subtractor/ Mux/ De-mux)		02
8	Observe and verify the truth table for sequential circuits. (RS flip flop / decade counter / shift register)		02
9	Measure linear displacement using LVDT.	Transducers and Signal Conditioning	02
10	Assemble Inverting/ Non-inverting amplifier using op-amp and calculate gain.		02
11	Operate AC / DC position control system	Control Systems	02
12	Operate various PLC modules.	Programmable Logic Controller	02
Skill Assessment			02
Total Hrs			32

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Solid State Devices And Diode Circuits	02(04)	04(04)	04(00)	10(08)
02	Digital Electronics	06(00)	04(04)	04(06)	14(10)
03	Transducers And Signal Conditioning	02(04)	04(06)	04(00)	10(10)
04	Introduction Of Control System	02(04)	04(04)	00(00)	06(08)
05	Fundamentals Of Mechatronics	02(00)	10(04)	06(00)	18(04)
06	Programmable Logic Controller	06(00)	06(00)	00(00)	12(00)
	Total	20(12)	32(22)	18(06)	70(40)

R – Remember

U – Understand

A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER:

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	2	R	2	3	R	2	4	R	2	5	R	2	1	R	2	5/7
	1	R	2																
02	2	R	4	2	U	4	1	U	4	3	R	4	4	R	4				3/5
03	3	A	4	4	U	4	1	A	4	2	U	4	1	U	4				3/5
04	3	U	4	2	A	4	5	U	4	4	U	4	5	U	4				3/5
05	5	U	6	5	A	6	3	U	6										2/3
06	6	R	6	6	U	6	2	A	6										2/3

T= Unit/Topic Number

L= Level of Question

M= Marks

R-Remember

U-Understand

A-Analyze/ Apply

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Drawing circuit diagram, selection of equipment's. writing procedure etc.	10
2	Performance	20
3	Calculation, Result, Drawing Graphs(if any)	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)										POS	
	1	2	3	4	5	6	7	8	9	10	1	2
1	3	-	-	-	-	-	-	-	-	3	-	-
2	3	-	-	-	-	-	-	-	-	3	-	-
3	3	-	-	-	-	-	-	-	-	3	-	-
4	3	-	2	2	-	-	-	2	-	3	-	-
5	3	-	2	2	-	-	-	2	-	3	-	-
6	3	-	2	2	-	-	-	2	-	3	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

REFERENCE & TEXT BOOKS:

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	A Textbook of Applied Electronics	R.L.Sedha, S.Chand & Co.,	13: 978-8121904209
2.	Operational Amplifiers	R.Gaikwad, Printice Hall of India,	8174092080
3.	Digital Electronics....	R.P.Jain,, Tata McGrawHill,	9780070669116
4	Microprocessor and its applications with 8085	Ramesh Gaonkar, Penram International, 5 th Edition.	8131803562
5	Electrical and Electronic Measurements & Instrumentation	A.K.Sawhney, Dhanpat Rai & Sons,	8177001013
6	Electronics Instrumentation	H.K. Kalsi Pub. Tata McGraw Hill	0-07-462186
7	Control System Engineering	I.J. Nagarath and M. Gopal John Wiley and Sons, 5th Edition ,2000	13: 978-1848290037
8	Programmable logic control	F. D. PETRUZELLA, Tata-McGraw Hill, 4th Edition.	978 – 07-351088-0.
9	Introduction to programmable logic controllers	Garry Dunning, 3rd Edition; Thomson	13: 9781401884260

❖ **E-REFERENCES:**

- ❖ www.learnelectronicsonline.com , assessed on 4th May 2016
- ❖ www.instructables.com/id/Basic-Electronics, assessed on 4th May 2016
- ❖ Learnabout-electronics.Org, assessed on 4th May 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

1. Voltmeter MI 0-150-300 V
2. Digital Multi-meter
3. CRO
4. Function Generator
5. Regulated Power Supply
6. PLC Trainer

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. S. S. Tadas	Head of Electronics & telecomm Engineering	Government Polytechnic, Nagpur.
2.	Mrs. M.N. Bawane	Lecturer in Electronics Engineering	Government Polytechnic, Nagpur.
3.	Mr. V. A. Rahate	Lecturer in Electronics Engineering	Government Polytechnic, Nagpur.
4.	Mr. D. A. Brahmanekar	Lecturer in Electronics Engineering	Government Polytechnic, Nagpur.
5.	Mrs. H.R. Bhusari	Lecturer	Government Polytechnic, Nagpur
6.	Ms. K. P. Yenurkar	Lecturer	Government Polytechnic, Nagpur
7.	Ms. K. G. Giri	Lecturer	Government Polytechnic, Nagpur

 (Member Secretary PBOS)

 (Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: ENGINEERING SCIENCES AND TECHNICAL ARTS COURSES
COURSE CODE	: TX301E
COURSE TITLE	: FABRIC STRUCTURE AND DESIGN
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 02; TU: 00; PR:04 (CLOCK HRs.)
TOTAL CREDITS	: 04 (1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE	: NIL
PR. TEE	: 02 HRs (Internal)
PT. EXAM	: 01 HR

❖ RATIONALE:

The quality of woven fabric depends on its functional and aesthetic properties. These in turn are governed by raw material selection, yarns used, fabric construction, structure and texture, and ornamentation of fabric. Some of the end uses emphasize only on the functional aspects and others on functional and aesthetic aspects. In this context fabric structure is of immense importance. In this course the basics of fabric structure with reference to weave, raw materials, feel, weight and appearance are covered.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Apply basic design principles and structures to woven fabrics.
2. Construct different weaves of fabric and represent them on graph sheet
3. Draw graph paper design of colour and weave effect
4. Prepare graphical representation of the weave
5. Develop design on a graph paper
6. Analyze fabric samples for design, draft, peg plan with quality particulars

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1. Fundamentals of Fabric Structure	1. Identify Warp and Weft 2. Measure EPI/ PPI of the Fabric 3. Define Weave, Draft, Lifting plan and denting order 4. Calculate the weight in GSM of the fabric	1.1 Concept of warp & weft 1.2 Basic operation in woven fabric production 1.3 Concept of interlacement of warp & weft 1.4 Method of fabric representation on point paper 1.5 Concept & definition of weave/design, weave repeat, draft, denting order & lifting plan. 1.6 Fabric quality parameters- Material of warp & weft, warp count weft count, EPI & PPI, warp cover factor, weft cover factor, fabric cover factor, weight in grams/sq.m. 1.7 Types of drafts – Straight draft, Skip draft, pointed draft, sateen draft.	04
2. Plain weave and its derivatives	1. Draw the cross section of the plain weave 2. Identify warp Rib, Weft Rib, Hopsack and Mat weaves 3. Differentiate quality parameters of different fabrics	2.1 Construction of plain woven fabrics Design, draft, lifting plan & denting order 2.2 Characteristic features of plain woven fabric, Interlacing Diagram of Plain weave, Cross – sectional views of plain weave. Derivatives of plain weaves - Warp Rib weaves ,Weft Rib weaves , Hopsack, Mat or Basket weaves 2.3 Quality particulars of Standard plain woven fabrics: Poplin, Voile, Cambric, Chiffon, Dhoti	04
3 Twill weave and its derivatives	1. Classify the twill weaves 2. Draw the different twill designs 3. Construct different twill based weaves	3.1 Standard twill woven fabrics- Basic Twills , Characteristic features of twill woven fabric , Classification of basic twills , Balanced twill-Design, draft, denting order & lifting plan 3.2 Unbalanced twill- Warp faced twill- Design, draft, denting order & lifting plan with cross section. 3.3 Unbalanced twill – Weft faced	08

		twill- Design, draft, denting order & lifting plan with cross section. 3.4 Weaves Constructed on Twill Bases Design, draft, denting order & lifting plan of following twills (a) Pointed twill (b) Waved twill © Broken twill (d) Herringbone twill (e) Transposed or Re arranged twill (f) Curved twill (g) Elongated twill (h) Combinations of twill weaves 3.5 Quality particulars of Standard Twill Woven Fabrics: Denim, drill.	
4. Satin/Sateen weaves and its derivatives.	1. Classify the different types of sateen weaves 2. Distinguish between satin and sateen weaves 3. Draw the different types of satin and sateen weaves	4.1 Characteristic feature of satin & sateen woven fabrics 4.2 Concept of move number for development of satin & sateen structure. 4.3 Development of regular satin & sateen weave 4.4 Draft, denting order & lifting plan of regular satin & sateen 4.5 Development of irregular satin & sateen weave	04
5. Colour & Weave effect	1. Describe colour and weave effect 2. Differentiate weaves with different colour patterns	5.1 Concept of colour & weave in combination 5.2 Classifications of colour & weave effect 5.3 Representation of colour & weave effect on design paper. 5.4 Examples of simple colour & weave effect 5.5 a) Continuous line effect b) Hound's tooth patterns c) Bird's eye & spot effects	04
6. Fancy Fabric Structures.	1. Draw different crepe weaves 2. Draw Huck-a-back structures 3. Draw Honeycomb structures 4. Draw Mock-leno structures	6.1 Study of design, draft, denting order & lifting plan 6.2 Crepe weaves developments a) Construction of crepe weaves upon sateen bases. b) Crepe weaves produced by reversing method.	08

		6.3 Development of Huck-a-Back structures. 6.4 Development of Honey-comb structures. a) Ordinary Honey-comb structures. b) Brighton Honey-comb structures. 6.5 Development of Mock- Leno Structure (8 x8, 10x10)	
Total Hrs.			32

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Prepare graphical representation of weave/design, weave repeat, draft, denting order & lifting plan.	Fundamentals of Fabric Structure	4
2	Analyse given plain weave fabric sample for its material of warp & weft, warp count weft count ,EPI & PPI, warp cover factor, weft cover factor, fabric cover factor, weight in grams/sq.mtr of		6
3	Analyse and draw design, draft, & lifting plan of following designs i) Warp Rib weaves ii) Weft Rib weaves iii) Hopsack, Mat or Basket weaves in the given fabric samples	Plain weave and its derivatives	8
4	Analyse and draw design , draft, & lifting plan of following twills i) Pointed twill ii) Waved twill iii) Broken twill iv) Herring bone v) Transposed or Re arranged twill vi) Curved twill vii) Elongated twill viii) Combinations of twill weaves	Twill weave and its derivatives	14
5	Analyse and draw, design, draft & lifting plan of satin and sateen weaves	Satin/Sateen weaves and its derivatives.	8
6	Draw following effect by simple colour& weave combination on graph paper : i) Continuous line effect ii) Hounds Tooth Pattern iii) Birds eye effect	Colour& Weave effect	10
7	Develop design on graph paper i) Honeycomb ii) Huckaback iii) Mock-Leno	Fancy Fabric Structures	6
8	Develop design on a graph paper. i) crepe, ii) diamond,		6
Skill Assessment			2
Total Hrs			64

❖ **SPECIFICATION TABLE FOR THEORY PAPER: NIL**

❖ **QUESTION PAPER PROFILE FOR THEORY PAPER: NIL**

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	1, 2, 3, 4,5,6
		Journal Writing		Continuous	05	--	Journal	1, 2, 3, 4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	1, 2, 3, 4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Draw design, draft and peg plan.	20
2	Fabric Analysis	10
3	Fabric calculation (GSM and Cover factor)	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	-	-	-	-	-	3	-	-
2	-	3	-	-	-	-	-	-	-	3	3	-
3	-	3	-	-	-	-	-	-	-	3	3	-
4	-	3	-	-	-	-	-	-	-	3	3	-
5	-	3	-	-	-	-	-	-	-	3	3	-
6	-	3	-	-	-	-	-	-	-	3	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Woven Cloth Construction	A. T. C. Robinson R Marks, Textile Institute Manchester, 1967	9781489958556
2	Watson's Textile Design and Colour: Elementary Weaves and Figured Fabrics. 7th ed.	Watson, William Grosicki, Z. J Published by Newnes Butterworths, 1979	10: 0408705159 / 9780408705158
3	Watson's Advanced Textile Design	Z. J. Grosicki , Woodhead Publishing	9781855739963/
4	Grammar of Textile Design	H. Nisbet, Abhishek Publisher,	9788182475144

❖ **E-REFERENCES:**

- 1 <http://www.textileassociationindia.org> accessed on 10th September 2016
- 2 <http://www.fiber2fashion.org/> accessed on 10th September 2016
- 3 <http://www.nift.ac.in/> accessed on 10th September 2016
- 4 www.itamma.org/ accessed on 10th September 2016
- 5 www.en.wikipedia.org/wiki/Textile_design accessed on 10th September 2016
- 6 <http://www.designdiary.nic.in/> accessed on 10th September 2016
- 7 <http://textilelearner.blogspot.in> accessed on 10th September 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

- 1 Hand loom for sample preparation
- 2 Pick counting glass
- 3 Pick glass to find out EPI, PPI, twist direction and type of weaves
- 4 Beesley balance
- 5 Electronic balance
- 6 Counting lens
- 7 Cutting template
- 8 Scissors
- 9 Measuring scales
- 10 Educational videos/animation films on preparation of different fabric structures
- 11 Fabric Analysis sheets
- 12 Fabric samples of different weaves

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S. S. Lawand	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6.	Mr. R. N. Yadav.	President	Mohota Spg and Wvg Mill, Hinganghat, Wardha
7.	Prof. G. S. Kakad	Head of Textile Department	JDIET, Yavatmal

 (Member Secretary PBOS)

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GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: ENGINEERING SCIENCES AND TECHNICAL ARTS COURSES
COURSE CODE	: TX302E ^{\$}
COURSE TITLE	: ADVANCED FABRIC STRUCTURE
PREREQUISITE	: TX301E
TEACHING SCHEME	: TH: 03; TU: 00; PR: 04 (CLOCK HRs.)
TOTAL CREDITS	: 05 (1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE	: 03 HRs
PR. TEE EXAM	: 02 HRs (Internal)
PT. EXAM	: 01 HR

1. RATIONALE:

Knowledge of special woven structures and its ornamentation is required as per the specific need of industries and society. It is necessary to develop design on graph paper with all necessary details like weave, draft, peg-plan and denting required for actual fabric production on machine. This course is aimed to provide the necessary knowledge, skills and attitudes to produce compound fabric structures like- Bedford cord, pique, pile fabrics and warp backed, weft backed, gauze and leno structures.

2. COURSE OUTCOMES:

After completing this course students will be able to–

1. Apply design concepts of compound fabric structures
2. Apply design principles to produce compound fabric structures
3. Prepare cross sectional diagram of the weaves
4. Develop design on a graph paper
5. Collect various fabric samples with compound weaves and their quality parameters
6. Analyze sample of fabric for weave, design, draft, peg plan with quality particulars

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1. Bedford cord and welt structures	1. Classify Bedford cord designs 2. Describe the methods for producing cord effects 3. Draw design draft peg plan & cross section of Bedford cord structures. 4. Prepare design, draft, peg plan and cross section of Ordinary Pique structure.	1.1 (a). Concept of cutting ends and cord ends. (b) Planning for number of repeats based on number of cord ends and cutting ends in the repeat (c) Construction of Plain-Faced Bedford cord. (d) Draft, denting order and lifting plan. (e) Development of Bedford cord arranged with different widths of the cord. (f) Cross-sectional view of plain-faced Bedford cord. 1.2 Development of Bedford cord arranged with alternate picks. (a) Twill Faced Bedford Cord Formation. (b) Wadded Bedford cord Structures. (c) Concept of wadding ends. (d) Requirements of number of wadding ends to be arranged for development of Bedford Cords. 1.3 (a) Plain faced Wadded Bedford Cord design development with draft, denting and lifting plan. (b) Cross-sectional view of plain faced Wadded Bedford Cord. 1.4 (a) Twill faced Wadded Bedford Cord design development with draft, denting and lifting plan. (b) Cross-sectional view of Wadded twill faced Bedford cord. 1.5 Pique Structures: (a) Development of pique. (b) Special requirements for development of pique structures during weaving process. (c) Ordinary pique structures with cross-sectional views	10
2. Backed Structures	1. State the uses of backed cloth.	2.1 Concept development and purpose of manufacturing of	06

	2.Prepare design, draft, peg plan and cross section for warp backed, weft backed structure 3 Describe the loom equipment for producing backed fabric	Backed Cloths, Types of Backed Cloths. 2.2 Step by step development of Warp Backed Cloth. 2.3 Step by step development of Reversible Warp Backed Cloth.	
3. Stitched Double Cloths	1.Classify double cloth fabrics 2.Describe the methods of producing the double cloth. 3.Prepare design, draft, peg-plan and cross section of double cloth on graph paper. 4.State loom equipments required to produce Double cloth	3.1 Development of stitched double cloths, Classification of double cloths. 3.2 Simple schematic diagrams of double cloths, Construction of double cloth 3.3 Development of Reversible double cloth designs. 3.4 Beaming and drafting of self-stitched double cloths	08
4. Figuring With Extra Threads	1.State use of extra warp and weft threads for ornamentation 2.Compare extra warp and extra weft figuring in fabrics 3. Describe method of Extra warp figuring 4. Prepare point paper designs of extra weft figuring weave	4.1 Object of extra threads for ornamentation, Principles of figuring with Extra Materials. 4.2 Methods of introducing Extra Figuring Threads, Methods of disposing of the surplus Extra Threads 4.3 Extra Warp figuring 4.4 (i)Continuous figuring in one extra warp (ii) Intermittent figuring in one extra warp 4.5 Extra Weft Figuring. i. Continuous figuring in one Extra Weft ii. Intermittent in one Extra Weft 4.6 Comparison of Extra Warp with Extra Weft	06
5. Leno Structures	1.Describe Leno structures 2.State the methods of producing Leno structures 3.Prepare point paper designs of leno weave 4. List the types of leno sheds	5.1 Describe the Leno structures with uses, Principle of Leno Structure. 5.2 Basic sheds of Leno Weaving 5.3 Methods of producing Leno structure. 5.4 Leno weaving flat steel doup	08
6. Pile Structures	1.Classify pile structures 2.State the methods of producing velveteens 3.Prepare warp pile structures 4.Describe the methods of producing terry piles. 5.Compare between various pile structures	6.1 Pile Structures: Classification of pile structure 6.2 Weft pile structures (a) Development of weft pile structure (b) Classification of velveteens (c) All-over velveteens (d) Corded velveteen	10

		(e) Design of plain back velveteen Length and density of pile 6.3 Warp Pile structures (a) Development of warp pile structures (b) Formation of terry pile (c) Terry weaves (d) Special Mechanism required in terry weaving. (e) Introduction to Warp Pile Fabrics produced with aids of wires	
Total			48

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	Draw Structural design for ‘Bedford cords’ on graph paper and analyse following fabrics (a) Plain Face Bedford cord structure (b) Twill face Bedford cord structure (c) Wadded Bedford cord structure arranged on alternate pick	Bedford cord and Pique structures	08
2	Draw the Structural design of Pique on graph paper and analyse the fabrics for Ordinary Pique structure		04
3	Draw structural design for warp and weft Back fabric and analyse the fabrics	Backed Structures	06
4	Draw Structural design for ‘Double Cloth’ on graph paper.	Stitched Double Cloths	04
5	Analyse double cloth samples		04
6	Analyse the fabric for Design, Draft and Peg Plan of Extra warp figuring		04
7	Analyse the fabric for Design, Draft and Peg Plan of Extra weft figuring .	Figuring With Extra Threads	04
8	Prepare chart of shed formation in leno weaving		04
9	Analyse the leno fabric	Leno Structures	04
10	Draw designs, draft and peg plan for Leno Design on graph paper and analyse the fabric		06
11	Draw designs, draft, peg plan & cross section for ‘Terry piles’ weft pile for the following. a) All over or plain Velveteen b) Corded Velveteen or Courduroys / Fustians d) Terry Piles (3 pick, 4 pick, 5 pick,) e) Wire piles	Terry Piles	06
12	Draw designs, draft, peg plan Warp pile and weft pile structure		08
Skill Assessment			2
Total			64

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Bedford cord and welt structures	02(00)	10(04)	04(04)	16(08)
02	Backed Structures	04(00)	00(04)	04(00)	08(04)
03	Stitched Double Cloths	02(04)	06(02)	04(02)	12(08)
04	Figuring With Extra Threads	02(00)	06(04)	00(02)	08(06)
05	Gauze and Leno Structures	04(00)	04(06)	04(00)	12(06)
06	Pile Structures	02(04)	10(00)	02(04)	14(08)
	Total	16(08)	36(20)	18 (12)	70 (40)

R – Remember

U – Understand

A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	4	R	2	3	R	2	3	R	2	6	R	2	1	A	2	3	R	2	5/7
	3	R	2																
02	2	R	4	3	U	4	5	R	4	3	R	4	2	A	4				3/5
03	2	A	4	5	U	4	5	A	4	1	U	4	1	A	4				3/5
04	1	A	4	3	A	4	1	A	4	6	R	4	6	A	4				3/5
05	1	U	6	4	U	6	5	U	6										2/3
06	6	U	6	1	U	6	4	U	6										2/3

T= Unit/Topic Number

L= Level of Question

M= Marks

R-Remember

U-Understand

A-Analyze/ Apply

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		Questionnaires	1, 2, 3, 4,5,6
	End Of Course			End Of The Course				

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Drawing weave plan on graph paper	10
2	Fabric Analysis	20
3	Calculation, Result, Drawing Graphs	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	-	-	-	-	-	-	3	-
2	-	3	-	-	-	-	-	-	-	-	3	-
3	-	3	-	-	-	-	-	-	-	-	3	-
4	-	3	3	3	-	-	-	3	3	3	3	-
5	-	3	3	3	-	-	-	3	3	3	3	-
6	-	3	3	3	-	-	-	3	3	3	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1	Watson's Textile Design and Colour: Elementary Weaves and Figured Fabrics. 7th ed.	Watson, William Grosicki Z J, Newnes- Butterworths, 1979	9780408705158
2	Watson's Advanced Textile Design	Z. J. Grosicki , Woodhead Publishing,	9781855739963/
3	Grammar of Textile Design	H.Nisbet , Abhishek Publisher, Chandigarh	9788182475144

❖ **E-REFERENCES:**

- 1 <http://www.textileassociationindia.org/> accessed on 5th September 2016
- 2 <http://www.fiber2fashion.org/> accessed on 5th September 2016
- 3 <http://www.nift.ac.in/> accessed on 5th September 2016
- 4 www.itamma.org/ accessed on 5th September 2016
- 5 www.en.wikipedia.org/wiki/Textile_design accessed on 5th September 2016
- 6 <http://www.designdiary.nic.in/> accessed on 5th September 2016
- 7 <http://textilelearner.blogspot.in> accessed on 5th September 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

1. Hand loom for sample preparation
2. Pick counting glass
3. Pick glass to find out EPI, PPI, twist direction and type of weaves
4. Beesley balance
5. Electronic balance
6. Counting lens
7. Cutting template
8. Scissors
9. Measuring scales
10. Educational videos/animation films on preparation of different fabric structures
11. Fabric Analysis sheets
12. Fabric samples of different weaves

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S. S. Lawand	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6.	Mr. R. N. Yadav.	President	Mohota Spg and Wvg Mill, Hinganghat, Wardha
7.	Prof. G. S. Kakad	Head of Textile Department	JDIET, Yavatmal

 (Member Secretary PBOS)

 (Chairman PBOS)

LEVEL - IV

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: PROFESSIONAL COURSES
COURSE CODE	: TX401E
COURSE TITLE	: COTTON OPENING AND CLEANING
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 03; TU: 00; PR: 02(CLOCK HRs.)
TOTAL CREDITS	: 04(1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE EXAM	: 03 HRs
PR. TEE EXAM	: 02 HRs (Internal)
PT. EXAM	: 01 HR

❖ RATIONALE:

Cotton accounts for almost 50% of the worldwide consumption of textile fibres. To convert cotton fibre into yarn, knowledge of fibre characteristics, ginning, baling, opening and cleaning is essential to produce high quality yarns. This course imparts necessary knowledge of selection and working of cleaning and blending machinery for different grades of fibres and anticipated wastes.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Identify cotton fibre parameters to produce quality yarns.
2. Identify objects of each process of yarn manufacturing.
3. Apply principles of cotton opening, cleaning and mixing in blow room.
4. Select cotton fibre for given mixing
5. Use the blow room machines to clean cotton
6. Maintain blow room machines to supply uniform open material to card.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1 Raw materials	1. Classify textile fibres based on their origin and chemical nature. 2. State physical properties of fibres essential for spinning.	1.1 Define and classify textile fibres, generic names of man-made fibres. 1.2 Essential physical properties of fibres required for spinning.	03
2. Cotton varieties, Ginning and baling	1. Identify different cotton varieties and areas of cultivation. 2. Describe cotton picking and ginning process. 3. Outline bale characteristics.	2.1 Important cotton varieties and areas of cultivation. 2.2 Cotton picking – hand and machine picking. 2.3 Cotton ginning – single roller, double roller and saw gins and faults produced in ginning. 2.4 Cotton pressing and baling, bale dimensions and density.	06
3 Yarn classification and process flow chart	1. Classify different types of yarns. 2. Draw flow chart of spinning process. 3. Describe objects, functions, and machine sequence.	3.1 Classification of yarns. 3.2 Flow chart for conversion of cotton fibres to yarn. 3.3 Object, input, and output of each stage of yarn manufacturing process.	03
4 Blow room	1. State the necessity for relaxation of given bale material before opening. 2. Identify characters of feeding devices used in blow room. 3. Select opener to clean given type of cotton fibre. 4. Describe grid bars setting to achieve desired waste levels. 5. Describe the working of a mixer for given type of cotton fibre mixing. 6. Illustrate cleaner machine parameters to achieve desirable cleaning effect for given type of fibre. 7. Distinguish features of various openers and cleaners used in blow room.	4.1 Conditioning of raw materials. 4.2 Feeding devices 4.3 Opening – Type of opening and degree of opening, intensity of opening. 4.4 Opening devices and opening operations. 4.5 Cleaning – mechanical cleaning, Grid and mote knives. Elements of grid, adjustments of grid bars, Interaction of feed assembly, opening element and grid, air flow cleaning, Cleaning efficiency and resistance to cleaning, factors influencing opening and cleaning. 4.6 Machine zones: a. Machines in opening zone: Conventional bale openers and hopper feeders, Automatic bale opening machines.	24

	8. Justify various systems in blow room, such as- Dust extraction, metal extraction, Fire elimination for removal of dust, prevention of damage and fire.	b. Coarse cleaners: Basics, Step cleaner, Axi- flow cleaner, Mono cylinder cleaner. c. Mixing/blending machines: Basics, manual mixing, Modern mixer. d. Fine cleaning: Basics, modern fine cleaners. e. Intensive cleaning: Basics, modern intensive cleaners. f. De-dusting machines: Basics, modern de-dusting machines. g. Separation of foreign fibre and metals, application in modern blow room line.	
5 Material regulation and transportation.	1. State application of different means of material transport in blow room. 2. Describe Control of material flow by various mechanisms. 3. State waste disposal arrangements in blow room.	5.1 Transport of material: conveyor belts, lattices and spiked lattices, pneumatic transport – basic principle, separation of air and material. 5.2 Control of material flow: a. Stop-go operation- swing doors, optical sensors. b. Continuous operation – piano feed regulating, electronically by Feed commander. 5.3 Waste disposal.	06
6. Blow room lines and production calculations	1. Select sequence of blow room machines for different materials. 2. Calculate blow room production and cleaning efficiency.	6.1 Sequence of modern blow room lines for different materials. 6.2 Calculations related to blow room production.	06
Total Hrs.			48

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Prepare chart showing characteristics of cotton varieties with commercial names used in various mixings	Cotton varieties, Ginning and baling	2
2	Draw diagram and identify important parts of ginning machine by visiting ginning center.		4
3	Prepare chart of process sequence of spinning with objects of each department by visit to spinning mills.	Yarn process sequence flow chart	4
4	Record the sequence of machines in blow room after watching the video.	Blow room	4
5	Record the operations of bale opening machinery in blow room after visit to a spinning mill.		4
6	Record the operations of cotton mixing machinery in blow room after visit to a spinning mill.		4
7	Record the openers/cleaners with its working parameters in blow room after watching the video of blow room.		4
8	Draw material regulating system and calculate production of blow room after watching the video of blow room.	Material regularity And calculations	4
Skill Assessment			2
Total Hrs			32

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Raw materials	06(02)	00(00)	00(00)	06(02)
02	Cotton varieties, Ginning and baling	04(00)	08(04)	00(00)	12(04)
03	Yarn classification , Yarn manufacture flow chart	04(02)	00(04)	00(00)	04(06)
04	Bow room	00(00)	16(08)	20(08)	36(16)
05	Material regulation and transportation.	00(00)	06(06)	00(00)	06(06)
06	Blow room lines and production calculations	00(00)	00(00)	06(06)	06(06)
	Total	14(04)	30(22)	26(14)	70 (40)

R – Remember U – Understand A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			Option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	1	R	2	1	R	2	3	R	2	3	R	2	3	R	2	5/7
	1	R	2																
02	2	R	4	2	U	4	2	U	4	2	U	4	3	U	4				3/5
03	4	U	4	4	U	4	4	U	4	4	U	4	4	U	4				3/5
04	4	U	4	4	A	4	4	A	4	4	A	4	4	A	4				3/5
05	4	A	6	5	U	6	5	U	6										2/3
06	4	A	6	6	U	6	6	A	6										2/3

T= Unit/Topic Number,

L= Level of Question,

M= Marks

R-Remember, U-Understand,

A-Analyze/ Apply

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Procedure	10
2	Process analysis	20
3	Calculation, Result	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (COs)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	-	-	-	-	-	2	3	-
2	-	3	-	-	-	-	-	-	-	2	3	-
3	-	3	-	-	-	-	-	-	-	2	3	3
4	-	3	2	-	-	-	-	2	2	-	3	3
5	-	3	2	1	-	-	-	2	2	-	3	3
6	-	3	2	1	-	-	-	2	2	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1	Introduction to Textile Fibres	H V S Murthy , The Textile Association, India	--
2	Technology of Short Staple Spinning- Vol. I	W. Klein, The Textile Institute Manchester, 1986	0 900739 91 6
3	The Practical Guide To Opening and Carding- Vol. 2.	W. Klein, The Textile Institute Manchester, 1986	0-900739 92 4
4	Elements of Raw Cotton and Blow room	Prof A K. Khare , Sai Book Centre,	-
5	Textile Yarns, Technology, Structure and Applications	B C Goswami, J G Martindale, F L Scardino, Mahajan Book Distributors, Ed 1977	81-85401-04-07
6	Spun Yarn Technology	Eric Oxtoby, Butterworth an Co. Ltd, London, 1987	0-408-01464-4

❖ **E-REFERENCES:**

1. <http://www.rieter.com/cz/rikipedia/articles/technology-ofshort-staple-spinning/opening/general-considerations-regarding-opening-andcleaning//>accessedon 10th April, 2016
2. <http://www.cottonyarnmarket.net/OASMTTP/BLOW%20ROOM.pdf>accessedon 10th April, 2016
3. <http://www.truetzschler-spinning.com/en/products/blow-room/technical-highlights-blow-room/>accessedon 10th April, 2016
4. <http://www.indiantextilejournal.com/articles/FAdetails.asp?id=2010>accessedon 10th April, 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

- Textile Laboratory –
Blow room machine set up
Conventional and modern machines
Ginning machines

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S. S. Lawand	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6	Mr. S. G. Gaikwad	Lecturer in Textile Technology	MSBTE Representative
7	Mr. R. N. Yadav.	President	Mohota Spg and Wvg Mill, Hinganghat, Wardha
8	Prof. G. S. Kakad	Head of Textile Department	JDIET, Yavatmal

 (Member Secretary PBOS)

 (Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: PROFESSIONAL COURSES
COURSE CODE	: TX402E
COURSE TITLE	: SLIVER FORMATION
PREREQUISITE	: TX401E
TEACHING SCHEME	: TH: 03; TU: 00; PR: 04(CLOCK HRs.)
TOTAL CREDITS	: 05(1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE EXAM	: 03 HRs
PR. TEE EXAM	: 02 HRs (Internal)
PT. EXAM	: 01 HR

❖ RATIONALE:

This is the most important part of the spinning process, because the quality of the final yarn depends on the quality of the intermediate products from which it is made. Complete cleaning of raw material is achieved at carding machine. Draw frame machine imparts order and evenness to the material in sliver form. Upgrading of raw material requires removal of short fibres which is achieved by combing. The object of this course is to have a thorough understanding of the detailed operations involved in these processes and to know the relationships involved in the interplay of various functions.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Apply carding process to individualize and clean fibres and form sliver
2. Impart order and evenness to the material in sliver form using draw frame process.
3. Upgrade quality of raw material using combing process
4. Maintain carding machine parameters to produce quality slivers.
5. Use draw frame machines to achieve fibre parallelization and sliver uniformity.
6. Set comber machines to eliminate predetermined quantity of short fibres.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1 Carding	1. List objects of carding. 2. State functions each part of carding machine. 3. Select settings at licker in and flats to Control the waste. 4. Identify features of additional cleaning at licker in and cylinder zones. 5. Describe various doffing devices at doffer. 6. Classify fibre orientation in the web delivered.	1.1 (a)Objects of carding (b) passage of material through modern card (c) Carding and stripping/doffing actions. 1.2 Operating zones of card: (a)Feed zone: Concepts of lap feed and chute feed, conventional and unidirectional feed to licker in. (b)Licker in zone :Licker in, waste removal, carding plates/comb bars, additional licker ins(c) Cylinder zone, pre and post carding stationery flats, under casing (d) Flats, control of flat strips (e)Doffer, fibre transfer efficiency, hook formation and classification (f) Doffing devices (g) Coiling.	10
2. Carding quality, maintenance and calculations	1. Distinguish between flexible and metallic card clothing. 2. Choose right type of auto-leveler. 3. Maintain and set card for Quality and production. 4. List steps to control neps and cleaning efficiency of card. 5. Calculate card production and linear density of sliver.	2.1 Card clothing: (a) Classification (b) Flexible clothing (c) Metallic clothing (d) Geometry of wire points (e) Clothing specifications for different materials. 2.2 Auto leveling: Types, measuring devices, principles of short, medium and long term auto leveling. 2.3 Maintenance: Stripping, burnishing and grinding. 2.4 Card settings and its importance. 2.5 Cleaning efficiency, waste losses and nep control at card. 2.6 Draft and production calculations	08
3. Draw frame	1. State objects of doubling and roller drafting 2. Describe principles of roller Drafting. 3. Describe draw frame machine and drafting parameters. 4. List features of different drafting systems. 5. Enlist measures to control sliver uniformity.	3.1 Objects of Draw frame, principles of roller drafting – drafting force, stick-slip effect, floating fibres, fibre friction field and fibre control. 3.2 Principles of doubling and evenness. 3.3 Ideal drafting. 3.4 Construction and working of Draw frame. Creel, drafting arrangements, roller setting,	12

	6. Calculate machine production.	factors affecting draft, elements of drafting arrangements –bottom rollers, top rollers, cots, cot maintenance, top roller loading systems, suction system. 3.5 Use of auto levelers. 3.6 Drafting systems: 3/3 roller drafting with pressure bar, 4/3 roller drafting, 5/4 roller drafting. 3.7 Web collection, trumpets, coiling system, cans, auto can changing. 3.8 Draft, doubling and production calculations. 3.9 Control of sliver uniformity and defects at draw frames.	
4. Preparation for combing	1. Identify pre-comber machine parameters to produce quality sliver laps. 2. State effect of lap preparation on comber performance.	4.1 Objects of comber lap preparation. 4.2 Study of different combinations of machines used for comber lap preparation. Effect of lap preparation on comber performance. 4.3 Concept of fibre hooks presentation at the comber. 4.4 Defective production at these machines and remedies for the same.	06
5. Principles of Combing	1. Specify objects of comber. 2. Identify machine setting that affect combing quality. 3. Enumerate steps to control noil extraction.	5 Objects combing, sequence of operation of comber, degree of combing. Noil extraction in forward and backward feed, yarn quality and noil% at comber, influence of machine components and settings on combing quality.	04
6. Comber operations and calculations	1. Describe various parts of comber and their sequence of operation. 2. Draw timing chart of comber. 3. Calculate noil and Production of comber.	5.1 Detailed description of comber machine, Passage of material through comber, Creel, feeding arrangement, nipper assembly, nipper movement, circular comb, half lap, top comb and its operation, piecing and operation of detaching rollers, web collection, aspirator, brush and waste collection, 5.2 Timing diagram of operation of comber. 5.3 Production, draft and noil% calculations.	08
Total Hrs.			48

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	a. Draw passage of material through card. b. Draw and identify various zones of carding machine.	Carding	06
2	a. Calculate speeds, drafts, machine constants, and production rate from gearing plan of given carding machine. Find gear change places on machine to control sliver hank and production. b. Record card clothing particulars for different materials. c. Set various parts of card with tools and gauges for given type of material. d. Record by observing grinding of card wire points. e. Record the schedules of cleaning and maintenance activities to maintain machine in good mechanical condition. f. Record methods to control waste and nep levels on the machine. g. Record by observing use of auto-leveler on card to control sliver uniformity.	Carding quality, maintenance and calculations	14
3	a. Draw passage of material through Draw frame. b. Draw and identify various zones of Draw frame. c. Determine the speeds, drafts, machine constants, and production rate from the gearing plan of given Draw frame. Find gear change places on machine to control sliver hank and production. d. Record the schedules of cleaning and maintenance activities and prepare detail chart of various activities. e. Determine hank and U% of sliver produced.	Draw frame	14
4	a. Draw passage of material through sliver lap machine. Make a chart of machine and process parameters. b. Draw passage of material through ribbon lap machine. Make a chart of machine and process parameters. c. Draw passage of material through super lap machine. Make a chart of machine and process parameters.	Preparation for combing	08
5	a. Draw passage of material through comber machine. b. Set various parts of comber machine with tools/gauges to control the comber performance and noil extraction.	Principles of Combing	06
6	a. Identify and draw various parts of comber machine. b. Demonstrate timing chart of comber. c. Determine speeds of each part from gearing plan of comber and. Identify gear change places of comber machine to control hank and production rate. d. Determine percentage of within and between combers noil removed. e. Schedule the cleaning and maintenance activities and prepare detailed chart of their activities.	Comber operations and calculations	14
Skill Assessment			2
Total Hrs			64

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Carding	02(02)	08(04)	00(06)	10(12)
02	Carding quality, maintenance and Calculations	04(00)	04(04)	06(00)	14(04)
03	Draw frame	02(04)	14(04)	04(00)	20(08)
04	Preparation for combing	04(00)	00(06)	04(00)	08(06)
05	Principles of Combing	00(00)	06(00)	00(04)	06(04)
06	Comber operations and calculations	02(02)	04(04)	06(00)	12(06)
	Total	14(08)	36(22)	20(10)	70 (40)

R – Remember U – Understand A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	2	R	2	3	R	2	5	R	2	6	R	2	1	R	2	5/7
	5	R	2																
02	1	U	4	3	U	4	4	U	4	1	U	4	3	U	4				3/5
03	1	R	4	3	U	4	4	U	4	2	U	4	6	R	4				3/5
04	2	U	4	3	A	4	6	A	4	3	A	4	6	U	4				3/5
05	1	U	6	5	A	6	3	A	6										2/3
06	2	U	6	6	A	6	4	U	6										2/3

T= Unit/Topic Number L= Level of Question M= Marks

R-Remember U-Understand

A-Analyze/ Apply

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Procedure	10
2	Process analysis	20
3	Calculation and interpretation of the result	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	-	-	-	-	-	2	3	3
2	-	3	-	-	-	-	-	-	-	2	3	3
3	-	3	-	-	-	-	-	-	-	2	3	3
4	-	3	3	3	-	-	-	3	3	-	3	3
5	-	3	3	3	-	-	-	3	3	-	3	3
6	-	3	3	3	-	-	-	3	3	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1	Technology of Short Staple Spinning- Vol. I	W. Klein, The Textile Institute Manchester, 1986	0 900739 91 6
2	The Practical Guide To Opening and Carding- Vol. 2.	W. Klein, The Textile Institute Manchester, 1986	0-900739 92 4
3	Spinning Preparation – Vol. 3	W. Klein, The Textile Institute Manchester	13-978-3-9523173-3-4
4	Spun Yarn Technology	Eric Oxtoby, Butterworth an Co. Ltd, London, 1987	0-408-01464-4
5	Textile Yarns, Technology, Structure and Applications	B C Goswami, J G Martindale, F L Scardino, Mahajan Book Distributors, Ahmadabad, Ed 1977	81-85401-04-07

❖ **E-REFERENCES:**

1. <http://www.rieter.com/en/rikipedia/articles/fibre-preparation/the-card/summary/introduction/> accessed on 28th September, 2016
2. http://textilelearner.blogspot.in/2011/04/combing-process-of-cotton-spinning_9182.html accessed on 28th September, 2016
3. <http://nptel.ac.in/courses/116102038> accessed on 28th September, 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

- Textile Laboratory –Carding, Draw frame, Sliver lap machine, Ribbon lap machine, Super lap machine, Comber machine, Setting tools and gauges.

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S. G. Gaikwad	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6.	Mr. R. N. Yadav.	President	Mohota Spg and Wvg Mill, Hinganghat, Wardha
7.	Prof. G. S. Kakad	Head of Textile Department	JDIET, Yavatmal

 (Member Secretary PBOS)

 (Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: PROFESSIONAL COURSES
COURSE CODE	: TX403E
COURSE TITLE	: ROVING AND YARN FORMATION
PREREQUISITE	: TX402E
TEACHING SCHEME	: TH: 03; TU: 00; PR: 04 (CLOCK HRs.)
TOTAL CREDITS	: 05 (1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE EXAM	: 03 HRs
PR. TEE EXAM	: 02 HRs (Internal)
PT. EXAM	: 01 HR

❖ RATIONALE:

Ring Frame and Speed frame together account for sixty percent of the total yarn conversion cost, productivity and quality. It accounts for 80% of the share of the staple yarn production. A fundamental and detailed understanding of the operations involved in creation of yarn is of crucial importance. The object of this course is to have a thorough understanding of the detailed operations involved in these processes so as to maintain machine to produce desired quality of yarn.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Apply speed frame process to produce roving from sliver.
2. Inter relate functions of various parts of ring frame machine to produce uniform yarns.
3. Apply doubling and TFO processes to produce double yarn.
4. Use speed frame machines to draft, twist and uniformly wind roving on bobbin.
5. Select and maintain ring frame machine parameters to produce quality yarns.
6. Set doublers and TFO machines to produce twisted doubled yarns

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1 Speed frame- Drafting and twisting	1. Describe function of speed frame. 2. Identify various parts of speed frame. 3. Summarise twisting operation on speed frame. 4. Justify the need of speed frame in ring spinning.	1.1 Introduction (a) Objects of speed frame (b) Passage of material through speed frame. 1.2 Operating zones of speed frame: (a) Creel (b) Drafting system: Description, top and bottom rollers, aprons, spacers, cradles, weighting system, roving guide, condensers, effects of arrangement of bobbins in two rows (c) Twisting: spindle, types of flyers, description of flyer, false twister, flyer and spindle drive	08
2 Speed frame- Roving winding and calculations	1. Define objects of building mechanism on speed frame. 2. Illustrate roving bobbin package building mechanism. 3. Relate bobbin and spindle speed to twist and wind roving on bobbin. 4. Enumerate change places on speed frame for different materials and hanks of roving. 5. Calculate machine production.	2.1 Winding: (a) Principle of package building on speed frame, (b) Bobbin drive, principle of spindle leading and bobbin leading, swinging joint/cradan shaft/telescopic shaft/chain drive to bobbin rail, (c) Study of bobbin building mechanism, differential drive and cone drum drive, (d) Gear change places of speed frame. 2.2 (a) Roving twist and draft calculations and its relationship to roving linear density, production and efficiency calculations. 2.3 Package and roving defects produced.	12
3. Ring frame- Drafting and twisting	1. Describe structural configuration of machine. 2. Describe top arm drafting system on ring frame. 3. State functions of creel, thread guide, moving lappet and balloon control ring. 4. List various travellers and	3.1 Introduction: (a) Objects of ring frame, (b) Passage of material through ring frame. 3.2 Operating zones of ring frame: (a) Creel (b) Drafting arrangements and its detail study (Top Arm Drafting system)	12

	rings with their features. 5. Interrelate functions of various parts of machine. 6. Illustrate significance of spinning geometry of ring frame	(c) Spindles, (d) Thread guides; moving lappets, separators, balloon control rings, (e) Travellers (f) Rings (e) Spinning geometry.	
4. Ring frame- Package formation and calculations	1. Illustrate ring frame package formation and winding parameters. 2. Enumerate changes on ring frame machine to suite different types of materials. 3. List the provisions on ring frame to control yarn tension during winding on bobbin. 4. Calculate speeds and production rate of ring frame.	4.1 Principle of cop building mechanism on ring frame. 4.2 (a) Yarn tension variation throughout cop build, variable speed drive to control end breaks, yarn package faults. (b) Gear change places of ring frame to suit various counts. © Pneumafil suction, overhead traveller clearer. 4.3 (a) Yarn twist, traveller and spindle speed, count and draft calculations, twist multipliers for various types of cotton yarns. (b) Production and efficiency calculations.	08
5. Ring doubling and twisting	1. Describe ring doubler. 2. State relationships between twist direction and twist on yarn properties.	5.1 Objects of yarn doubling, passage of material through of Ring doubler. 5.2 Effect of direction and amount of twist in doubling for desirable doubled yarn properties such as strength, balance, lustre etc.	04
6. TFO and Fancy yarns	1. Describe TFO. 2. Calculate production, average count of doubled yarns.	6.1 (a) Principle and working of Two For One (TFO) twister and Fancy doubler (b) Introductory aspects of Voile yarn, sewing threads, and Fancy yarns. 6.2 Calculations of production, twist, average and resultant count.	04
Total Hrs			48

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	(a) Draw passage of material through speed frame. (b) Draw and identify various zones of speed frame machine. (c) Determine draft, spindle speed and TP from the machine gearing plan.	Speed frame-Drafting and twisting	08
2	(a) Draw and identify gearing plan to drive bobbin. (b) Illustrate differential gearing and cone drums with sketch. (c) Draw bobbin building mechanism. (d) Use swing mechanism to transmit traverse to bobbin rail. (e) Determine bobbin speed, bobbin rail traverse speed, coils per inch from gearing diagram and locate change places on speed frame. (f) Record the cleaning and maintenance activities to maintain machine in good mechanical condition.	Speed frame-Roving winding and calculations	14
3	(a) Demonstrate the passage of material through ring frame. (b) Use Top Arm drafting system to draft the sliver. (c) Draw and identify spindle, bolster, lappet guide, balloon control rings, separator, ring, and traveller. (d) Determine drafts, draft constant, spindle speed from draft gearing plan on ring frame.	Ring frame-Drafting and twisting	12
4	(a) Use building mechanism on ring frame to build ring bobbin. (b) Calculate ring rail traverse rate, winding to binding coils, coils per inch. (c) Calculate production of ring frame. (d) Locate change places on ring frame gearing diagram. (e) Record the schedule of cleaning and maintenance activities to maintain machine in good mechanical condition.	Ring frame-Package formation and calculations	16
5	(a) Demonstrate the passage of material through ring doubler machine. (b) Identify process parameters to produce voile yarns, sewing threads.	Ring doubling and twisting	06
6	(a) Draw the passage of material through TFO. (b) Identify process parameters to produce fancy yarns	TFO and Fancy yarns	06
Skill Assessment			2
Total Hrs.			64

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Speed frame-Drafting and twisting	02(02)	04(04)	06(00)	12(06)
02	Speed frame-Roving winding and calculations	04(00)	04(06)	06(00)	14(16)
03	Ring frame-Drafting and twisting	10(02)	10(04)	00(06)	20(12)
04	Ring frame-Package formation and calculations	00(00)	08(08)	06(00)	14(08)
05	Ring doubling and twisting	06(00)	00(00)	00(04)	06(04)
06	TFO and Fancy yarns	00(00)	04(04)	00(00)	04(04)
	Total	22(04)	30(26)	18(10)	70 (40)

R – Remember

U – Understand

A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	2	R	2	2	R	2	3	R	2	5	R	2	1	R	2	5/7
	3	R	2																
02	3	R	4	5	R	4	4	U	4	1	U	4	2	U	4				3/5
03	1	U	4	2	U	4	6	U	4	4	U	4	5	A	4				3/5
04	3	U	4	2	U	4	4	U	4	3	U	4	6	U	4				3/5
05	3	U	6	4	A	6	2	U	6										2/3
06	1	A	6	2	A	6	3	A	6										2/3

T= Unit/Topic Number

L= Level of Question

M= Marks

R-Remember

U-Understand

A-Analyze/ Apply

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Procedure	10
2	Process analysis	20
3	Calculation and interpretation of the result	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (COs)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	-	-	-	-	-	3	3	3
2	-	3	-	-	-	-	-	-	-	3	3	3
3	-	3	-	-	-	-	-	-	-	3	3	3
4	-	3	3	3	-	-	-	3	3	-	3	3
5	-	3	3	3	-	-	-	3	3	-	3	3
6	-	3	3	3	-	-	-	3	3	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1	Introduction to Textile Fibres	H V S Murthy , The Textile Association, India, 1986	
2	Technology of Short Staple Spinning- Vol. 1	W. Klein, The Textile Institute Manchester, 1986	0 900739 91 6
3	Spinning Preparation – Vol. 3	W. Klein, The Textile Institute Manchester	13-978-3-9523173-3-4
4	Ring Spinning – Vol. 4	W. Klein, The Textile Institute Manchester	13-978-95231173-5-8
5	Textile Yarns, Technology, Structure and Applications	B C Goswami, J G Martindale, F L Scardino, Mahajan Book Distributors, Ahmadabad Ed 1977	81-85401-04-07
6	Spun Yarn Technology	Eric Oxtoby, Butterworth an Co. Ltd, London, 1987	0-408-01464-4

❖ **E-REFERENCES:**

- <http://nptel.ac.in/courses/116102038/8> accessed on 10th August, 2016
- <http://nptel.ac.in/courses/116102038/16> accessed on 10th August, 2016
- <http://www.rieter.com/cz/rikipedia/articles/ring-spinning/function-and-mode-of-operation/operating-principle/> accessed on 10th August, 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

- Textile Laboratory –Speed frame, Ring frame, Ring doubler, TFO machine, tools and gauges.

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S. S. Lawand	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6.	Mr. R. N. Yadav.	President	Mohota Spg and Wvg Mill, Hinganghat, Wardha
7.	Prof. G. S. Kakad	Head of Textile Department	JDIET, Yavatmal

 (Member Secretary PBOS)

 (Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: PROFESSIONAL COURSES
COURSE CODE	: TX404E
COURSE TITLE	: YARN PREPARATION FOR WEAVING
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 03; TU: 00; PR: 02 (CLOCK HRS.)
TOTAL CREDITS	: 04 (1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE EXAM	: 03 HRs
PR. TEE EXAM	: 02 HRs (Internal)
PT. EXAM	: 01 HR

❖ RATIONALE:

Fabric manufacturing preparatory process includes converting the yarn into warp beams and good quality weft packages. Removal of objectionable faults in the yarn with uniform build of packages is essential for efficient weaving preparatory. Therefore, process parameters and detailed knowledge of operations and maintenance of these machines are imparted in this course.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Select process parameters of winding and warping.
2. Determine the linear density of yarns.
3. Select drawing in process for warp tying-in method.
4. Use winding machine to produce cone/cheese.
5. Use warping machine to produce warpers beam and weavers beam.
6. Calculate production, efficiency of Winding and Warping machines.

❖ COURSE DETAILS:

A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1 Yarn Numbering Systems	1. Define various Yarn numbering systems. 2. Calculate count, resultant count and average count of given yarn. 3. Identify equivalent count in another system.	1.1 Definition of linear density of yarn (Count), Indirect and Direct Yarn numbering systems. 1.2 Definition, formulae and calculations for (a) English Cotton Count, (b) Metric Count, (c) Tex and (d) Denier Count. 1.3 Conversion of linear density from one system to another system. 1.4 Calculations of resultant count of folded yarns and average count.	08
2 Warp Yarn Winding Process	1. Describe supply and end packages in Winding. 2. Classify defects in yarn 3. Calculate speed and production of Winding machine 4. Select yarn tensioners and clearers	2.1 Flow chart for the weaving and weaving preparatory process 2.2 Objects of Winding process, supply and end packages of winding. 2.3 Basic principle of package winding parameters- Travers length, traverse ratio, Winding speed, wind angle, clearing efficiency, knot factor. 2.4 Types of winding machines. Drum winding machine Precision winding machine: Advantages and Disadvantages of both machines 2.5 Yarn tensioning- Objects and Types of different tensioners. 2.6 Yarn clearing: objects and types of clearers-mechanical and electronic type (capacitance and photo electric). 2.7 Knotting and splicing: Types of knots- weavers and fisherman's kno, draw backs of knots. Splicing technique 2.8 Yarn waxing: objects of waxing, waxing device. 2.9 Study of package faults produced during winding process and their remedies. 2.10 Features of Modern Winding machines.	16

		2.11 Calculations of speed and production of winding machine. 2.12 Objects of Yarn conditioning.	
3 Weft Yarn Winding	1. Describe construction and working of Pirn Winding machines 2. Distinguish non-automatic and automatic Pirn Winding machine. 3. Identify package defects in pirn winding. 4. State formula for the production of Pirn winding machines.	3.1 Objects of Pirn Winding 3.2 Types of Pirn Winding machines – non-automatic, automatic. 3.3 Passage of yarn on non-automatic and automatic Pirn Winding, construction and working of various parts on non-automatic and automatic Pirn Winding machines. 3.4 Requirements of quality of pirns for automatic looms. 3.5 Built of pirn : defects and remedies 3.6 Calculation of pirn winding speed, production & efficiency	04
4 Direct Warping	1. Define objects of Warping 2. Describe various parts and functions of warping machine 3. Calculate production of Direct warping	4.1 Direct Warping (Beam Warping):- (a) Objects (b) passage of warp, (c) Construction and working of Drum and Spindle driven warping machines, (d) Different types of creels used, their merits and demerits, (e) Different types of tension devices 4.2 Head Stock (a) Spindle and drum drive, (b) Brakes, (c) Expanding comb, (d) Manual and automatic doffing, (e) Stop motions on Beam Warping machine, 4.3 Significance of warping process on Beam quality. 4.4 Features of Modern Beam Warping machines 4.5 Calculations of production and efficiency of Direct Warping machine.	12
5 Indirect Warping	1. Describe procedure of leasing and beaming 2. Compare Beam and Sectional Warping 3. Calculate the production of Indirect warping machine	5.1 Indirect Warping:- (Sectional Warping) (a) objects, (b) Passage of warp through machine, (c) Preparation of sections, (d) Construction of warping drum, (e) Lease rod, (f) Section reed, (g) Traverse motion, (h) Section warping, (i) Leasing, (j) Beaming and creeling for colour patterns, (k) Description of colour master for creeling, (l) Ball warping process	06

		5.2 Features of Modern Indirect Warping machines 5.3 Calculations of production and efficiency of Indirect Beam warping machine.	
6 Drawing-in Process	1. Describe Drawing-in process 2. Compare Manual and Automatic reaching-in machines 3. Select automatic reaching-in machine for drawing-in	6.1 Objects of drawing in process. 6.2 Manual Semi automatic reaching-in machine, 6.3 Fully automatic warp drawing-in machine	02
Total			48

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Find linear density of yarn in direct and indirect system by using wrap reel	Yarn Numbering Systems	04
2	Prepare visit report on following by observing video CD / by visit to a mill a) Draw passage of warp through cone/cheese winding m/c, speed and process parameter. b) Draw passage of warp through super speed winding m/c, speed and process parameters c) Draw Mechanical and Electrical yarn clearer & yarn tensioning device bunch length	Warp Yarn Winding Process	12
3	Prepare visit report on following by observing video CD / by visit to a mill a) Draw passage of warp through Pirn winding machine	Weft Yarn Winding	02
4	Prepare visit report on following by observing video CD / by visit to a mill a) Draw the passage of yarn through beam warping m/c , calculate its speed. b) Draw various types of creels in warping machine	Direct Warping	06
5	Prepare visit report on following by observing video CD / by visit to a mill a) Draw the passage of yarn through sectional warping machine, calculate the speed of machine.	Indirect Warping	04
6	Prepare visit report on following by observing video CD / by visit to a mill a) Draw the passage of yarn through Drawing-in m/c,	Drawing-in Process	02
Skill Assessment			02
Total Hrs			32

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Yarn Numbering Systems	04(02)	04(00)	08(04)	12(04)
02	Warp Yarn Winding Process	04(04)	12(12)	12(00)	24(16)
03	Weft Yarn Winding	04(00)	00(04)	00(00)	04(04)
04	Direct Warping	04(00)	14(04)	00(06)	18(10)
05	Indirect Warping	02(00)	06(00)	00(06)	08(06)
06	Drawing-in Process	00(00)	04(00)	06(06)	04(00)
	Total	14(04)	34(22)	22 (14)	70 (40)

R – Remember U – Understand A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	2	R	2	2	R	2	5	R	2	1	R	2	2	R	2	5/7
	2	R	2																
02	3	R	4	2	U	4	1	A	4	2	U	4	4	U	4				3/5
03	2	U	4	6	U	4	4	U	4	1	A	4	2	U	4				3/5
04	2	U	4	4	U	4	1	A	4	2	U	4	3	U	4				3/5
05	2	A	6	4	U	6	5	U	6										2/3
06	2	A	6	5	U	6	4	A	6										2/3

T= Unit/Topic Number L= Level of Question M= Marks

R-Remember U-Understand

A-Analyze/ Apply

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ SCHEME OF PRACTICAL EVALUATION:

S.N.	Description	Max. Marks
1	Diagram/Description	10
2	Process analysis	20
3	Calculation, Result	10
4	Viva voce	10
	TOTAL	50

❖ MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:

Course Outcomes (COs)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	-	-	-	-	-	-	3	3
2	-	3	-	-	-	-	-	-	-	-	3	3
3	-	3	-	-	-	-	-	-	-	-	3	3
4	-	3	2	2	-	-	-	2	2	2	3	3
5	-	3	2	2	-	-	-	2	2	2	3	3
6	-	3	2	2	-	-	-	2	2	2	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ REFERENCE & TEXT BOOKS:

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1	Modern Preparation and Weaving Machinery	A.Ormerod, Woodhead Publishing Ltd. Cambridge, England	1 85573 998 4.
2	Conversion of Yarn to Fabric	P. R. Lord, M. H.Mohamed, Woodhead Publishing, Ltd.Cambridge, England	9781845692902
3	Weaving Preparation Technology	Gokarneshan N , Abishek Publications, 2009.	9789350434642
4	Fiber to Fabric	Bernard P Cobman , McGraw-Hill Book Company	0070662363, 9780070662360

❖ E-REFERENCES:

1. <http://www.textileassociationindia.org/> accessed on 20th September 2016
2. <http://www.nitma.org/> accessed on 20th September 2016
3. <http://www.sitra.org/> accessed on 20th September 2016
4. www.itamma.org/ accessed on 20th September 2016
5. <http://www.uttaindia.org/> accessed on 20th September 2016

6. <http://www.texmechwarp.com> accessed on 20th September 2016
7. <http://karlmayer.com> accessed on 20th September 2016
8. <http://en.wikipedia.org/wiki/weaving> accessed on 20th September 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

1. Lea wrap reel
2. Electronic precision weighing machine up to 10 mg.
3. Drum winding machine
4. High speed cone winding machine
5. Pirn winding machine
6. Beam warping machine
7. Sectional warping machine
8. Drawing in machine.

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S. S. Lawand	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6.	Mr. R. N. Yadav.	President	Mohota Spg and Wvg Mill, Hinganghat, Wardha
7.	Prof. G. S. Kakad	Head of Textile Department	JDIET, Yavatmal

(Member Secretary PBOS)

(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: PROFESSIONAL COURSES
COURSE CODE	: TX405E
COURSE TITLE	: YARN SIZING AND LOOM
PREREQUISITE	: TX 404E
TEACHING SCHEME	: TH: 03; TU: 00; PR: 04 (CLOCK HRs.)
TOTAL CREDITS	: 05 (1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE EXAM	: 03 HRs
PR. TEE EXAM	: 02 HRs (Internal)
PT. EXAM	: 01 HR

❖ RATIONALE:

The knowledge of weaving preparatory processes and power looms machines is very essential. Sizing is the last operation in the preparatory process. To achieve higher productivity and improved fabric quality, it is desired to prepare warp end sufficiently strong enough to withstand the stress & strain during weaving operation. Weaving is one of the methods of woven fabric productions. This course imparts knowledge of basic technology of sizing process and exposed to detailed knowledge of weaving process, power looms and their production calculations.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Select sizing ingredients for warp yarn sizing.
2. Identify different zones of sizing machine and their functions.
3. Apply working mechanism of plain power loom for weaving.
4. Use sizing machine to produce sized beam
5. Use power loom to produce cloth
6. Calculate production, efficiency of sizing and power loom machine.

❖ COURSE DETAILS:

A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1 Sizing materials and Size paste preparation	1. State need and Importance of Sizing. 2. List size ingredients and their functions 3. Describe importance of size preparation process and sizing cooking.	1.1. Objectives of Sizing 1.2. Classification of size ingredients 1.3. Types of Sizing ingredients & their properties 1.4. Preparation of size paste and equipments : stirrers, cookers and homogenizers 1.5. Mixing process of sizing ingredients and its importance.	06
2. Sizing methods	1. List different sizing methods. 2. Describe importance of different control devices for Sizing machine. 3. Describe faults during sizing process, their causes and remedies 4. Choose the right size recipe as per type of yarn 5. Calculate Production of Sizing 6. Compare different drying methods in sizing	2.1. Techniques of sizing process: hank sizing, ball warp sizing, slasher sizing. Passage of warp yarn through tape or slasher sizing machine. 2.2. Types of creel, their functions, merits and demerits. Leasing the warp. 2.3. Size box (Conventional & Modern) ,their elements in sow box and their functions 2.4. Methods of drying- Two cylinder , Multi cylinder , Hot air , Infra Red drying devices of sizing machine and their comparison 2.5. Head stock: Dry splitting, types of comb, measuring and marking motion, winding, beam pressing motion, Drag roller. Concepts of wet splitting and dry splitting .Single end sizing concept. 2.6. Various control devices and their importance on Sizing machine - Size level control , Temperature control , Moisture control , Stretch control 2.7. Heavy and medium sizing, Light and pure sizing. Size recipes of various yarn 2.8. Migratory ends and lappers during sizing. 2.9. Properties of the size paste. Factors affecting size pick up. Size recipes as per count and material. Developments at sizing 2.10. Calculations – Weight of warp,	14

		Size pick up percentage and Size add-on percentage, Production and efficiency of machine.	
3. Passage of warp and cloth	1. Describe Weaving process. 2. Describe passage of warp and cloth	3.1 Weaving techniques, Classification of weaving machines 3.2 Passage of warp yarns and cloth through a plain power loom	02
4. Primary motions in plain power loom	1. Describe basic mechanisms of a plain power loom. 2. List various parts of Primary motion and their sequence of operation. 3. Sketch loom timing cycle of primary motion. 4. Calculate sleigh eccentricity ratio.	4.1 Types of motion on plain power loom Primary motion of loom. (Objects, Types). Method for Indicating loom timing cycles. 4.2 Shedding motion- Different shedding mechanisms, Types of shed, Negative tappet shedding motion with timing and settings, Early and late shedding, Importance of Dwell period. 4.3 Picking and checking motion - different types of picking, Over pick and Under motion with timing and settings. Picking accessories- Shuttle, pickers, picking strap, check strap, buffers. 4.4 Beating up motion - Beat up motion with timing and settings. Importance of eccentricity of sleigh.	10
5. Secondary motions of plain power loom	1. List objectives of secondary motion 2. Identify various parts of secondary motion and their sequence of operation. 3. Show loom timing and setting of secondary motion. 4. Calculate dividend of take up motions	5.1. Secondary motion of loom : objects and types -Seven wheel take up motion , Negative let off motion 5.2. Objects and type of warp protector motion, Working of Fast reed and loose reed warp protector motion, 5.3. Objects and Working of Side weft fork stop motion	08
6. Auxiliary motion and calculations of plain power loom	1. Describe various parts of Auxiliary motion and their sequence of operation. 2. List types of reed and Healds 3. Calculate reed count , Production and efficiency of loom.	6.1 Auxiliary motions – Arrangement of various parts in the shuttle box, Object and types of Temples, Brake motion, 6.2 Different types of reed and Healds. 6.3 Reed and Heald count calculation, Production and efficiency calculations	08
Total			48

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Prepare visit report on following by observing video CD / by visit to a mill (a) Record sizing ingredients and their properties (b) Size paste preparation, equipments and their functions.	Sizing materials and Size paste preparation	06
2	Prepare visit report on following by observing video CD / by visit to a mill (a) Draw passage of material through sizing machine. (b) Different zones of sizing machine. (c) Types of Size box used in sizing machine. (d) Types of drying equipments used in sizing machine. (e) Types of creels in sizing department (f) Control devices on Sizing machine (g) Describe migratory ends and lappers	Sizing methods	14
3	Prepare visit report on following by observing video CD / by visit to a mill (a) Draw passage of warp through plain power loom machine. (b) Draw sketch of each part of machine and write their functions.	Passage of warp and cloth	4
4	Prepare visit report on following by observing video CD / by visit to a mill (a) Make a chart of types of motions on loom and loom timing cycle. (b) Working of negative shedding motion and draw sketch. (c) Working of over pick motion and draw sketch. (d) Working of under pick motion and draw sketch. (e) Working of Beat up motion and draw sketch.	Primary motion	14
5	Prepare visit report on following by observing video CD / by visit to a mill (a) Make a chart of types of secondary motions on loom and loom timing cycle. (b) Working of seven wheel take up motion and draw sketch. (c) Working of negative let off motion and draw sketch. (d) Working of fast reed motion and draw sketch. (e) Working of loose reed motion and draw sketch. (f) Working of side weft fork motion and draw sketch.	Secondary motion	14
6	Prepare visit report on following by observing video CD / by visit to a mill (a) Draw sketch of non automatic loom shuttle and	Auxillary motion and calculations	10

	automatic loom shuttle. (b) Draw sketch of shuttle box and write function of various parts. (c) Draw sketch of temples and write its functions (d) Working of break motion and draw sketch (e) Types of reeds , heald wires ,healds and describe them (f) Calculate heald and reed count , loom speeds , efficiency and production rate		
Skill Assessment			2
Total Hrs.			64



❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Sizing materials and Size paste preparation	04(04)	06(00)	00(00)	10(04)
02	Sizing methods	08(04)	08(06)	04(02)	20(12)
03	Passage of warp and cloth	00(00)	04(02)	00(00)	04(02)
04	Primary motion	04(00)	06(06)	02(02)	12(08)
05	Secondary motion	04(00)	06(04)	02(02)	12(06)
06	Auxillary motion and calculations	04(02)	04(00)	04(06)	12(08)
	Total	24(10)	34(18)	12 (12)	70 (40)

R – Remember U – Understand A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER

Q. No	Bit 1 12			Bit 2 16			Bit 3 6			Bit 4 12			Bit 5 12			Bit 6 12			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	U	2	2	R	2	3	U	2	4	R	2	5	R	2	6	R	2	5/7
	2	R	2																
02	1	R	4	2	R	4	4	U	4	5	A	4	6	U	4				3/5
03	1	R	4	2	U	4	3	U	4	4	U	4	4	R	4				3/5
04	1	U	4	2	U	4	4	A	4	6	R	4	6	A	4				3/5
05	2	A	6	5	U	6	2	R	6										2/3
06	2	U	6	5	U	6	6	A	6										2/3

T= Unit/Topic Number L= Level of Question M= Marks

R-Remember U-Understand

A-Analyze/ Apply

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ SCHEME OF PRACTICAL EVALUATION:

S.N.	Description	Max. Marks
1	Drawing of machine	10
2	Process analysis	20
3	Calculation, Result	10
4	Viva voce	10
	TOTAL	50

❖ MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	-	-	-	-	-	-	3	-
2	-	3	-	-	-	-	-	-	-	-	3	-
3	-	3	-	-	-	-	-	-	-	-	3	-
4	-	3	3	3	-	-	-	3	3	3	3	-
5	-	3	3	3	-	-	-	3	3	3	3	-
6	-	3	3	3	-	-	-	3	3	3	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ REFERENCE & TEXT BOOKS:

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1	Sizing materials methods machines	D.B. Ajgaonakar, Dr. M.K.Taulkdar, V.R. Wadekar Textile Trade Press	-
2	Weaving machine, material & management	Talukdar, Sriramulu & Ajgaonakar Mahajan Publishers Private Limited, Ahmedabad	-
3	Woven Fabric Production – I	NCTUE 2002	-
4	Weaving Mechanism	Marks and Robinson	-
5	Plain loom Motion	K.T.Aswani, Mahajan Publishers Private Limited, Ahmedabad	-

❖ **E-REFERENCES:**

1. www.fiber2fashion.com assessed on 5th September 2016
2. www.nptl.com assessed on 5th September 2016
3. www.textilelearner.com assessed on 5th September 2016
4. www.wikipedia.org/wiki/weaving assessed on 5th September 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

- Textile Laboratory – Sizing machine, power loom and Setting tools and gauges.

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S. G. Gaikwad	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6.	Mr. R. N. Yadav.	President	Mohota Spg and Wvg Mill, Hinganghat, Wardha
7.	Prof. G. S. Kakad	Head of Textile Department	JDIET, Yavatmal

 (Member Secretary PBOS)

 (Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: PROFESSIONAL COURSES
COURSE CODE	: TX406E
COURSE TITLE	: DOBBY, JACQUARD AND AUTO LOOM
PREREQUISITE	: TX405 E
TEACHING SCHEME	: TH:03; TU:00;PR:04(CLOCK HRs.)
TOTAL CREDITS	: 05(1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE EXAM	: 03 HRs
PR. TEE EXAM	: 02 HRs (Internal)
PT. EXAM	: 01 HR

❖ RATIONALE:

This is the most important part of the fabric forming process which produces fancy designs by using different dobby and jacquard mechanism. Society requires large quantity and quality with different designs of fabrics. Power looms are not the solution, engineering and technological changes have brought about automation in weaving looms to increase production rates, different designs and quality of fabrics. This course imparts knowledge and skills to the diploma students in automatic looms and dobby, jacquard and drop box devices.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Suggest shedding devices and drop box to produce colour and weave effect.
2. Apply principles of various mechanism of automatic loom to produce fabric
3. Select process parameters for weaving of blended yarn
4. Use dobby, jacquard, drop box devices and automatic loom to produce different designs of fabrics.
5. Prepare pegging lattice for dobby and card cutting for jacquard to produce figured fabrics.
6. Choose process parameters at weaving preparatory and loom for blended yarn.

❖ COURSE DETAILS:

A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1 Dobby shedding device	1. State scope of dobbie. 2. Describe working of various dobbies. 3. Sketch different parts of Dobby and their functions. 4. Describe pegging methods for different weaves 5. Identify dobbie cloth Defects.	1.1 Scope of dobbie shedding. 1.2 Classification of dobbies 1.3 Comparison of single lift & double lift dobbie 1.4 Construction & Working of following dobbies. - Climax Dobby - Cross border dobbie. - Cam Dobby - Paper Dobby - Rotary dobbie. 1.5 Climax dobbie setting. Methods of pegging lags for right and left hand dobbies. Need of dobbie pick finding devices. 1.6 Mechanical defects of dobbies	08
2. Jacquard shedding device	1. Identify different types of jacquard 2. State function of each Part of jacquard. 3. Calculate capacity of jacquard. 4. Describe in detail working principle of jacquard 5. Describe different types of ties. 6. Prepare jacquard cards chain for given design	2.1 Scope of jacquard shedding & Classification of Jacquards 2.2 Construction & Working of Single lift single cylinder jacquard , Double lift single cylinder jacquard , Double lift Double cylinder jacquard , Cross border jacquard , Electronic jacquard. 2.3 Capacity of a jacquard , Difference between coarse and fine pitch jacquard , card cutting and lacing. 2.4 Different ties - Straight tie and , Cross tie , Repeating tie , Center tie , Border tie ,Combination tie	08
3 Box motion devices	1. List different types box motion. 2 State use and need of multiple boxes. 3. Describe in detail working of Drop box motion 4. Prepare card chain for given weft pattern	3.1 Need for Box motions on a conventional looms 3.2 Working of Eccle's Drop box motion , pick at will motions on looms 3.3 Different types of cards and Pegs 3.4 Importance of Card Saving Devices	06
4 Warp preparation for Automatic	1. Describe objects, functions, and machine sequence 2. Distinguish automatic and non-automatic loom.	4.1 Comparisons of Automatic looms & non-automatic looms 4.2 Types of Automatic looms. 4.3 Features of automatic looms 4.4 Preparation of warp for efficient	04

loom	3. Describe the features of automatic loom	automatic weaving.	
5 Automatic loom	1. List the types of weft feelers and their functions 2. Compare pirn and shuttle changing mechanism. 3. Describe working of Let-off motion. 4. Describe need of warp stop motion and their working 5. Describe need of centre weft fork and center selvedge motion. 6. Identify the parts of shuttle changing mechanism	5.1 Automatic weaving concept and requirements. Types of Automatic looms. 5.2 Features of automatic looms. 2 Types of weft feelers and their Working. Mechanical (Midget), Electrical (Two pronged feeler), Photo electrical 5.3 Study of construction and working of pirn changing motion and shuttle changing automatic motion 5.4 Introduction to automatic looms with multiple box motion – colour retention motion 5.5 Study of diff. type of warp stop motions used on automatic looms. a) Mechanical warp stop motion b) Electrical warp stop motion 5.6 Draw backs of negative friction let-off. Study of diff. types of positive motions used on automatic looms e.g. Rapiers let-off, Barlet let-off, Ruti let-off, Hunts let-off 5.7 Study of centre weft fork and center selvedge motions 5.8 Preparation of warp for efficient automatic weaving.	14
6. Weaving of Different types of yarns	1. List the yarn properties of polyester blended yarn 2. Describe process parameters at preparatory and loom for blended yarn. 3. Describe processing sequence for voile yarn weaving 4. Suggest process parameters for filament yarn weaving.	6.1 Process flow chart for blended and filament yarns 6.2 Yarn properties of a) Polyester cotton blend b) Polyester viscose blend c) polyester wool blend. 6.3 Weaving of polyester blends, man-made filament /, silk with special reference to preparatory and loom-type, speeds, setting etc. 6.4 Voile/high twist yarn weaving.	08
Total			48

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Prepare visit report on following by observing video CD / by visit to a mill I) (a) Classification of dobbie (b) Working of Climax Dobby and draw sketch (c) Working of Cross border dobbie and draw sketch (d) Working of Cam Dobby and draw sketch (e) Working of Paper Dobby and draw sketch (f) Working of Rotary dobbie and draw sketch (g) Climax dobbie setting and prepare detail chart of various activities (h) Mechanical defects of dobbies II) (a) Prepare card chain for given weft pattern for right and left hand dobbie (Methods of pegging)	Dobby shedding device	10
2	Prepare visit report on following by observing video CD / by visit to a mill I) (a) Classification of Jacquard. (b) Working of Single lift single cylinder jacquard and draw sketch (c) Working of Double lift single cylinder jacquard and draw sketch (d) Working of Double lift Double cylinder jacquard and draw sketch (e) Working of Cross border jacquard and draw sketch (f) Working of Electronic jacquard II) (a) Observe card cutting and lacing and Prepare card chain for given weft pattern.	Jacquard shedding device	12
3	Prepare visit report on following by observing video CD / by visit to a mill (a) Working of Eccle's Drop box motion and draw sketch (b) Use card chain for given weft pattern.	Box motion devices	06
4	Prepare visit report on following by observing video CD / by visit to a mill (a) Record warp preparation for efficient automatic weaving. (b) Compare Automatic looms & non-automatic looms (c) Features of automatic looms and prepare chart	Warp preparation for Automatic loom	06
5	Prepare visit report on following by observing video CD / by visit to a mill (a) Working of pirn changing mechanism and draw sketch (b) Working of Let-off motions (Roper, Bartlett and	Automatic loom	14

	Ruti). (c) Working of Mechanical Warp stop motion and draw sketch (d) Working of Electrical Warp stop motion and draw sketch (e) Working of centre weft fork and draw sketch (f) Types of feelers and draw sketch		
6	Prepare visit report on following by observing video CD / by visit to a mill (a) Prepare weaving process flow chart for PC / PV / PW blended yarn (b) Precautions taken during processing of PC / PV / PW blended yarn in weaving preparatory (c) Precautions taken during processing of PC / PV / PW blended yarn in loom shed (d) Prepare weaving process flow chart for Voile yarns	Weaving of Blends	14
Skill Assessment			2
Total Hrs			64



❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Dobby shedding device	04(02)	04(00)	04(04)	12(06)
02	Jacquard shedding device	02(00)	08(04)	02(02)	12(06)
03	Box motion devices	04(02)	04(04)	02(00)	10(06)
04	Warp preparation for Automatic loom	00(00)	08(06)	00(00)	08(06)
05	Automatic loom	04(00)	08(08)	04(02)	16(10)
06	Weaving of Blends	04(06)	04(00)	04(00)	12(06)
	Total	18(10)	36(22)	16 (08)	70 (40)

R – Remember U – Understand A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	2	R	2	3	A	2	4	U	2	5	R	2	6	R	2	5/7
	5	R	2																
02	1	R	4	3	R	4	4	U	4	5	U	4	3	U	4				3/5
03	2	A	4	1	R	4	4	U	4	5	U	4	6	U	4				3/5
04	1	U	4	3	U	4	4	U	4	5	U	4	5	U	4				3/5
05	2	U	6	5	A	6	6	R	6										2/3
06	1	A	6	2	U	6	6	R	6										2/3

T= Unit/Topic Number L= Level of Question M= Marks

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	PT	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Class Room Assignments		Assignments	10	--	Assignment Book	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	ST	Students	One skill test at end of term	20	--	Practical Answer Sheets	4,5,6
		Journal Writing		Assignments	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First PT	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ SCHEME OF PRACTICAL EVALUATION:

S.N.	Description	Max. Marks
1	Drawing	10
2	Process analysis	20
3	Calculation, Result	10
4	Viva voce	10
	TOTAL	50

❖ MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	-	-	-	-	-	-	3	-
2	-	3	-	-	-	-	-	-	-	-	3	3
3	-	3	-	-	-	-	-	-	-	-	3	-
4	-	3	3	3	-	-	-	3	3	3	3	3
5	-	3	3	3	-	-	-	3	3	3	3	-
6	-	3	3	3	-	-	-	3	3	3	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ REFERENCE & TEXT BOOKS:

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1	Weaving machine, material & management	Talukdar, Sriramulu & Ajgaonakar Mahajan Publishers Private Limited, Ahmedabad	-
2	Woven Fabric Production – I	NCTUE 2002	-
3	Woven Fabric Production - II	NCTUE 2002	-
4	Principles of Weaving	R. Marks & A.T.C. Robinson The Textile Institute Manchester	-
5	Fancy Weaving Mechanism	Prof.K.T.Aswani Mahajan Publishers Private Limited, Ahmedabad	-

❖ **E-REFERENCES:**

- <http://en.wikipedia.org/wiki/weaving> assessed on 7th September 2016
- www.nptl.com assessed on 7th September 2016
- <http://www.lakshmiautomatic.com> assessed on 7th September 2016
- www.staubli.com assessed on 7th September 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

- Textile Laboratory –Dobby loom, Jacquard loom, Drop box loom and Automatic loom

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S. G. Gaikwad	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6.	Mr. R. N. Yadav.	President	Mohota Spg and Wvg Mill, Hinganghat, Wardha
7.	Prof. G. S. Kakad	Head of Textile Department	JDIET, Yavatmal

(Member Secretary PBOS)

(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: PROFESSIONAL COURSES
COURSE CODE	: TX407E
COURSE TITLE	: FIBRE AND YARN TESTING
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 03; TU:00;PR: 04 (CLOCK HRs.)
TOTAL CREDITS	: 05 (1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE EXAM	: 03 Hrs
PR. TEE EXAM	: 02 HRs (External)
PT. EXAM	: 01 HR

❖ RATIONALE:

The advances in textile manufacturing technology are improving the quality of the textile day by day. To ensure best quality as per the needs of the customer, many advances in textile testing are also taking place simultaneously. It is therefore essential for textile engineers to appreciate the importance of testing and to develop skills to test the textiles as per standards using advance testing methods.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Apply sampling techniques used in textile testing.
2. Enumerate primary and secondary properties of textile fibres.
3. Determine yarn properties
4. Investigate primary and secondary properties of textile fibres by using relevant instruments.
5. Measure yarn properties.
6. Use modern techniques in Fibre and yarn testing.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs
1. Introduction to Textile Testing.	1. Justify the need for testing of textiles. 2. Describe the Standard atmospheric condition for testing 3. Differentiate various sampling methods.	1.1 Need for Textile Testing. 1.2 Standard atmospheric condition for textile testing and its measurement: wet and dry bulb hygrometer, absolute humidity. 1.3 Sampling: Aim of Sampling, Types of Sampling, Random Sampling, Bias Sampling, Zoning technique. 1.4 Moisture regain, moisture content, Measurement of moisture content and regain of textile materials, influences of moisture on textile materials.	04
2. Fibre Testing	1. Identify fibre testing parameters 2. Describe the working of Fibre Fineness and maturity Testing 3. Describe Moisture content/regain 4. Draw the flow chart to measure Trash content 5. Determination of maturity by various methods. 6. Analyze the results of High Volume Instrument (HVI) 7. Describe the working of AFIS	2.1 Fibre length measurement: Importance, determination, fibre parameter, Baer sorter, digital fibrograph 2.2 Fiber Fineness Importance and Measurement: , microscopic, gravimetric airflow method, 2.3 Fibre maturity: Importance, determination of maturity by caustic soda swelling method 2.5 Shirley Trash Analyser 2.6 High Volume Instrument (HVI) 2.7 Advance fibre information system (AFIS)	10
3 Yarn Count and Twist Measurement	1. Differentiate the direct and indirect yarn numbering system. 2. Measure the yarn count 3. Determine the twist	3.1 Linear Density of Yarn, count or yarn number Direct and indirect systems of yarn, Measurement of yarn number or count, Yarn count and yarn diameter. 3.2 Instrument used for yarn count, Quadrant Balance, Knowles Balance, Wrap Reel numbering. 3.2 Definition, twist direction, amount of twist, twists multiplier/Factor, functions of twist in yarn structure, twist and yarn strength. 3.3 Twist and Twist Measurement, effect of twist in yarn on fabric	08

		properties. 3.4.Measurement of twist in single and double yarns, straightened fibre method, continuous twist tester method, twist contraction method, twist to break test method, twist measurement by microscope	
4.Tensile testing of fibre and yarn strength testing	1. Describe different Tensile Terms 2. Describe the principle for measuring tensile strength of textile material 3. Describe the working principle of Fibre Strength tester 4. Analyze the test results of Yarn Strength tester 5. Describe the working of UTM	4.1 Tensile Terms: Load, breaking load, Stress, Strain, Elastic recovery, stress strain curve, Initial Modulus, Work of Rupture, yield point, CSP, RKM Value , 4.2 Principle for testing tensile strength: CRE, CRT, CRL, pendulum lever. Strain gauge. Inclined plane. Balancing lever principle., impact, ballistic principle 4.3 Fibre strength Testers: Stelometer, Pressley Strength Tester 4.4 Single yarn Strength Tester,lea strength tester, continuous yarn strength tester. 4.5 Factors influencing tensile properties of textile materials. 4.6 Universal testing machine (UTM)	08
5. Evenness of Yarn	1.Classify the yarn variation 2. Identify irregularity of yarn 3. Analysis of classimat fault.	5.1 Classification of variation, Expression of irregularity, Basic irregularity, index of irregularity. Addition of irregularities. 5.2 Measurement of yarn irregularities, visual examination, cutting & weighing method, electronic capacitance principle, variation of thickness under compression, photoelectric testers. 5.3 Analysis of irregularity VL – BL curves, spectrogram analysis, correlogram, causes of irregularity, interpretation of results of irregularity tests, effect of irregularity on the fabric behaviour. 5.4 Imperfections & classimat faults, principle & working of Uster classimat, Analysis of classimat faults. 5.5 Hairiness in spun yarn, causes & reduction of Hairiness. Measurement of hairiness.	10

6. Statistical quality control	1. Calculate the standard deviation and C.V 2. Prepare the quality control charts.	6.1 Frequency distribution, graphical presentation of data, 6.2 Central tendency and dispersion, standards deviation, CV, Variance, 6.3 Quality control chart, P Chart, R chart, correlation	08
Total Hrs.			48

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practical	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Measure fibre length using Fibrograph	Fibre Testing	4
2	Measure Fiber strength using Stelometer		4
3	Measure Fibre strength using Presley bundle strength tester	Fibre Testing	4
4	Measure moisture content and moisture regain in given sample	Fibre fineness and Fibre maturity	4
5	Measure count of yarn using wrap reel	Yarn Count, Twist and Irregularity	4
6	Measure yarn twist using continues twist testing method	Yarn Count, Twist and Irregularity	4
7	Measure the CSP using lea strength tester	Yarn Count, Twist and Irregularity	6
8	Measure the strength of yarn using single yarn strength tester	Yarn Count, Twist and Irregularity	4
9	Record working of HVI	Advancement in Testing	8
10	Measure the trash content in given cotton sample	Fibre fineness and Fibre maturity	4
11	Measure the fibre maturity of given cotton sample		4
12	Measure Fiber fineness using air flow method		4
Skill Test			2
Total Hrs			64

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Introduction to Textile Testing.	04(00)	06(02)	00(02)	10(04)
02	Fibre Testing	02(02)	06(02)	04(02)	12(06)
03	Yarn Count and Twist Measurement	02(02)	06(04)	06(02)	14(08)
04	Tensile testing of fibre and yarn strength testing	02(02)	06(06)	04(02)	12(10)
05	Evenness of Yarn	02(00)	06(02)	02(02)	10(04)
06	Statistical quality control	02(02)	06(04)	04(02)	12(08)
	Total	14(08)	36(20)	20 (12)	70 (40)

R – Remember U – Understand A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	3	R	2	4	R	2	5	R	2	6	R	2	2	R	2	5/7
	3	R	2																
02	1	R	4	1	R	4	2	R	4	2	R	4	3	U	4				3/5
03	1	U	4	2	U	4	5	U	4	1	U	4	3	U	4				3/5
04	6	U	4	2	A	4	3	A	4	1	A	4	5	A	4				3/5
05	4	A	6	6	A	6	4	U	6										2/3
06	3	U	6	3	A	6	6	A	6										2/3

T= Unit/Topic Number L= Level of Question M= Marks

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Setting of experiments	10
2	Process analysis	20
3	Calculation and interpretation of the result	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	3	-	-	-	-	-	-	-	3	3
2	-	3	3	-	-	-	-	-	-	-	3	3
3	-	3	3	3	3	-	-	-	3	3	3	3
4	-	3	3	3	3	-	-	2	3	3	3	3
5	-	3	3	3	3	-	2	-	3	3	3	-
6	-	3	3	-	-	-	2	2	-	-	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Textile testing	P. Angappan and R. Gopalakrishnan	0408705159
2	Principle of Testing	J. E. Booth	0408704586
3	Structural Mechanics of fibres, yarns & fabrics	Herle, Grosberg and Backer	9781855739963
4	Grammar of Textile Design	H.Nisbet , Abhishek Publisher, Chandigarh	9788182475144

❖ **E-REFERENCES:**

- <http://www.textileassociationindia.org/> assessed on 15th September, 2016
- <http://www.fiber2fashion.org/> assessed on 15th September, 2016
- <http://www.nift.ac.in/> assessed on 15th September, 2016
- www.itamma.org/ assessed on 15th September, 2016
- www.en.wikipedia.org/wiki/Textile_design 15th September, 2016
- <http://www.designdiary.nic.in/> g 15th September, 2016
- <http://textilelearner.blogspot.in> 15th September, 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

- 1 Hand loom for sample preparation
- 2 Pick counting glass
- 3 Pick glass to find out EPI, PPI, twist direction and type of weaves
- 4 Beesley balance
- 5 Electronic balance
- 6 Counting lens
- 7 Cutting template
- 8 Scissors
- 9 Measuring scales
- 10 Educational videos/animation films on preparation of different fabric structures
- 11 Fabric Analysis sheets
- 12 Fabric samples of different weaves

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S. G. Gaikwad	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6	Prof. G. S. Kakad	Head of Textile Department	JDIET, Yevatmal.
7	Mr. R. N. Yadave	President	M/S. R. S. R. Mohota Spinning and Weaving Mills, Hinganghat, Dist. Wardha

 (Member Secretary PBOS)

 (Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: PROFESSIONAL COURSES
COURSE CODE	: TX 408E
COURSE TITLE	: FABRIC TESTING
PREREQUISITE	: TX 407E
TEACHING SCHEME:	TH: 03; TU: 00; PR: 04 (CLOCK HRs.)
TOTAL CREDITS	: 05(1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT=1 CLOCK HR.)
TH. TEE EXAM	: 03 Hrs
PR. TEE EXAM	: 02 Hrs (External)
PT. EXAM	: 01 Hr

❖ RATIONALE:

The advances in textile manufacturing technology are improving the quality of the textile day by day. This has further raised the expectations of customer. To ensure best quality as per the needs of the customer, many advances in textile testing are also taking place simultaneously. It is therefore essential for textile engineers to appreciate the importance of testing and to develop skills to test the textiles as per standards using advance testing methods. During studies the knowledge about fabric testing methods, devices and standards is provided. The abilities to classify, to identify, to investigate and to characterize fabric properties as well as to determine the influence of materials properties in the technological and wear processes of clothing are trained. After learning this course, students would be able to measure property of textile material and analyze the result for specific end use or next process. Also they can pinpoint the any deficiency in the process using the result of testing and take remedial measures to ensure the quality. This course is therefore a key course for textile engineers

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Determine the dimensional and tensile properties of fabrics.
2. Specify the comfort properties of fabrics.
3. Specify the fastness and flammability properties of fabric.
4. Investigate the dimensional and tensile properties of given fabric sample.
5. Measure the comfort and serviceability properties of given fabric sample.
6. Find out the fastness and flammability properties of given fabric sample.

❖ COURSE DETAILS:

A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1. Fabric Dimensions.	1. Justify the need for testing of Fabrics. 2. Describe the dimensional characteristics of fabrics 3. Determinate ends per inch and picks per inch. 4. Find out crimp in warp and weft of fabric 5. Find out fabric thickness by thickness tester.	1.1 Dimensional characteristics of fabric 1.2 Measurement of fabric length, width, EPI.PPI, Fabric weight. 1.3 Definition of crimp, measurement of warp and weft crimp in fabric by Crimp meter. Yarn crimp, and influence of crimp on fabric properties. 1.4 Derive formula for cover factor of fabric and its significance. 1.5 Fabric thickness testing by thickness Tester 1.6 Blend tests by solubility methods	08
2. Tensile Testing of Fabrics	1. Describe the load elongation curve 2. Determination of fabric strength by Tensile Strength Tester 3. Calculate the Initial young modules, work of rupture, elastic recovery. 4. Describe the factors affecting tensile properties of fabrics.	2.1 Introduction to tensile strength testing, Methods of measuring tensile strength testing. 2.2 Load elongation curve, Tensile test by raveled strip and grab test method. 2.3 Tearing strength testing by Elmendorf tearing strength tester based on Ballistic principle. 2.4 Principle and working of Hydraulic bursting strength tester.	08
3 Measurement of serviceability and Handle of Fabrics	1. Find out serviceability of fabric by Abrasion tester. 2. Find out serviceability of fabric by Use of Drape meter 3. Find out serviceability of fabric by Stiffness Tester 4. Find out Crease recovery of fabric by Crease recovery Tester 5. Find out pilling by ICI pill box	3.1 Purpose of serviceability testing. Testing of abrasion resistance, factors affecting abrasion resistance. 3.2 Wear and abrasion test on fabrics. 3.3 Measurement of serviceability by Abrasion Tester 3.4 Definition of pilling, factors affecting pilling, Test for Pilling of Fabric by using Pilling Tester 3.5 Measurement of crease recovery, by crease recovery tester. 3.6 Definition of drape, drape coefficient and its measurement. 3.7 Definition of fabric stiffness, bending length, flexural rigidity and bending modulus. Measuring fabric stiffness by cantilever principle.	08
4. Air and Water permeability of Fabrics.	1. Find out air permeability of fabric by Air Permeability Tester 2. Find out water permeability of fabric by water Permeability Tester	4.1 Definition of air permeability, air Resistance and air porosity. Factors affecting air permeability of fabrics, Measurement of air permeability by Shirley Air Permeability Tester. 4.2 Definition of: Water permeability, absorbability, water repellent and	08

		water proof fabrics. Basic concept of wetting and water repellence. 4.3 Wettability test for fabric water Proofing and shower proofing by Drop penetration test, Spray test	
5. Color fastness testing of fabric	1. Find out the colour fastness of fabric. 2. Find out the washing fastness of fabric. 3. Find out the Perspiration (acidic and alkaline) test by Persperometer. 4. Find out the Light fastness of fabric.	5.1 Outline of colour fastness test, sample preparation, assessment of colour fastness test by gray scale. 5.2 Methods of determination of colour Fastness to Washing. Colour fastness to other agents. 5.3 Methods of determination of perspiration 5.4 Methods of determination of rubbing fastness 5.5 Methods of determination of light fastness by Xenon methods and sublimation fastness of fabric by using hot plate method.	08
6. Fabric Shrinkage and Flammability test	1. Find out the blend proportion by Blend testing by chemical (Solubility). 2. Find out the Shrinkage test by Launderometer and Template. 3. Find out the Flammability test by Flammability Testers.	6.1 Introduction to fabric shrinkage, relaxation and felting. Measurement of fabric shrinkage, dimensional stability, swelling effects. 6.2 Need and importance of flammability test. Flammability test for fabrics. 6.3 Factors affecting flame proofing and flame resistance.	08
Total Hrs.			48

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Measure the strip Tensile Strength of Fabrics	Tensile Testing of Fabric	4
2	Find out bursting strength of fabric by Hydraulic Strength Tester		4
3	Find out fabric thickness by thickness tester.	Quality particulars of fabric	4
4	Find out air permeability of fabric by Air Permeability Tester	Air and Water permeability of Fabric.	8
5	Find out Crease Recovery of fabric by Crease Recovery Tester	Measurement of serviceability Test of Fabric	6
6	Find out crimp in warp and weft of fabric	Quality particulars of fabric	6
7	Find out the washing fastness of fabric.	Measurement of serviceability Test of Fabric	6
8	Measure the Drape coefficient of fabric.	Measurement of serviceability Test of Fabric	4
9	Measure the Stiffness of fabric sample.	Measurement of serviceability Test of Fabric	4
10	Determine Shrinkage percentage by Launderometer and Template	Fabric Shrinkage and Flammability test	4
11	Evaluate the Flammability test.		6
12	Measure cloth cover factor.		4
Skill Assessment			4
Total Hrs			64

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Fabric Dimensions.	04(00)	04(04)	00(04)	14(08)
02	Tensile Testing of Fabrics	04(06)	04(00)	04(00)	12(06)
03	Measurement of serviceability and Handle of Fabrics	04(02)	06(08)	04(00)	18(10)
04	Air and Water permeability of Fabrics.	02(00)	06(06)	04(00)	08(06)
05	Color fastness testing of fabric	02(00)	06(00)	02(04)	06(04)
06	Fabric Shrinkage and Flammability test	04(00)	08(00)	02(06)	12(06)
	Total	20(08)	34(18)	16 (14)	70 (40)

❖ QUESTION PAPER PROFILE FOR THEORY PAPER

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	3	R	2	4	R	2	5	R	2	6	R	2	2	R	2	5/7
	3	R	2																
02	1	R	4	1	R	4	2	R	4	2	R	4	3	U	4				3/5
03	1	U	4	2	U	4	5	U	4	1	U	4	3	U	4				3/5
04	6	U	4	2	A	4	3	A	4	1	A	4	5	A	4				3/5
05	4	A	6	6	A	6	4	U	6										2/3
06	3	U	6	3	A	6	6	A	6										2/3

T= Unit/Topic Number L= Level of Question M= Marks

R-Remember U-Understand

A-Analyze/ Apply

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

SCHEME OF PRACTICAL EVALUATION:

S.N.	Description	Max. Marks
1	Setting of experiments	10
2	Process analysis	20
3	Calculation and interpretation of the result	10
4	Viva voce	10
	TOTAL	50

❖ MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	-	-	-	-	-	-	3	-
2	-	3	-	-	-	-	-	-	-	-	3	-
3	-	3	-	-	-	-	-	-	-	-	3	-
4	-	3	3	3	3	-	-	-	3	3	3	-
5	-	3	3	3	3	-	-	2	3	3	3	-
6	-	3	3	3	3	1	1	2	3	3	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ REFERENCE & TEXT BOOKS:

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Textile Testing	P. Angappan, R. Gopalakrishnan	0408705159
2	Principle of Testing	J. E. Booth, Chemical Publishing Corporation; 3rd edition, 1968	10: 0592063259 13: 978-0592063256
3	Structural Mechanics of fibres, yarns & fabrics	Herle, Grosberg, Backer,	9781855739963
4	Grammar of Textile Design	H. Nisbet, Abhishek Publisher,	9788182475144

❖ **E-REFERENCES:**

1. <http://www.textileassociationindia.org/> Assessed on 15thSeptember, 2016
2. <http://www.fiber2fashion.org/> Assessed on 15thSeptember, 2016
3. <http://www.nift.ac.in/> Assessed on 15thSeptember, 2016
4. www.itamma.org/ Assessed on 15thSeptember, 2016
5. www.en.wikipedia.org/wiki/Textile_design
6. <http://www.designdiary.nic.in/> g. <http://textilelearner.blogspot.in>

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

1. Hand loom for sample preparation
2. Pick counting glass
3. Pick glass to find out EPI, PPI, twist direction and type of weaves
4. Beesley balance
5. Electronic balance
6. Counting lens
7. Cutting template
8. Scissors
9. Measuring scales
10. Educational videos/animation films on preparation of different fabric structures
11. Fabric Analysis sheets
12. Fabric samples of different weaves

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
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3.	Mr. S. G. Gaikwad	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6.	Mr. R. N. Yadav.	President	Mohota Spg and Wvg Mill, Hinganghat, Wardha
7.	Prof. G. S. Kakad	Head of Textile Department	JDIET, Yavatmal

 (Member Secretary PBOS)

 (Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: PROFESSIONAL COURSES
COURSE CODE	: TX409E
COURSE TITLE	: TEXTILE PROCESSING
PREREQUISITE	: NIL
TEACHING SCHEME:	TH: 03; TU: 00; PR: 02 (CLOCK HRs.)
TOTAL CREDITS	: 04 (1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE EXAM	: 03 HRs
PR. TEE EXAM	: 02 HRs (Internal)
PT. EXAM	: 01 HR

❖ RATIONALE:

Processing of the textiles is one of the important processes in textile manufacturing. This gives the textile required finish, colour and print. The processing is a vast complex area in itself and hence there is a separate branch of engineering known as textile processing. This course provides only basic knowledge about textile wet processing including the chemical and mechanical technology involved in the wet processing of textiles. This course is therefore a key course for textile engineers.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Describe concepts of textile wet processing.
2. Analyze the importance of pretreatment before wet processing.
3. Select the dye according to the fibre.
4. Perform dyeing and printing of fabric.
5. Apply the finishes according to end use.
6. Select washing and drying machines.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs
1. Introduction to Textile Wet Processing	1. Identify the need and Importance of textile wet processing 2. List the Sequence of textile wet processing operations 3. Inspection of grey fabric. 4. State the objective of shearing and cropping machine.	1.1 Objective & sequence of textile wet processing 1.2 Grey inspection, stitching and marking 1.3 Object of shearing and cropping machine	02
2. Preparatory for Cotton Textile processing	1. State the importance of pretreatments in textile processing. 2. Describe the working of yarn and fabric singeing machine. 3. Classify the desizing methods. 4. State the chemical reactions in scouring of cotton. 5. Enlist the effect of mercerization on cotton material.	2.1 Importance of pretreatment to grey fabric for textile processing. 2.2 Object of singeing machine, classification, working of hot plate and gas singeing machine. 2.3 Object of Desizing, classification, enzymatic desizing method and sodium bromite desizing method with merits and demerits . 2.4 Objects of Scouring, scouring agents, scouring of grey and coloured goods 2.5 Objects of Bleaching, Classification of bleaching agents, bleaching of cotton with hypochlorites and hydrogen peroxide, Continuous bleaching process. 2.6 Object of mercerization, effect of mercerization, yarn mercerization and fabric mercerizing machines	10
3. Dyeing Technology	1. State the objective and importance of dyeing. 2. Classify the colouring matter. 3. Describe the dyeing of cotton, viscose, silk, wool, acrylic, nylon and polyester. 4. Compare natural dyes with synthetic dyes. 5. Enlist the various	3.1 Objective & importance of Dyeing technology. 3.2 Dyes & its classification 3.3 Dyeing of natural and regenerated fibres (cotton, wool, silk and viscose) 3.4 Dyeing of synthetic fibres (polyester ,acrylic, nylon) 3.5 Principle of dyeing machines 3.6 Loose stock dyeing machine, Package dyeing machine, HTHP	12

	machines used for dyeing.	Beam dyeing machine, Jigger dyeing machine, jet dyeing machine	
4. Printing Technology	1. State the objective and importance of printing. 2. Describe printing styles and printing methods. 3. Explain printing of natural and synthetic fabric. 4. Enlist various machines used for printing. 5. Summarize the after treatment method and its importance.	4.1 Objective of printing, difference between dyeing and printing. 4.2 Preparation of printing paste, sequence of printing 4.3 Styles of printing(Direct, Discharge and Resist) 4.4 Methods of printing(Block, roller, flat screen, rotary screen, transfer) 4.5 Printing of cotton and polyester fabric 4.6 After treatment to printed materials(Ageing and steaming)	10
5. Finishing Technology	1. Classify the finishes and state its objective. 2. Describe the different types of finishing treatments.	5.1 Objective of finishing , classification of finishes 5.2 Types of finishing treatments(Back filling, anti crease finish, wash & wear finish, stiff finish, soft finish, calendaring, anti shrink, heat setting, water proof, water repellent, fire retardant, soil release)	10
6. Washing and Drying processes	1. State the objective of washing and drying processes. 2. Select the washing machine according to the treatment.. 3. Describe the different drying machines.	6.1 Objective of washing and drying processes. 6.2 Washing Machines : Classification, tight rope, slack rope and open width type 6.3 Drying Machines : classification, hot air drying, float dryer and stenter	04
Total			48

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	a) Perform acid desizing on cotton cloth and test for desizing loss. b) Perform scouring of cotton by sodium hydroxide and test for scouring. c) Perform bleaching of cotton by bleaching powder and test for bleaching d) Perform mercerization of cotton and test mercerization.	Preparatory for Cotton Textile processing	08
2	a) Perform dyeing of cotton with direct dyes. b) Perform dyeing of cotton with reactive dyes. c) Perform dyeing of cotton with Vat yes. d) Perform dyeing polyester with disperse dyes. e) Perform dyeing of wool/silk with acid dyes.	Dyeing Technology	10
3	a) Perform block printing b) Perform screen printing c) Perform transfer printing d) Perform resist style of printing	Printing technology	08
4	a) Perform stiff finish treatment on cotton fabric. b) Perform water proof finish on cotton fabric	Finishing Technology	04
Skill Assessment			2
Total Hrs			32

❖ SPECIFICATION TABLE FOR THEORY PAPER

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Introduction to Textile processing	00(02)	04(00)	00(00)	04(02)
02	Preparatory for cotton textile processing	04(04)	06(04)	04(00)	14(08)
03	Dyeing Technology	06(00)	12(04)	00(06)	18(10)
04	Printing Technology	02(06)	06(02)	06(00)	14(08)
05	Finishing Technology	04(04)	04(04)	06(00)	14(08)
06	Washing and Drying Processes	02(00)	00(04)	04(00)	06(04)
	Total	18(16)	32(18)	20(06)	70 (40)

R – Remember U – Understand A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	2	R	2	2	R	2	3	R	2	4	R	2	6	R	2	4	R	2	5/7
	1	R	2																
02	1	U	4	2	U	4	4	R	4	3	R	4	5	R	4				3/5
03	1	U	4	4	U	4	5	U	4	3	U	4	2	A	4				3/5
04	3	U	4	5	A	4	6	A	4	1	A	4	6	U	4				3/5
05	3	U	6	4	A	6	4	R	6										2/3
06	4	U	6	5	A	6	3	A	6										2/3

T= Unit/Topic Number L= Level of Question M= Marks

R – Remember U – Understand A – Analyze / Apply

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		Questionnaires	1, 2, 3, 4,5,6
	End Of Course			End Of The Course				

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Performance	20
2	Writing skill	10
3	Testing	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	-	-	-	-	-	2	-	-
2	-	3	-	-	-	-	-	-	-	2	-	-
3	-	3	-	-	-	-	-	-	-	2	3	-
4	-	3	2	2	-	2	-	2	2	2	-	2
5	-	3	2	2	-	2	-	2	2	2	-	2
6	-	3	2	2	-	2	-	2	2	2	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Technology of Textile Processing	V. A. Shenai, Sevak publication ,Vol X,1987	OCLC:313590523
2	Chemical Processing of Textiles	NCUTE publication 2002	
3	Technology of Dyeing	V.A Shenai, Sevak Publications,1984	
4	An Introduction to Textile finishing	J.T Marsh, Chapman & Hall, 2 nd Edition,1966	978-1114790087
5	Technology of Printing Vol.IV	V.A. Shenai, Sevak Publication,2003	9783659686047
6	Chemical Technology in the Pre Treatment Processes of Textiles	S.R. Karmakar, Elsevier Science,1 edition,1999	9780444500601
7	Dyeing and Chemical Technology of Textile Fibres	E R Trotman, John Wiley & Sons Inc; 6 Sub edition .1985	978-0471809104

❖ **E-REFERENCES:**

- 1 <http://www.textileassociationindia.org/>assessed on 10th September, 2016
- 2 <http://www.fiber2fashion.org/>assessed on 10th September, 2016
- 3 <http://textilelearner.blogspot.in/2012/02/textile-ebooksbooks-free-download-for.html>assessed on 10th September, 2016
- 4 <http://nptel.ac.in/>assessed on 10th September, 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

- 1 Beaker dyeing machine
- 2 Weighing balance
- 3 Oven
- 4 Scissors
- 5 Beaker
- 6 Hot plate
- 7 Blocks
- 8 Screens

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S.G.Gaikwad	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6.	Mr M.V.Gokhale	Lecturer in Chemical Processing	Mahila Nikalas ,Nagpur
7.	Mr. S.P Gadge	Lecturer in Chemical Processing	Mahila Nikalas , Nagpur
8.	Prof. G.S. Kakad	Head of Textile Department	JDIT,Yavatmal
9.	Mr. R.N.Yadav	President	RSR Mohota Spinning and Weaving Mill

 (Member Secretary PBOS)

 (Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: PROFESSIONAL COURSES
COURSE CODE	: TX410E
COURSE TITLE	: KNITTING TECHNOLOGY
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 03; TU: 00; PR: 02(CLOCK HRs.)
TOTAL CREDITS	: 04(1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE EXAM	: 03 HRs
PR. TEE EXAM	: 02 HRs(Internal)
PT. EXAM	: 01 HR

❖ RATIONALE:

Knitting is a technique of making fabric. In the market knitted fabrics are giving neck to neck competition to the woven fabrics. Knitting requires less yarn preparatory compared to weaving and gives high production. The aim of this course is to develop the competency of operating knitting technological equipment used in the industry. This course is important for textile engineers as liking for knitted textile are increasing day by day due to better comfort provided by knitted textile as compared to woven textile.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Describe different knitting cycle.
2. Apply the concept of knitting in designing the knitted structures.
3. Identify machine parameters for different knitted structures.
4. Draw the knitting elements of weft and warp knitting machine
5. Produce the knitted structures.
6. Calculate the production of circular weft knitting machine

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs
1. Introduction to Knitting	1. List objects of Knitting. 2. Compare weaving and Knitting 3. Classify weft knitting and warp knitting machines.	1.1 Knitting- scope and objective 1.2 Terms and definitions used in knitting 1.3 Characteristics of yarns used for knitting. 1.4 Comparison of woven and knitted fabric 1.5 Classification of weft knitting and warp knitting machines 1.6 Knitting needles (spring beard ,latch needles & compound needle)	06
2. Weft knitting elements	1. Draw and describe passage of material. 2. Describe functions of knitting elements. 3. Describe knitting cycle of needles. 4. Select different needles for knitting cycle.	2.1 Passage of material through weft knitting machine 2.2 Knitting machine elements: - cylinder, sinker, creels, cams, feed yarn carriers, take up mechanism. 2.3 Knitting cycle of latch needle , spring beard and compound needle	06
3. Basic weft – knit structures	1. Illustrate with neat sketch the weft knit structures 2. Draw single knit and double knit structures. 3. Draw and describe the float and tuck structures 4. Analyze float and tuck stitches.	3.1 Classification of weft-knit structures 3.2 Single jersey structure, characteristics. 3.3 Double jersey structure their features and properties of : (a) Rib knit structure (1x1), (b) Interlock knit structure(1x1), (c) Purl knit structure (1x1) 3.4 Float, tuck stitch structures and their Characteristics. 3.5 Development and automation in weft knitting machine	12
4. Weft Knitting Calculations	1. State the relation between machine gauge and yarn number. 2. Calculate the production of knitting machine. 3. Determine the knitting parameters of machine.	4.1 Cylinder diameter and cut, machine Gauge. 4.2 Production in weight per linear yard, fabric width and weight per square yard, yarn diameter, number of needles, stitch length.	08
5. Warp	1. Draw the basic warp knit structure.	5.1 Introduction to warp knits 5.2 Preparation for warp knitting	06

knitting	- Analyze warp knits, weft knits and woven structures. - Describe underlap, overlap, closed lap and open lap stitches. - Justify the different knitted structures for their use.	- Compare warp, weft knits and woven fabrics. - Basic Warp knit structure - Underlap and overlap, closed lap and open lap stitches.	
6. Warp knitting machines	- Describe the passage of material through tricot and Raschel knitting machine. - Analyse the knitting cycle of Tricot and Raschel Knitting machine. - State the development and automation in warp knitting machine.	- Passage of material through tricot and Raschel warp knitting machine, knitting elements, knitting cycle - Compare Tricot and Raschel knitting machine - Development and automation in warp knitting machine.	10
Total			48



B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	a) Draw the sketches of knitting needles by observation. b) Identify and compare woven and knitted goods.	Introduction to Knitting	04
2	a) Draw the passage of material through the circular weft knitting machine. b) Draw the sketch of various parts of the knitting machine.	Weft knitting elements	04
3	a) Identify rib, purl and interlock structure. b) Draw the structure of tuck and float.	Basic weft – knit structures	04
4	a) Calculate the production of the circular weft knitting machine in kg and yard. b) Calculate the theoretical width of the fabric. c) Calculate stitch length of the given fabric	Knitting Calculations	06
5	a) Draw the passage of material through the warp knitting machine b) Calculate the aerial density of warp knitted fabric.	Warp knitting	04
6	a) Draw the knitting cycle of Tricot machine by observation. b) Draw the knitting elements of Tricot machine. c) Draw the knitting cycle of Raschel machine by observation. d) Draw the knitting elements of Raschel machine.	Warp knitting machines	08
Skill Assessment			2
Total Hrs			32

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Introduction to Knitting	04(00)	04(04)	00(00)	08(04)
02	Weft knitting elements	00(02)	04(04)	04(00)	08(06)
03	Basic weft –knit structures	02(04)	12(06)	04(00)	18(10)
04	Weft Knitting Calculations	04(00)	04(06)	04(00)	12(06)
05	Warp knitting	00(04)	04(00)	06(02)	10(06)
06	Warp knitting machines	04(00)	06(04)	04(04)	14(08)
	Total	14(10)	34(24)	22 (06)	70 (40)

R – Remember U – Understand A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	1	R	2	3	R	2	4	R	2	4	R	2	2	R	2	5/7
	5	A	2																
02	2	U	4	3	R	4	2	A	4	6	A	4	1	U	4				3/5
03	1	U	4	3	A	4	4	U	4	6	U	4	2	U	4				3/5
04	5	U	4	4	A	4	6	A	4	5	R	4							3/5
05	3	U	6	5	A	6	4	U	6										2/3
06	3	U	6	6	U	6	3	U	6										2/3

T= Unit/Topic Number L= Level of Question M= Marks

R-Remember U-Understand A-Analyze/ Apply

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		Questionnaires	1, 2, 3, 4,5,6
	End Of Course			End Of The Course				

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Drawing of passage and parts of the machine	10
2	Description of the Process	20
3	Calculation, Result	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	-	-	-	-	-	3	3	-
2	-	3	-	-	-	-	-	-	-	3	3	2
3	-	3	-	-	-	-	-	-	-	-	-	-
4	-	3	2	2	-	-	-	2	2	3	-	-
5	-	3	2	-	-	-	-	2	-	-	3	-
6	-	3	2	2	-	-	-	2	2	3	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1	Knitting Technology	D B Ajgaokar, Universal Book Corp,1998	9788185027340
2	Advances in Knitting Technology	Kin-Fan Au, Woodhead Publishing,2016	9780081017173
3	Knitting Technology	D.Spenser ,Woodhead Publishing,2001	9781855733336
4	Knitting Technology	NCUTE, IIT Delhi,2003	-

❖ **E-REFERENCES:**

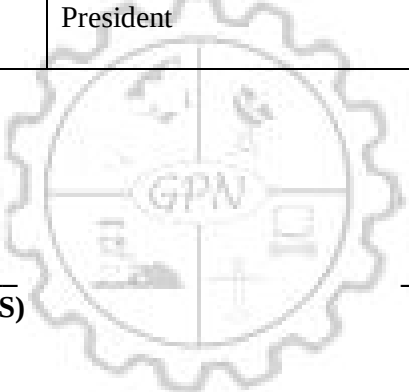
- <http://www.textileassociationindia.org/> assessed on 18th September, 2016
- <http://nptel.ac.in/courses/116102008/> assessed on 18th September, 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

- Circular knitting machine, latch needle, spring beard needle, compound needle, cams, guides, warp knitting machines

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S. G. Gaikwad	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6.	Prof. G.S. Kakad	Head of Textile Department	JDIT, Yavatmal
7.	Mr. R.N.Yadav	President	RSR Mohota Spinning and Weaving Mill



(Member Secretary PBOS)

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GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: PROFESSIONAL COURSES
COURSE CODE	: TX411E
COURSE TITLE	: FIBRE SCIENCE AND TECHNOLOGY
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 03; TU: 01; PR: 00(CLOCK HRs.)
TOTAL CREDITS	: 04 (1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE EXAM	: 01 HRs (Objective Type Online Examination)
PR. TEE EXAM	: NIL
PT. EXAM	: 15 MINUTES (Objective Type offline Examination)

❖ RATIONALE:

The use of manmade fibres is increasing due to its mechanical and technical properties. This course is related to fibre manufacture, properties and utilization of common manmade fibres such as - regenerated cellulosic fibre, nylon, polyester, acrylics from their monomers and blending them with other fibres. The flat filament yarns produced can be characterized to impart desirable properties by texturizing process.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Identify fibre forming polymers.
2. Identify various methods of manmade fibre spinning.
3. Select manufacturing process parameters of manmade fibres
4. Illustrate role of drawing, heat setting and spin finishes in post spinning process.
5. Describe yarn texturising process.
6. Suggest changes on cotton system to process manmade fibres and their blends.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1 Polymerisation	1. Classify polymers. 2. List characteristics of fibre forming polymers. 3. Compare poly-addition and poly-condensation polymerisation methods.	1.1 Synthesis of monomers 1.2 Polymerisation and formation of polymers. 1.3 Polymerisation techniques. 1.4 Characteristics of fibre forming polymers	04
2 Fibre Formation	1. Identify various methods of manmade fibre spinning. 2. Distinguish between different spinning methods. 3. Describe spin-line and its components. 4. Draw and describe various spinning methods. 5. Recommend use of partially oriented yarns.	2.1 Melt spinning – Melt spinning line, extruder, spinning manifold, spin pack and spinneret, cooling systems, wind-up device, melt spinning variables, spinning speeds and orientation – LOYMOY, POY, Fully oriented yarns for polyester fibres 2.2 Dry spinning- Preparation of dope, dry spinning unit, solidification process in dry spinning, fibre cross section formation 2.3 Wet spinning – Wet spinning line, solidification process in wet spinning.	06
3. Production of synthetic fibres	1. Describe manufacturing process and parameters a. Regenerated fibres b. N6, N6 c. Polyester fibre d. Polyethylene fibre e. Polypropylene fibres f. Poly-acrylonitrile fibre 2. Write chemical reactions involved in above process. 3. Draw the process flow chart for above fibres. 4. Describe properties of above fibres. 5. Suggest applications of above fibres	3.1 Methods, materials, flow chart, Process parameters, chemical reactions, properties and end uses of: a. Regenerated cellulose fibres- Viscose, High Wet Modulus viscose, Polynosic, Cupra ammonium rayon, Acetate Rayon b. Nylon6 and Nylon66, c. Polyester fibre d. Polyethylene fibre e. Polypropylene fibre f. Poly-acrylonitrile fibre	20
4. Post spinning process	1. Illustrate use of spin finish for manmade fibre. 2. Describe methods of spin finish application to fibres	4.1 Properties, role, components and Application methods of spin finishes. 4.2 Drawing of melt spun filaments	08

	during manufacture. 3. Describe heat setting and drawing of manmade fibres. 4. Describe tow to top conversion techniques. 5. Justify heat setting of manmade yarns.	–drawing unit, drawing parameter. 4.3 Heat setting - Heat setting parameters for polyester, N6, N66. 4.4 Principle and objectives of Tow-to-top conversion, Cutting methods: Crush cutting, Stretch break, Abrasive method	
5. Yarn Texturising	1. Summarise need of texturing continuous filament yarns. 2. Describe false twist principle to produce texturised yarns. 3. Describe airjet texturing. 4. Write properties and applications of textured yarns. 5. Suggest factors affecting stretch characteristics of false twist textured yarns.	5.1 Texturing - Advantages, classification. Principle, methods of production and Properties of textured yarns by false twist – spindle and friction twisting, Air Jet texturing, stuffer box texturing, Draw texturing – simultaneous and Sequential methods. 5.2 Factors affecting stretch characteristics of false twist textured yarns.	06
6. Spinning of man-made fibres and blends on cotton system	1. Differentiate between cotton and manmade fibre characteristics. 2. Enlist changes to be made on cotton system to process manmade fibres and their blends.	6.1 Spinning of manmade fibres and their blends on cotton system. Study of changes required to be made from Blow-room to Ring Frame as per the differences in properties of these fibres, relate each change with the property.	04
Total			48

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
NIL			

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Polymerization	02(00)	04(00)	00(00)	06(00)
02	Fibre Formation	00(00)	04(00)	04(00)	08(00)
03	Production of synthetic fibres	08(00)	16(00)	06(00)	30(00)
04	Post spinning process	04(00)	04(00)	04(00)	12(00)
05	Yarn Texturising	00(00)	04(00)	04(00)	08(00)
06	Spinning of man-made fibres and blends on cotton system	02(00)	04(00)	00(00)	06(00)
	Total	16(00)	36(00)	18(00)	70(00)

R – Remember

U – Understand

A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			Bit 7		
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M
01 To 35	1	R	2	2	R	2	2	R	2	4	U	2	3	U	2	5	A	2	6	U	2
	1	U	2	1	A	2	2	A	2	4	A	2	5	A	2	3	U	2	3	A	2
	2	A	2	3	R	2	3	R	2	5	U	2	3	U	2	6	U	2	3	R	2
	4	R	2	3	R	2	4	U	2	5	U	2	3	U	2	3	U	2	4	A	2
	4	R	2	3	R	2	3	U	2	6	R	2	3	U	2	3	U	2	3	A	2

T= Unit/Topic Number

L= Level of Question

M= Marks

R-Remember

U-Understand

A-Analyze/ Apply

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3, 4,5,6
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3, 4,5,6
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3, 4,5,6
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	--	--	--	--
		Journal Writing		Continuous	--	--	--	--
				TOTAL	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
NIL		

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	2	3	-	-	-	-	-	-	-	3	3	-
2	2	3	-	-	-	-	-	-	-	3	3	-
3	-	3	-	-	-	-	-	-	-	3	3	-
4	-	3	-	-	-	-	-	-	-	3	3	-
5	-	3	-	-	-	-	-	-	-	3	3	-
6	-	3	-	-	-	-	-	-	-	3	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1	The Text Book of Fibre Science and Technology	S. P. Mishra, New Age International Publishers, Edition:2000	8122412055
2	Manufactured Fibre Technology	V. B. Gupta, V. K. Kothari, 1997, Springer India, Pvt. Ltd.	9788132207894
3	Handbook of Textile Fibres: Man-Made Fibres: 2	J Gordon Cook, Woodhead Publishing; 5 edition (1984)	978-1855734852
4	Man-made fibres	R. W. Moncrieff, 1970, Wiley Publications	9780592063324

❖ **E-REFERENCES:**

- <http://nptel.ac.in/courses/116102026/>
- nptel.ac.in/courses/116102010/

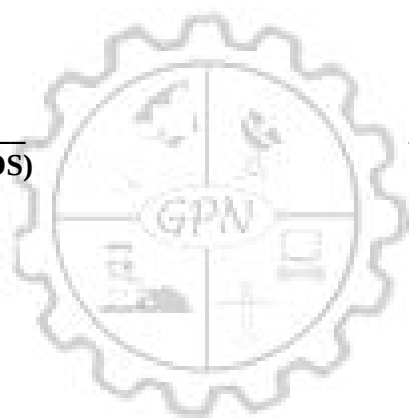
❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

- Visit to manmade industry.

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S. G. Gaikwad	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6.	Mr. R. N. Yadav.	President	Mohota Spg and Wvg Mill, Hinganghat, Wardha
7.	Prof. G. S. Kakad	Head of Textile Department	JDIET, Yavatmal

(Member Secretary PBOS)



(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: PROFESSIONAL COURSES
COURSE CODE	: TX412E
COURSE TITLE	: PROCESS CONTROL IN SPINNING
PREREQUISITE	: TX403E
TEACHING SCHEME	: TH: 03; TU: 00; PR: 04(CLOCK HRs.)
TOTAL CREDITS	: 05 (1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE EXAM	: 03 HRs
PR. TEE EXAM	: 02 HRs (External)
PT. EXAM	: 01 HR

❖ RATIONALE:

The aim of any production activity is to produce desirable quality at minimum cost. It is imperative to understand scope and role of process control in spinning. This course thoroughly prepares the students to meet the knowledge, skills and attitude required to take on the challenges of day today working of spinning mill.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Control the quality and cost of raw material in the mixing.
2. Apply principles of process control at all stages of yarn manufacture.
3. Measure machine and labour productivity and apply energy conservation measures in yarn production process.
4. Evaluate process performance parameters at each stage of yarn manufacture.
5. Undertake end breakage studies in each department to control machine and labour productivity.
6. Perform machinery and energy audit in spinning process

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1 Principles of process control and raw material control	1. Define objectives and scope of process control. 2. Establish process key variables. 3. Establish norms for key variables. 4. Apply instrumental evaluations of fibre properties to prepare mixing. 5. Suggest methods to control mixing quality and cost by various methods. 6. List records for estimation of yarn realization. 7. Estimate yarn realisation. 8. Suggest steps to control yarn realization.	1.1 Evolving a system for process control a. Scope for process control in spinning. b. Key variables for process control. c. Establishing norms and standards. d. Collection and interpretation of data for process control. e. Taking corrective action. 1.2 Control of mixing quality and cost: a. Evaluation of cotton quality – traditional instruments and HVI. b. Control of mixing through fibre characteristics, FQI. c. Simultaneous control of mixing cost and quality, cost quality index. d. Linear Programming for mixing control. e. Application of HVI to control mixing 1.3 Yarn Realisation – a. Definition and Importance. b. Records for estimating yarn realisation and waste. c. Norms for yarn realisation.	08
2 Application of Process control in yarn preparatory departments of spinning	1. Define key process variables to be controlled at: a. Blow room. b. Carding. c. Draw frame. d. Comber. e. Speed frame 2. Enlist the norms for process key variables at each stage of process. 3. Evaluate key process variables at each stage of	2.1 Blow room –Methods of measurement, norms and control of: a. Trash content and cleaning efficiency. b. Waste losses, c. Lap uniformity CV% (within lap and between lap) and lap rejection d. Build of lap. e. Nep generation 2.2 Card – Methods of measurement,	14

	process. 4. Suggest measures to control key process variables at each stage of process.	norms and control of: - Cleaning efficiency. - Waste. - Nep. - Fibre rupture. - CV% of sliver wrapping and U%. - Application of AFIS at card. 2.3 Draw frame - Methods of measurement, norms and control of : - CV% of sliver wrapping. - Sliver U%. - Sliver breakage rate. 2.4 Comber - Methods of measurement, norms and control of: - Noil- within comber and between combers. - Fractionating efficiency of comber. - Influence of comber preparatory on comber performance. - Nep. - Sliver uniformity and wrapping. - Comber stoppages. 2.5 Speed Frame - Methods of measurement, norms and control of: - CV% of roving wrapping. - U% of roving. - End breakage rate. - Roving bobbin defects.	
3. Application of Process control in Ring frame department	- Define key process variables at ring frame to control yarn quality and faults. - State the norms for lea count variations, lea CSP variations, Yarn U%, hairiness. - Suggest steps to control lea count variations, lea CSP variations, Yarn U%, hairiness. - List remedial measures to control end breakage rate.	3. Ring frame - Methods of measurement, norms and control of: - CV% of leacount (within and between bobbin variations). - Yarn strength (lea and single thread). - Yarn U%. - Yarn imperfections. - Random and periodic irregularity (spectrogram analysis).Index of irregularity, length-variance	14

	5. Identify package defects. 6. State remedial measures to control package defects.	curve. f. End breakage. g. Yarn and package defects-slubs, crackers, spinners doubles, slough-off, bad piecing, snarls, lapping, and yarn hairiness.	
4. Measurement and analysis of productivity	1. Define machine, labour and efficiency indices of productivity. 2. Identify steps to improve labour and machine productivity.	4.1 Definition of Indices of productivity and measurement of productivity. 4.2 Means to improve productivity: a. Maximising efficiency in ring spinning. b. Scope and means for increasing machine productivity in preparatory section.	04
5. Machinery Audit and implementation of process control in cotton spinning	1. Define and describe scope of machinery audit. 2. Prepare chart of implementation of process control programme.	5.1 Machinery audit- a. Definition and scope. b. Check list of machinery audit. c. Test instruments for machinery audit. 5.2 Chart of implementation of process control in spinning.	04
6. Energy conservation in spinning	1. Identify energy consumed in each process of yarn manufacture in spinning mill. 2. Identify energy conservation applications in spinning mill.	6 Energy management in spinning mill. a. Energy consumption during yarn manufacture. b. Energy efficient technology and conservation in spinning process. c. Use of renewable energy in spinning mill.	04
Total			48

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	a. Prepare mixing wise list of characteristics of cotton with standard norms for mixing. b. Prepare list of HVI parameters for mixing bale management. c. Calculate FQI for various mixings. d. Estimate yarn realization mixing wise	Principles of process control and raw material control	10
2	Evaluate process control parameters in: a. Blow room b. Card c. Draw frame d. Comber e. Speed frame	Application of Process control in yarn preparatory departments of spinning	10
3	a. Identify lea count variation by analysing within and between bobbin lea count variations. b. Determine within and between bobbin lea CSP variations. c. Determine losses in efficiency at ring frame by using snap study technique. d. Determine end breakage rate at ring frame and analyze causes for end breaks. e. Classify and analyze defects and package faults produced at ring frame. f. Analyze idle spindles by taking snap study.	Application of Process control in Ring frame department	18
4	a. Determine losses in efficiency by recording actual production and estimated production in each department and analyze. b. Compare variations in hankmeter production of ring frame with doff weight production and analyze the result.	Measurement and analysis of productivity	08
5	a. Prepare machinery audit chart and draw sketch of tools and equipments required for machine audit. b. Prepare process control chart for each process and observe it in each department	Machinery Audit and implementation of process control in cotton spinning	08
6	a. Prepare a chart of energy requirements in each department. b. Calculate kW/kg of yarn produced. c. Prepare a chart of energy efficient measures in spinning department.	Energy conservation in spinning	08
Skill Assessment			2
Total Hrs			64

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Principles of process control and raw material control	04(00)	08(00)	00(06)	12(06)
02	Application of Process control in yarn preparatory departments of spinning	04(02)	12(10)	04(00)	20(12)
03	Application of Process control in Ring frame department	04(00)	12(06)	04(04)	20(10)
04	Measurement and analysis of productivity	02(00)	04(00)	00(04)	06(04)
05	Machinery Audit and implementation of process control in cotton spinning	02(00)	00(04)	04(00)	06(04)
06	Energy conservation in spinning	02(02)	00(02)	04(00)	06(04)
	Total	18(04)	36(22)	16(14)	70 (40)

R – Remember

U – Understand

A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	2	R	2	3	R	2	4	R	2	5	R	2	1	R	2	5/7
	6	R	2																
02	1	U	4	2	R	4	4	U	4	5	U	4	3	U	4				3/5
03	2	U	4	3	U	4	5	U	4	4	U	4	2	A	4				3/5
04	2	U	4	3	A	4	6	A	4	6	A	4	1	U	4				3/5
05	1	U	6	2	A	6	3	A	6										2/3
06	3	R	6	3	U	6	2	U	6										2/3

T= Unit/Topic Number

L= Level of Question

M= Marks

R-Remember

U-Understand

A-Analyze/ Apply

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Procedure	10
2	Process analysis	20
3	Calculation, Result	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	-	-	-	-	-	3	3	3
2	-	3	-	-	-	-	-	-	-	3	3	3
3	-	3	-	-	-	-	-	-	-	3	3	3
4	-	3	3	3	-	-	-	3	3	-	3	3
5	-	3	3	3	-	-	-	3	3	-	3	3
6	-	3	3	3	-	-	-	3	3	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1	Process Control and Yarn Quality in Spinning	Dr G Thilagavathi & Dr T Karthik, Woodhead Publishing Exclusive distributors, Viva Books Private Limited, 2015	9789380308357
2	Process management in Spinning	R. Senthil Kumar, CRC Press, 2014	9781482208368
3	Process Control in Spinning	Garde. A. R., Subramania. T. A., Published by Atira, Ahmedabad, India, 1974	

❖ **E-REFERENCES:**

1. https://www.researchgate.net/publication/236107795_Process_Control_in_Drawframe_Comber_and_Speedframe accessed on 28th August, 2016
2. http://smallb.sidbi.in/sites/default/files/knowledge_base/best_practices/EnergySavingsAuditinTextileIndustry.pdf accessed on 28th August, 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

- Textile Laboratory – Fibre testing equipments, Trash analyzer, yarn testing equipments.

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S. G. Gaikwad	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6.	Mr. R. N. Yadav.	President	Mohota Spg and Wvg Mill, Hinganghat, Wardha
7.	Prof. G. S. Kakad	Head of Textile Department	JDIET, Yavatmal

 (Member Secretary PBOS)

 (Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURE S
LEVEL NAME	: PROFESSIONAL COURSES
COURSE CODE	: TX413E
COURSE TITLE	: PROCESS CONTROL IN WEAVING
PREREQUISITE	: TX406E
TEACHING SCHEME:	TH: 03; TU: 00; PR: 04 (CLOCK HRs.)
TOTAL CREDITS	: 05(1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE EXAM	: 03 HRs
PR. TEE EXAM	: 02 HRs (External)
PT. EXAM	: 01 HR

❖ RATIONALE:

The students must be aware of various process control program in weaving preparatory & weaving sections. The knowledge of proper control of quality and processes at each process in the industry is essential. The students also will be able to understand the importance of controls of fabric quality, controls of waste at different machines, humidity in weaving process, selection of machinery & controls on consumption of accessories.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Apply the principles of process control in weaving.
2. Design the process control program in weaving preparatory and loom shed.
3. Suggest preventive maintenance activities in loom shed
4. Assess end product with norms.
5. Evaluate the performance of weaving preparatory and loom shed
6. Identify fabric defects and suggest measures for corrective action.

❖ COURSE DETAILS:

A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1 Process Control in Winding	1. Describe scope of process control at winding 2. List norms and schedule of checks 3. State the parameters to be controlled in Winding. 4. Identify package defects. 5. Compare splice and knots	1.1 Scope and approach to process control 1.2 Setting norms and schedule of checks 1.3 Quality of knots and splice, yarn clearer and their settings, unwinding tension, winding tension, package quality, Causes and Remedies of package defects. 1.4 Control of quality and productivity in Winding. Norms for process parameters. 1.5 Assessment of performance of winding machine - knot factor, clearing efficiency, classimat classification	08
2. Process Control in Warping & Sizing	1. Select the processing parameters of warping. 2. State the causes of low productivity. 3. Choose the correct size recipe and processing parameters of sizing. 4. Describe the methods to control the stretch of yarn, size pick-up and temperature control. 5. Describe the causes of defects and remedies in sizing beams.	2.1 Warping – scope of process control, control of end breakages, Quality of warping beams, Minimizing end breaks in warping, condition of machine, Causes of low productivity at warping. 2.2 Method of assessing productivity of warping machine & measures to improve the productivity. 2.3 Sizing - scope of process control, choice of sizing recipe and size pick up. Control of size pick up & yarn strength. Control of yarn stretch 2.4 Quality of sized beam, sizing loss Control of productivity at sizing 2.5 Devices for improving weavability of sized yarn.	10
3 Process Control in Pirn Winding and Drawing-In	1. Describe stoppages due to mechanical failures at pirn winding 2. Select parameters to control productivity at pirn winding. 3. Classify Drawing in and Warp tying.	3.1 Scope of process control. Minimizing end breakages, alignment of supply package, winding tension. 3.2 Minimizing stoppages due to mechanical failures at pirn winding. Improve built of pirn. 3.3 Control of productivity at pirn	06

	4. List the importance of selection of healds , reeds, Drop pins 5. State the Precautions during drawing - in	winding. 3.4 Introduction,-Drawing in and Warp Tying. 3.5 Use and selection of healds, reeds, Drop pins in drawing-in and warp tying. 3.6 Precautions during drawing - in and warp tying process.	
4 Loom Shed Control	1. Choose the important factors that affect loom efficiency 2. Identify the causes of yarn breaks in loom-shed. . 3. Describe the stoppages due to mechanical faults. 4. State the causes of loss of efficiency. 5. Suggest remedial measures to improve the efficiency.	5.1 Scope of process control. Limitations on maximum speed , mechanical condition causing reduction in loom speed 5.2 Control of loom speed, efficiency and loom stoppages. 5.3 Assessment of Loom performance. by snap readings. 5.4 Factors affecting calculation of correct loom shed efficiency 5.5 Concept of preventive and breakdown maintenance in loom shed. 5.6 Work activities in preventive maintenance: cleaning, lubrication, inspection. 5.7 Machine audit	10
5 Control of Hard Waste and Fabric Quality	1. State the necessity to control hard waste 2. Identify hard waste at weaving preparatory and loom shed. 3. Describe importance of Grey fabric inspection 4. State the procedure to identify fabric defects and there remedy 5. Calculate fabric value loss	5.1 Hard waste control - Approach to the reduction of hard-waste and Setting the standards of hard-waste 5.2 Control of waste at winding, warping, sizing, Pirn winding, drawing and loom shed. 5.3 Grey fabric inspection, fabric defects, fabric value loss.	08
6 Control on Consumption of Accessories	1. State Selection of accessories and there care 2. Describe Mill experimentation process 3. Choose loom shed accessories. 4. Identify causes for rejection of loom shed accessories.	1.1 Scope of control 1.2 Selection of accessories- Causes of rejection , tests for selection of loom accessories 1.3 Care of accessories – Healds , Reed , shuttle 1.4 Implementation of process control programme in weaving. (Mill experimentation)	06
Total			48

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Prepare visit report on following by visit to a mill 1. Prepare a list of process control activities with their norms in winding. 2. Comparison of two winding machines for winding performance.(As per chart) 3. Record the causes of end breaks and number of breaks per hour. 4. Observe winding package faults and describe them 5. Observe and Record classimat faults of yarn 6. Calculate production and efficiency of winding machine	Process Control in Winding	10
2	Prepare visit report on following by visit to a mill 1. Prepare a list of process control activities with their norms in winding.. 2. Prepare a list of process control activities with their norms in winding. 3. Observe defects at warping and describe them 4. Observe defects at sizing and describe them 5. Calculate production and efficiency of warping machine. 6. Calculate production and efficiency of sizing machine	Process Control in Warping & Sizing	12
3	Prepare visit report on following by visit to a mill 1. Prepare a list of process control activities with their norms in winding. 2. Prepare a list of process control activities with their norms in winding. 3. Observe defects at pirn winding and describe them 4. Observe types of Healds, Reed, Drop pins and describe them. 5. Calculate production and efficiency of pirn winding machine	Process Control in Pirn Winding and Drawing-in	10
4	Prepare visit report on following by visit to a mill 1. Prepare a list of process control activities with their norms in loom shed. 2. Prepare visit report on following by observing video CD or by visit to a mill a) Snap study at loom shed and record the causes of stop. b) cleaning and lubrication schedule at loom shed and describe them c) Observe preventive and breakdown maintenance in loom shed and describe them 3. Calculate production and efficiency of loom shed	Loom Shed Control	12
5	Prepare visit report on following by observing video CD or by visit to a mill	Control of Hard Waste and Fabric	12

	a) Hard waste control study at weaving preparatory and suggest their norms. b) Hard waste control study at loom shed and suggest their norms 1. Observe fabric defects at loom shed and describe them 2. Calculate fabric value loss	Quality	
6	Prepare visit report on following by visit to a mill 1. Observe causes of rejection, tests for selection of loom accessories 2. Observe Care of accessories for Healds, Reed, shuttle	Control on Consumption of Accessories	06
Skill Assessment			2
Total Hrs			64



❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels From Cognition Process Dimension			Total Marks
		R	U	A	
01	Process Control in Winding	04(02)	06(00)	00(04)	10(06)
02	Process Control in Warping & Sizing	04(04)	08(04)	02(00)	14(08)
03	Process Control in Pirn Winding and Drawing-In	04(02)	06(04)	00(00)	10(06)
04	Loom Shed Control	04(00)	04(02)	04(04)	12(06)
05	Control of Hard Waste and Fabric Quality	04(02)	06(04)	04(02)	14(08)
06	Control on Consumption of Accessories	04(04)	04(02)	02(00)	10(06)
	Total	24(14)	34(16)	12 (10)	70 (40)

R – Remember U – Understand A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	2	R	2	3	R	2	4	U	2	5	R	2	6	A	2	5/7
	2	A	2																
02	1	A	4	2	U	4	3	R	4	4	A	4	5	U	4				3/5
03	5	R	4	2	U	4	3	U	4	4	R	4	6	R	4				3/5
04	5	U	4	2	U	4	4	A	4	6	R	4	6	U	4				3/5
05	1	R	6	3	U	6	4	U	6										2/3
06	1	U	6	2	R	6	5	A	6										2/3

T= Unit/Topic Number L= Level of Question M= Marks

R-Remember U-Understand A-Analyze/ Apply

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		Questionnaires	1, 2, 3, 4,5,6
	End Of Course			End Of The Course				

❖ SCHEME OF PRACTICAL EVALUATION:

S.N.	Description	Max. Marks
1	Drawing	10
2	Process analysis	20
3	Calculation, Result	10
4	Viva voce	10
	TOTAL	50

❖ MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	-	-	-	-	-	-	3	3
2	-	3	-	-	-	-	-	-	-	-	3	3
3	-	3	-	-	-	-	1	-	-	-	3	3
4	-	3	3	3	-	-	-	3	3	3	3	3
5	-	3	3	3	-	-	-	3	3	3	3	3
6	-	3	3	3	-	-	-	3	3	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ REFERENCE & TEXT BOOKS:

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1	Process control in Weaving	M.C Paliwal , P.D.Kimothi Ahmedabad Textile Industry's Research Association, 1974	-
2	Norms for Textiles	Shri T.V. Ratnam, R.Rajamanicham, K.P. Chellamani, D. Shanmuganandan, Ms. Indra Doraiswamy, Dr. Arindam Basu. The South India Textile Research Association Publication ,1980	-
3	Weaving Machine, Mechanisms, Management	Dr.M.K. Talukdar, D.B.Ajagaonkar Mahajan Publication ,Edition I ,2000	9788185401164
4	Norms on Winding, Warping, Drawing in Looms.	Ahmedabad Textile Industry's Research Association Publication,1974	-
5	Weaving: Conversion of yarn to fabric	Lord P.R. and Mohamed M.H. Merrow Publication ,Edition II,1992	9781845692902

❖ **E-REFERENCES:**

1. www.fibre2fashion.com , assessed on 9th September 2016
2. <http://www.textileassociationindia.org/> , assessed on 9th September 2016
3. <http://textilelearner.blogspot.in> , assessed on 9th September 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

- Textile Laboratory –Weaving preparatory and loom shed machine set up, conventional and modern machines.

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S. G. Gaikwad	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6	Mr. R. N. Yadav.	President	Mohota Spg and Wvg Mill, Hinganghat, Wardha
7	Prof. G. S. Kakad	Head of Textile Department	JDIET, Yavatmal

(Member Secretary PBOS)

(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: PROFESSIONAL COURSES
COURSE CODE	: TX414E
COURSE TITLE	: PRODUCTION PLANNING AND ORGANIZATION
PREREQUISITE	: TX 403E, TX 406E
TEACHING SCHEME:	TH: 03; TU: 00; PR: 04(CLOCK HRs.)
TOTAL CREDITS	: 05(1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE EXAM	: 03 Hrs
PR. TEE EXAM	: 02 HRs (Internal)
PT. EXAM	: 01 HR

❖ RATIONALE:

This course will provide the knowledge which deals with various important issues facing to manage the Textile Industry. The content related with Man, Machine, Material, and Money will help Textile students to manage the resources effectively. The planning of machine specification and its implementation will help students to arrange plant layout in detail. The managerial aspects like Man power requirement, Productivity management content will help to take effective decision. The objective of this course is to take effective decision and manage the textile industry effectively by textile students.

❖ COURSE OUTCOMES:

❖ After completing this course students will be able to–

1. Select site, building, plant and machinery layout for textile mill.
2. Organize material, hank and machine production for spinning and weaving mill.
3. Select the optimum manpower required for the spinning and weaving department
4. Prepare a plan for plant and machinery layout of textile mill.
5. Prepare an organization plan for spinning, weaving mills
6. Calculate labour complement in textile mill to produce given quantity of yarn/fabric.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1. Site Selection and building construction for Textile mills.	1. Justify the need for site selection for textile mill. 2. Identify the various factors considered for site selection. 3. Describe the need of SEZ (Special economic zone) and cluster development for textile industry. 4. Describe the types of factory building for textile industry	1.1 Selection of site for textile mills, 1.2 Factors influencing site selection, Climatic considerations, geo-technical report, bearing pressure etc. 1.3 General information about SEZ , cluster development and its facility. 1.4 Architectural & structural aspects of textile mill building. 1.5 Illumination plan for textile industry 1.6 Humidification plan for textile industry	06
2. Plant and Machinery layout.	1. Identify the objective of plant and machinery layout. 2. Describe factors Influencing layouts and selection of machinery. 3. Prepare the plant and machinery layout for spinning and weaving industries. 4. Identify the symptoms of bad layout.	2.1 Concept of plant and machinery layout. 2.2 Types of Plant layout 2.3 Factors affecting plant layout. 2.4 Selection criteria for good plant layout. 2.5 Layout aspects of spinning, weaving, knitting and composite mills. 2.6 Calculation of spatial requirements	08
3. Organization. Of Spinning Mill	1. Prepare the Hank organization. 2. Calculation for no. of machines in spinning /spin plan 3. Selection of machines & machinery specifications required for the product of spinning mill.	3.1 Selection of machines & its specifications for spinning mills. 3.2 Preparation of organization for Ring, Open End and Blended yarns. 3.3 Calculations regarding efficiency, waste, draft, twist, production rates, amount of raw material required	10
4. Organization of Weaving Mill	1. Calculate no. of machines in weaving / weave plan. 2. Prepare organization for shuttle & shuttle less weaving mill 3. Determine production calculation of different cloths.	4.1 Selection of machines & its specifications for weaving units. 4.2 Preparation of weaving organization for different quality of fabrics and relevant calculations. 4.3 Preparation of organization for shuttle & shuttle less weaving mill.	10

5. Labour Complements in Textiles	1. Describe the requirement of skilled, unskilled labor for spinning, weaving mills based on work load consideration. 2. Identify the requirement of technical and administrative staff for textile industry	5.1 Operative duties of skilled manpower in Spinning and Weaving mills. 5.2 Staff required for spinning and weaving based on workload consideration 5.3 Types of labour required, labour complement in textile mill 5.4 Work study ,Motion study ,method study, Snap study	08
6. Material Handling and Industrial Safety	1. Describe the need and importance of material handling. 2. Prepare the safety charts. 3. Identify the causes to reduce fire and safety hazards. 4. List out the factors to reduce the noise pollution.	6.1 Importance of material handling, Housekeeping 6.2 Study of different equipments used for material handling and housekeeping in textile mill 6.3 Concept of Industrial Safety, Safety procedures, Importance and its applications 6.4 Fire safety, Health hazards and precautionary measures. 6.5 Noise - Definition of Noise, Noise control, Desirable noise in different sections of a textile mill	06
Total Hrs.			48

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Identify the various factors considered for site selection.	Site Selection and building construction for Textile mills.	4
2	Prepare critical report on salient features of SEZ (Special economic zone) and textile cluster in your area.		6
3	Draw the complete plant layout of spinning mill with machinery dimension on drawing sheet.	Plant and Machinery layout.	6
4	Draw the complete plant layout of weaving unit with machinery dimension on drawing sheet.		4
5	Prepare the spinning organization for carded yarn in spinning mill.	Machinery Specification, Selection & calculation for No. of Spinning Machines	4
6	Prepare the spinning organization for combed yarn in spinning mill.		6
7	Prepare the spinning organization for blended polyester/ cotton (67:33) yarn in spinning mill.		6
8	Prepare the weaving organization for cotton shirting fabric on shuttle less weaving machines.	Machinery Specification, Selection & calculation for No. of Weaving Machines	6
9	Prepare the weaving organization for polyester/ viscose suiting fabric on shuttle weaving machines.		6
10	Identify the factors of noise reduction in Textile mill.	Labour Compliments	4
11	Find out the operative duties of weaver working on air jet weaving machine.		4
12	Identify the safety measures observed in Textile mills.		4
Skill Assessment			4
Total Hrs			64

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Site Selection and building construction for Textile mills.	04(00)	06(02)	00(02)	10(04)
02	Plant and Machinery layout.	02(02)	06(02)	04(02)	12(06)
03	Organization. Of Spinning Mill	02(02)	06(04)	06(02)	14(08)
04	Organization of Weaving Mill	02(02)	06(06)	04(02)	12(10)
05	Labour Complements in Textiles	02(00)	06(02)	02(02)	10(04)
06	Material Handling and Industrial Safety	02(02)	06(04)	04(02)	12(08)
	Total	14(08)	36(20)	20 (12)	70 (40)

R – Remember U – Understand A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	3	R	2	4	R	2	5	R	2	6	R	2	2	R	2	5/7
	3	R	2																
02	1	R	4	1	R	4	2	R	4	2	R	4	3	U	4				3/5
03	1	U	4	2	U	4	5	U	4	1	U	4	3	U	4				3/5
04	6	U	4	2	A	4	3	A	4	1	A	4	5	A	4				3/5
05	4	A	6	6	A	6	4	U	6										2/3
06	3	U	6	3	A	6	6	A	6										2/3

T= Unit/Topic Number L= Level of Question M= Marks

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	70	28	Theory Answer Sheets	1, 2, 3
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Setting of experiments	10
2	Process analysis	20
3	Calculation and interpretation of the result	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	-	-	-	-	-	-	3	3
2	-	3	-	-	-	-	-	-	-	-	3	3
3	-	3	-	-	-	-	-	-	-	-	3	3
4	-	3	3	3	-	-	-	3	3	3	3	3
5	-	3	3	3	-	-	-	3	3	3	3	3
6	-	3	3	3	-	-	-	3	3	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Management of Textile Industry	Dr. V. D. Dudeja	0408705159
2	Management of Textile Production,	A.Ormorod and N. Butter Wortrs	0408705159
3	Project, Planning Analysis, Selection Implementation & Review by	Prasanna Chandra, Tata McGraw Hill Publishing Co. Ltd.,	0408704586
4	Industrial Organization & Engineering Economics	T.R. Banga & S.C. Sharma, Khanna Publishers, Delhi.	9781855739963/
5	A Weavers' View Can We Afford Not to invest	L. Cegielka M.A, The Textile Institute Publisher	9788182475144
6	Textile Project Management	A Ormerod, The Textile Institute Publication	-

❖ **E-REFERENCES:**

- <http://www.textileassociationindia.org/> assessed on 15th September, 2016
- <http://www.fiber2fashion.org/> assessed on 15th September, 2016
- <http://www.nift.ac.in/> assessed on 15th September, 2016
- www.itamma.org/ assessed on 15th September, 2016
- www.en.wikipedia.org/wiki/Textile_design assessed on 15th September, 2016
- <http://www.designdiary.nic.in/g> assessed on 15th September, 2016
- <http://textilelearner.blogspot.in> assessed on 15th September, 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

NIL

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S. G. Gaikwad	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6.	Prof. G. S. Kakad	Head of Textile Department	JDIET, Yevatmal.
7.	Mr. R. N. Yadav	President	M/S. R. S. R. Mohota Spinning and Weaving Mills, Hinganghat, Dist. Wardha

(Member Secretary PBOS)_____
(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME : DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME : PROFESSIONAL COURSES
COURSE CODE : TX415E
COURSE TITLE : TEXTILE CAD
PREREQUISITE : TX301E
TEACHING SCHEME: TH: 00; TU: 00; PR: 04(CLOCK HRs.)
TOTAL CREDITS : 02 (1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE EXAM : NIL
PR. TEE EXAM : 02 HRs (Internal)
PT. EXAM : NIL

❖ RATIONALE:

Textile designers developed the traditional Indian Textile design and designing of figured fabrics by using colour theories & modification of colours. The original works of the designers based on different bases/sketches that are used for fabric weaving and printing purpose. Computer Aided Design and Operation has now become an integral part of textile industry. CAD helps them to visualize and see their imaginative design in final form without producing any sample. CAD system stores designs in library; it can be recalled and modified as per requirement.

❖ COURSE OUTCOMES:

1. Use free hand sketches of different textile bases.
2. Choose the different motifs.
3. Draw different bases of textile designs.
4. Operate CAD software.
5. Use different tools to produce textile designs.
6. Use poster paints for textile designing.

❖ COURSE DETAILS:

A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
NIL			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practical's	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Draw different textiles motifs.	-	04
2	Draw and paint chromatic circle.	-	04
3	Draw and paint different textile bases.	-	04
4	Draw and paint shirting , suiting patterns	-	04
5	Draw and paint dress material, saree border designs	-	04
6	List different tools used in Textile CAD	-	04
7	Create library of the basic weaves and save them in folder	-	04
8	Prepare Design using CAD - Design size, overall size on the loom - No. of ends and picks. - Size of repeating motif and within the design - warp and weft thread Pattern. Possible weave effect.	-	06
9	Use design tools to produce stripe designs.	-	04
10	Use design tools to produce check designs.	-	04
11	Practice a dobby design to simulate the fabric using different Color combinations	-	04
12	Calculate warp , weft cost and fabric cost using CAD tools.	-	04
13	Use design tools to produce a Jacquard design.	-	04
14	Practice a Jacquard design to simulate the fabric using different Colour combinations.	-	04
15	Use design tools to produce a printed design and its colour Separations.	-	04
Skill Assessment			02
Total Hrs			64

❖ **SPECIFICATION TABLE FOR THEORY PAPER: NOT APPLICABLE**❖ **QUESTION PAPER PROFILE FOR THEORY PAPER - NOT APPLICABLE**

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	1, 2, 3, 4,5,6
		Journal Writing		Continuous	05	--	Journal	1, 2, 3, 4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	1, 2, 3, 4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ SCHEME OF PRACTICAL EVALUATION:

S.N.	Description	Max. Marks
1	Sketches drawing	10
2	Application of design tools	20
3	Preparation of designs	10
4	Viva voce	10
	TOTAL	50

❖ MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	3	3	3	-	-	3	3	3	3	-
2	-	3	3	3	3	-	-	3	3	3	3	-
3	-	3	3	3	3	-	-	3	3	3	3	-
4	-	3	3	3	3	-	-	3	3	3	3	3
5	-	3	3	3	3	-	-	3	3	3	3	3
6	-	3	3	3	3	-	-	3	3	3	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ REFERENCE & TEXT BOOKS:

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1	CAD/CAM in textile and clothing	Stephan Gray Gower publishing, Hampshire, UK	056607673
2	CAD in clothing and Textile : A collection of expert views	Aldrich W. Wiley-Blackwell; New Delhi	0632038934
3	Computers in the Fashion Industry	Taylor P. Heinemann Professional USA	0434919160
4	Computers in the world of Textile	The Textile Institute	09007369

❖ E-REFERENCES:

Not applicable

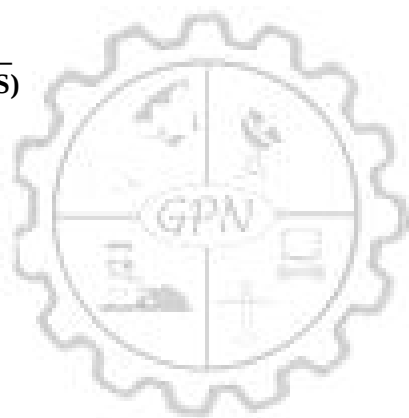
❖ LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION

- Textile CAD software

❖ LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S. G. Gaikwad	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6.	Mr. R. N. Yadav.	President	Mohota Spg and Wvg Mill, Hinganghat, Wardha
7.	Prof. G. S. Kakad	Head of Textile Department	JDIET, Yavatmal

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GOVERNMENT POLYTECHNIC, NAGPUR.

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COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: PROFESSIONAL COURSES
COURSE CODE	: TX416E
COURSE TITLE	: ENTERPRISE RESOURCE PLANNING
PREREQUISITE	: CA201E, TX414E
TEACHING SCHEME	: TH: 00; TU: 00; PR: 04 (CLOCK HRs.)
TOTAL CREDITS	: 02(1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE EXAM	: NIL
PR. TEE EXAM	: 02 HRs (Internal)
PT. EXAM	: NIL

❖ RATIONALE:

Textile Industry in India has the potential to emerge as a true global player. It requires strategic and time bound action plans. Enterprise resource planning a tool allows companies to regain active control of their whole administration and operation environments to increase efficiency and profitability. It definitely requires more investment in the installation but gives good returns in the future. It also helps in giving a quick response to customer requirement. This course will cover techniques and concepts for integrated management of business.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Identify different components of ERP.
2. Apply ERP tool for Operation processes
3. Use ERP tool to control inventory
4. Plan Human Resources using ERP tool
5. Determine Product cost by applying ERP tool
6. Check measures for manufacturing performance by ERP tool.

❖ COURSE DETAILS:

A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
NIL			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Prepare chart showing ERP components.	Introduction to ERP	06
2	Use ERP tool for Production planning	ERP tool for Operation processes	08
3	Practice ERP tool for Purchasing	ERP tool to control inventory	08
	Use ERP tool for Inventory Management		08
5	Use ERP tool for Human resources	Human Resources ERP tool	08
6	Use ERP tool for manufacturing performance measures	Manufacturing performance ERP tool	12
7	Use ERP tool for Product costing	Product costing	12
Skill Assessment			02
Total Hrs			64

❖ **SPECIFICATION TABLE FOR THEORY PAPER: NIL**❖ **QUESTION PAPER PROFILE FOR THEORY PAPER: NIL**

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	100	40		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	1, 2, 3, 4,5,6
		Journal Writing		Continuous	05	--	Journal	1, 2, 3, 4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Practical Answer Sheets	1, 2, 3, 4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Procedure	10
2	Process analysis	20
3	Calculation, Result	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	3	3	-	-	-	-	-	-	-	-
2	-	3	3	3	-	-	-	3	3	3	3	3
3	-	3	3	3	-	-	-	3	3	3	3	3
4	-	3	3	3	-	-	-	3	3	3	3	3
5	-	3	3	3	-	-	-	3	3	3	3	3
6	-	3	3	3	-	-	-	3	3	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1	ERP: The Future of Business Automation	Zubair H. Shaikh, Atlantic Publishers and Distributors (P) Ltd., December 2009	10: 8126910852 13:978-8126910854
2	Making ERP Work: The Ten Point Guide to a World Class Implementation	Sam Graham, Create Space Independent Publishing Platform, 1 st Edition, June 2016	1533588740 978-1533588746
3	Concepts in Enterprise Resource Planning	Ellen Monk, Bret Wagner, Cengage Learning Custom Publishing, Third Edition, 2012	8131516717 978-8131516713
4	Enterprise Resource Planning	Dr. P. Rizwan Ahmed, Margham Publications, 2016	9383242418 978-9383242412

❖ **E-REFERENCES:**

- <https://erpnext.com/> accessed on 20th October, 2016
- https://en.wikipedia.org/wiki/Enterprise_resource_planning accessed on 2nd October, 2016
- <https://www.syspro.com/au/> accessed on 20th October, 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

NIL

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
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3.	Mr. S. S. Lawand	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6	Mr. S. G. Gaikwad	Lecturer in Textile Technology	MSBTE Representative
7	Mr. R. N. Yadav.	President	Mohota Spg and Wvg Mill, Hinganghat, Wardha
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GOVERNMENT POLYTECHNIC, NAGPUR.

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COURSE CURRICULUM

PROGRAMME : DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME : PROFESSIONAL COURSES
COURSE CODE : TX417E
COURSE TITLE : INDUSTRIAL PROJECT
PREREQUISITE : 60 CREDITS
TEACHING SCHEME : TH: 00; TU: 00; PR: 04(CLOCK Hrs.)
TOTAL CREDITS : 02(1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE EXAM : NIL
PR. TEE EXAM : 02 HRs (External)
PT. EXAM : NIL

❖ RATIONALE:

Industrial project course is the manifestation of technical knowledge acquired by the student during their course of work. This course provides an opportunity to the students to identify and solve real life problem of the industries /research organization / society. Students also get opportunity to provide innovative, economic and technological viable solution to the world of work.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

- 1 Carryout market survey /Literature survey
- 2 Select project and Prepare planning
- 3 Perform project work in group
- 4 Test project work
- 5 Prepare project report
- 6 Present project work

❖ COURSE DETAILS:

A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
Nil			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	Perform introductory Task - Form project batch of four-five students - Select project as per area of interest - Select topic / industrial problem / work by consulting the guide from following list List of projects : - Spinning - Weaving - Textile testing - Textile processing - Technical textiles - Knitting - Environment and sustainability - Industrial safety - Energy conservation - Modern trends in textile technology Perform Literature Survey - Refer various Periodicals, Journals, Books, Internet literature related to project topic - Note down findings - Prepare database of collected literature on the basis of title, area of work, methodology used, type of work - Analyze industrial need - Prepare brief report	Introductory Task and Literature Survey	08
2	Plan project - Prepare Synopsis in standard format which includes following. Title Page: Project Title, Purpose of submission, Institute logo, Students Name, Guide Name, Department and Institute Name - Use Latex for preparing synopsis. - Submit the Synopsis to guide. - Approve synopsis from guide - Prepare action plan of project activities - Submit the action plan to guide. - Approve action plan from guide	Planning	12
3	Perform Project work - Define the problem - Conduct literature survey - Collect relevant data from the textile mills - Conduct experimentation at - Collect observations - Conduct Analysis	Project Work	24

	7. Find / Record conclusions		
4	Test Project work	Testing	08
5	Prepare project report in standard format, which includes following. - Title Page which includes: Project Title, Purpose of submission, Institute logo, Students Name, Guide Name, Department and Institute Name - Certificates: Student declaration, Certificate from guide - Acknowledgement - Table of contents - List of Tables - List of Figures - List of abbreviations and acronyms (if any) - Text 1. Introduction, objectives 2. Literature Survey 3. Methodology/Materials/Methods/Estimate. 4. Results 5. Summary/Conclusion. 6. References Use Latex for preparing report. Perform plagiarism check from free internet site. - Submit report of plagiarism check to the guide with project report	Project Writing	06
6	Present project work - Prepare power point presentation of work done. - Prepare yourself to handle examiner questions after presentation. - Practice group presentation. - Present before guide.	Presentation	06
			64

❖ **SPECIFICATION TABLE FOR THEORY PAPER:**

Not Applicable

❖ **QUESTION PAPER PROFILE FOR THEORY PAPER:**

Not Applicable

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	40	--	Project Report and work done	1.2,3,4,5,6
		Journal Writing		Continuous	10	--	Project Report and work done	1.2,3,4,5,6
				TOTAL	50	20		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	100	40	Project Report and work done	1.2,3,4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Selection of topic	10
2	Literature survey	10
3	Project planning and implementation	10
4	Work done, Feasibility of work, Results	50
5	Report writing	10
6	Presentation of work and viva voce	10
Total		100

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	3	3	-	3	-	3	3	-	-	-
2	-	3	3	3	-	3	-	3	3	3	3	3
3	-	3	3	3	-	3	-	3	3	3	3	3
4	-	3	3	3	-	3	-	3	3	3	3	3
5	-	3	3	3	-	3	-	3	3	3	3	3
6	-	3	3	3	-	3	-	3	3	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Weaving machine, material & management	Talukdar, Sriramulu & Ajgaonakar Mahajan Publishers Private Limited, Ahmedabad	-
2.	Conversion of Yarn to Fabric	P. R. Lord, M. H. Mohamed, Woodhead Publishing, Ltd. Cambridge, England	9781845692902
3.	Fiber to Fabric	Bernard P Cobman , MaGraw-Hill Book Company	0070662363, 9780070662360
4.	Textile Yarns, Technology, Structure and Applications	B C Goswami, J G Martindale, F L Scardino Ed 1977, Mahajan Book Distributors, Ahmadabad	81-85401-04-07
5.	Process Control in Spinning	Garde. A. R., Subramania. T. A., Published by Atira, Ahmedabad, India, 1974	

❖ **E-REFERENCES:**

- ❖ http://smallb.sidbi.in/sites/default/files/knowledge_base/best_practices/EnergySavingsAuditinTextileIndustry.pdf, accessed on 28th August, 2016
- ❖ <http://nptel.ac.in/courses/116102038/23>, accessed on 28th August, 2016
- ❖ <http://www.rieter.com/cz/rikipedia/articles/rotor-spinning/the-importance-of-rotor-spinning/historical-background/>, accessed on 28th August, 2016
- ❖ <http://www.rieter.com/cz/rikipedia/articles/alternative-spinning-systems/alternative-spinning-processes/synopsis/introduction/>, accessed on 28th August, 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

NIL

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S. G. Gaikwad	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6	Mr. R. N. Yadav.	President	R.S.R.Mohota Spg and Wvg Mill, Hinganghat, Wardha
7	Prof. G. S. Kakad	Head of Textile Department	JDIET, Yavatmal
8	Dr. S.W.Rajurkar	In-Charge, Curriculum Development Cell	Government Polytechnic, Nagpur.
9	G.V.Gotmare	In-Charge, Curriculum Development Cell	Government Polytechnic, Nagpur.

(Member Secretary PBOS)

(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME : DIPLOMA IN CE/ME/EE/EC/CM/IT/AE/MT/PK/TX

LEVEL NAME : PROFESSIONAL COURSES

COURSE CODE : SE401E

COURSE TITLE : SEMINAR

PREREQUISITE : 60 Credits

TEACHING SCHEME: TH:00; TU:00;PR: 02(CLOCK Hrs.)

TOTAL CREDITS : 01(1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)

TH. TEE EXAM : NIL

PR. TEE EXAM : 02 HRs (Internal)

PT. EXAM : NIL

❖ **RATIONALE:**

Seminar course is the manifestation of soft skills acquired by the student during their course of work. This course provides an opportunity to develop and present their own technical knowledge, communication skills, presentation skills, self-learning abilities, creativity, and team working abilities. This course will also enable them to gain confidence to face the world of work.

❖ **COURSE OUTCOMES:**

After completing this course students will be able to–

- 1 Select seminar topic
- 2 Carryout Literature survey
- 3 Prepare planning
- 4 Prepare seminar report
- 5 Prepare seminar presentation
- 6 Present interpersonal skills, presenting skills, soft skills and creativity.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
Nil			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	Perform introductory Task - Select seminar topic individually as per area of interest - Select recent technical topic, not covered in curriculum, by consulting the guide.	Topic Selection	2
2	Perform Literature Survey - Refer various Periodicals, Journals, Books, Internet literature related to seminar topic - Note down findings - Prepare brief report	Literature Survey	6
3	Plan Seminar - Prepare outline of selected seminar topic in standard format - Approve seminar topic from guide - Prepare action plan of work - Submit the action plan to guide. - Approve action plan from guide	Planning	2
4	Prepare seminar report in standard format, which includes following. - Title Page which includes: Seminar Title, Purpose of submission, Institute logo, Students Name, Guide Name, Department and Institute Name - Certificates: Student declaration, Certificate from guide - Acknowledgement - Text - Introduction - Literature Survey - Methodology/Materials/Methods - Results - Summary/Conclusion. - References Use Latex for preparing report. Perform plagiarism check from free internet site. - Submit report of plagiarism check to the guide with seminar report	Report Writing	12
5	Prepare power point presentation Prepare yourself to handle audience / examiner questions after presentation. Practice presentation before group of students	Preparation	08
6	Present before guide Present before assessment panel.	Presentation	02
Total Hrs.			32

- ❖ **SPECIFICATION TABLE FOR THEORY PAPER:** Not Applicable
- ❖ **QUESTION PAPER PROFILE FOR THEORY PAPER:** Not Applicable
- ❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	40	--	Rubrics, Assessment Sheets & Seminar Report	1,2,3,4,5,6
		Report Writing		Continuous	10	--	Seminar Report	1,2,3,4,5,6
				TOTAL	50	20		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics, Seminar Report & Presentation	1, 2, 3, 4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Selection of topic	05
2	Literature survey	05
3	Project planning and implementation, Work done, Feasibility of work	05
4	Report writing	05
5	Presentation Skills	25
6	Viva voce	05
Total		50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (COs)	Program Outcomes (POs)										PSO	PSO
	1	2	3	4	5	6	7	8	9	10	1	2
1	–	3	–	–	–	–	–	3	3	–	–	–
2	–	3	3	3	–	–	3	3	3	3	–	–
3	–	3	3	3	–	–	3	3	3	3	–	–
4	–	3	3	3	–	–	3	3	3	3	–	–
5	–	3	3	3	–	–	3	3	3	3	–	–
6	–	–	–	–	–	–	–	3	3	3	–	–

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	The Presentation Secrets of Steve Jobs: How to Be Insanely Great in Front of Any Audience	Carmin Gallo, McGraw-Hill Education, 1 st Edition, October 2009	10: 0071636080 13: 978-0071636087
2.	Speaking Your Mind: Oral Presentation and Seminar Skills	Rebecca Stott, Tory Young, Cordelia Bryan, Longman, 2001	0582382432, 9780582382435
3.	How to Design TED-Worthy Presentation Slides: Presentation Design Principles from the Best TED Talks	Akash Karia, Create Space Independent Publishing Platform, 3 rd Edition, February 2015	10: 1507638124 13: 978-1507638125
4.	Presenting with Credibility: Practical Tools and Techniques for Effective Presentations	Bruna Martinuzzi, Six Seconds Emotional Intelligence Press, Kindle Edition, April 2012	978-1-935667-12-4

❖ **E-REFERENCES:**

- http://www.prepareforsuccess.org.uk/skills_for_presenting_in_seminars.html , accessed on 5th November, 2016
- <http://www.che.iitb.ac.in/faculty/jb/courses/seminar/tips.html> , accessed on 5th November, 2016
- <https://www.youtube.com/watch?v=dEDcc0aCjaA> , accessed on 5th November, 2016
- <https://www.youtube.com/watch?v=V2q7Q2j7ESs> , accessed on 5th November, 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

1. DLP Projector, latest specification
2. Computer, latest specification

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Dr. S. W. Rajurkar	In-Charge, Curriculum Development Cell	Government Polytechnic, Nagpur.
2.	Mr. G. V. Gotmare	In-Charge, Curriculum Development Cell	Government Polytechnic, Nagpur.

(Member Secretary PBOS)

(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN TEXTILE MANUFACTURES
LEVEL NAME	: PROFESSIONAL COURSES
COURSE CODE	: ID403E
COURSE TITLE	: INDUSTRIAL TRAINING
PREREQUISITE	: 60 CREDITS
TEACHING SCHEME	: TH:00; TU:00;PR: 02(CLOCK Hrs.)
TOTAL CREDITS	: 01(1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE EXAM	: NIL
PR. TEE EXAM	: 02 HRs (External)
PT. EXAM	: NIL

❖ RATIONALE:

The aim of the Polytechnic education is to create a pool of skill based manpower to support shop floor and field operations as a middle level link between technicians and engineers. Diploma pass out plays an important role in managing shop-floor operations. Therefore, it is necessary to the diploma pass out to get acquainted with the actual shop floor operations in the industry. This course has been designed to give actual working environment exposure to the diploma students.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

- 1 Adhere to industrial safety practices
- 2 Work in industrial environment.
- 3 Carryout survey related to industrial processes.
- 4 Identify industrial problems for industrial Project Course
- 5 Prepare industrial training report based on work experience
- 6 Present industrial training report

❖ COURSE DETAILS:

A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
Nil			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	Adhere Industrial Safety Practices • Meet safety officer • Record the safety practices to be followed in industry. • Record Don'ts and Do's. • Follow all instructions.	Safety Practices	04
2	Perform Textile Industry Process Survey • Collect information regarding various processes carried out in a textile industry • Note down findings • Prepare brief report	Survey	06
3	Work in textile industrial environment • Follow instructions of supervisor • Observe textile processes • Record daily work done in diary	Working Experiences	18
4	Identify textile industry related problems • Discuss with the supervisor and workers • Identify the problem in textile industrial process/system • Record your findings	Problem Identification	04
5	Prepare industrial training report in standard format, which includes following. • Title Page which includes: Title, Purpose of submission, Institute logo, Students Name, Industry Name, Department and Institute Name • Certificates: Student declaration, Certificate from industry • Acknowledgement • Text 1. Introduction to Industry 2. Safety Practices in Industry 3. Industrial Process 4. Working Experience 5. Results 6. Summary/Conclusion. 7. References Use Latex for preparing report. Perform plagiarism check from free internet site. • Submit report of plagiarism check to the allotted teacher with industrial training report	Report Writing	After Completion of Training
6	Prepare power point presentation. Present the same before guide teacher.	Presentation	
Total Hrs.			32

- ❖ **SPECIFICATION TABLE FOR THEORY PAPER:** Not Applicable
- ❖ **QUESTION PAPER PROFILE FOR THEORY PAPER:** Not Applicable
- ❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	40	--	Rubrics, Assessment Sheets & Report	1,2,3,4,5,6
		Report Writing		Continuous	10	--	Report	1,2,3,4,5,6
				TOTAL	50	20		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics, Report & Presentation	1, 2, 3, 4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Selection of industry/ industry supervisor's remark	05
2	Survey	05
3	Work done and Feasibility of work/ problem identified	15
4	Report writing	15
5	Presentation Skills	05
6	Viva voce	05
Total		50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	3	3	-	3	3	3	3	3	3	3
2	-	3	3	3	-	3	3	3	3	3	3	3
3	-	3	3	3	-	3	3	3	3	3	3	3
4	-	3	3	3	-	3	3	3	3	3	3	3
5	-	3	3	3	-	3	3	3	3	3	3	3
6	-	3	3	3	-	3	3	3	3	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Process Control and Yarn Quality in Spinning	Dr G Thilagavathi & Dr T Karthik, Woodhead Publishing Exclusive distributors, Viva Books Private Limited, 2015	9789380308357
2.	Process Control in Weaving	P.D.kimothi, Published by Atira, Ahmedabad, India, 1974	
3.	Process Control in Spinning	Garde. A. R., Subramania. T. A., Atira, Ahmedabad, India, 1974	
4	Process Control and Yarn Quality in Spinning	Dr G Thilagavathi, Dr T Karthik, Woodhead Publishing Exclusive distributors, Viva Books Private Limited, 2015	9789380308357

❖ **E-REFERENCES:**

- <http://ihmshimla.org/wp-content/uploads/2013/05/Industrial-Training-Rule-Book.pdf>,
assessed on 25th September, 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

Nil

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S. G. Gaikwad	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6.	Mr. R. N. Yadav.	President	R.S.R.MohotaSpg and Wvg Mill, Hinganghat, Wardha
7.	Prof. G. S. Kakad	Head of Textile Department	JDIET, Yavatmal
8.	Dr. S.W.Rajurkar	In-Charge, Curriculum Development Cell	Government Polytechnic, Nagpur.
9.	G.V.Gotmare	In-Charge, Curriculum Development Cell	Government Polytechnic, Nagpur.

(Member Secretary PBOS)

(Chairman PBOS)

FREE ELECTIVES

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN CE/ME/EE/EC/CM/IT/MT/PK/AE/TX/TR
LEVEL NAME	: ELECTIVE COURSES
COURSE CODE	: FS501E
COURSE TITLE	: FINISHING SCHOOL
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 00; TU: 00; PR: 04(CLOCK Hrs.)
TOTAL CREDITS	: 02(1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE EXAM	: NIL
PR. TEE EXAM	: 02 HRs (Internal)
PT. EXAM	: NIL

❖ RATIONALE:

Polytechnic Diploma pass outs who are not readily employable in the desired target jobs, need further grooming. Diploma engineers are not fit for relevant jobs in related work areas in corporate due to lack of required skills like communication, team work, arithmetic, public speaking, attitude building, ethics, business etiquettes etc. This 'disconnects' between the desired jobs and the qualifications obtained needs to be addressed by institutes. This course helps in bridging the gap between Formal education and Industry requirements. Industries and Institutes have a role to play. A pre-employment training programme in which curriculum is developed for students to prepare them for requirements of industries. It aims to provide soft skills to student to facilitate their employability and play a part in the supply side issues (of talent) of the industry. Students then can adapt themselves to the industrial scenario.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

- 1 Perform SWOT analysis
- 2 Demonstrate soft skills.
- 3 Enhance employability skills.
- 4 Adapt ethics and values.
- 5 Practice interpersonal skills.
- 6 Refine communication skills.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes(Cognitive Domain)	Topics and subtopics	Hrs
Nil			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	- Identify Strengths and Weaknesses of Self - Observe Opportunities and Threats in Self - Exhibit different interpersonal skills in given situations.	A. Soft Skills Understanding self & others a. SWOT Analysis b. Interpersonal Skills	4
2	- Practise face to face communication in formal/informal groups. - Observe Body Language of others and note the changes in different persons. - Construct and demonstrate short public speech of five minutes on a topic of interest. - Identify signs and signals as a means of communication and list them.	A. Soft Skills Communication Skills a. Verbal & Non Verbal Communication b. Body Language c. Sixth sense Intuition d. Public Speaking	8
3	- Identify factors in self esteem. - Produce a list of behavioural elements of concentration. - Practise tongue twister to enhance power of concentration.	A. Soft Skills Self Confidence a. Strength of Conviction b. Power of Concentration c. Self Esteem	4
4	- Practise three different dress combinations for professional presentation. - Demonstrate three social manners and etiquettes in a group task	A. Soft Skills Presenting Self a. Fine Grooming b. Dress Sense c. Manners & Etiquettes	4
5	- Set career goals for next five years and list activities to achieve these goals. - Prepare a chart of daily routine activities with Important, Very important, Urgent and Very urgent	A. Soft Skills Effective Self Management a. Goal Setting b. Time Management c. Emotional Quotient d. Motivating self and	6

	classification. - Identify assertive behavioural aspects of persons in your surrounding - Identify factors/elements related to emotional balance in given situations.	Others e. Positive Thinking & Assertiveness	
6	- Practise yoga /meditation. - Prepare a habit plan and list steps for action plan. - Construct diet chart for self.	A. Soft Skills Personality Development a. Physical & Mental Health b. Habit formation- Do's & Don'ts c. Diet Pyramid	6
7	Exhibit attitude as response to various situations (case studies).	B. Employability Skills Attitudes	2
8	Demonstrate technical skills of different subjects.	B. Employability Skills Technical Skills	6
9	Observe the weakness domain of the individuals in given situations.	B. Employability Skills Adaptability	4
10	- Compose creative essay. - Suggest creative solutions to various given situations.	B. Employability Skills Creativity and Innovation	4
11	Exhibit team spirit and leadership qualities while working in a team.	B. Employability Skills Interpersonal Skills a. Working in Team b. Leadership	4
12	Practise Role play in group to exhibit corporate culture.	B. Employability Skills Corporate culture	4
13	- Prepare Resume. - Practise Group Discussions. - Demonstrate interview techniques through mock interview.	B. Employability Skills Job Selection Process a. Resume Writing b. Group Discussions c. Personal Interview	8
Total Hrs.			64

❖ **SPECIFICATION TABLE FOR THEORY PAPER:**

Not Applicable

❖ **QUESTION PAPER PROFILE FOR THEORY PAPER:**

Not Applicable

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	1, 2, 3, 4,5,6
		Journal Writing		Continuous	05	--	Journal	1, 2, 3, 4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Printouts	1, 2, 3, 4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Report writing	20
2	Presentation Skills	20
3	Viva voce	10
Total		50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (Cos)	Program Outcomes (Pos)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	-	3	2	-	-	-	3	-	3	-	-
2	-	-	3	-	3	-	3	3	3	3	-	-
3	-	-	-	2	3	-	3	3	3	3	-	-
4	-	-	-	-	3	2	3	3	3	3	-	-
5	-	-	3	-	3	2	3	3	3	3	-	-
6	-	-	3	-	3	2	-	3	3	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	How to win friends and Influence people	Dale Carnegie, Fingerprint Edition 2016	10: 8175993480 13: 978-8175993488
2.	The SWOT Analysis	Lawrence G. Fine, Createspace Edition 2009	10: 1449546757 13: 978-1449546755
3.	Body Language	Allan Pease, Manjul Publishing House Pvt. Ltd., Edition 2014	10: 8183224105 13: 978-8183224109
4.	The Spark is Within You	Jagdish Bali, Authorspress, Edition 2016	10: 9352072332 13: 978-9352072330
5.	How to Read a Person Like a Book	Rupa Publications India, Edition 2012	10: 8129119188 13: 978-8129119186

6.	Believe in Yourself	Dr. Joseph Murphy, Manjul Publishing House Pvt. Ltd., 1 st Edition 2014	10: 8183225098 13: 978183225090
7.	Think and Grow Rich	Napoleon Hill, Jaico Publishing House; First edition 2007	10: 817992792X 13: 9788179927922
8.	Communication Skills	Sanjay kumar, Oxford Edition 2011	10: 0198069324 13: 9780198069324
9.	The Power of your Sub conscious Mind	Dr. Joseph Murphy, Amazing Reads Edition 2015	10: 8192910962 13: 9788192910963
10.	The Power of Positive Thinking	Norman Vincent Peale,	10: 0091906385 13: 9780091906382
11.	The Ace of Soft Skills: Attitude, Communication and Etiquette for Success	Gopalaswamy Ramesh	10: 8131732851 13: 978-8131732854

❖ E-REFERENCES:

- https://en.wikipedia.org/wiki/Soft_skills accessed on 20th September, 2016
- <http://www.p21.org/about-us/p21-framework/262> accessed on 1st November 2016
- <http://innovationexcellence.com/blog/2012/08/04/whats-the-difference-between-creativity-and-innovation/> accessed on 10th October 2016
- <http://study.com/academy/lesson/self-understanding-and-self-concept.html> accessed on 20th October, 2016
- <http://www.skillsyouneed.com/ips/understanding-others.html> accessed on 20th October, 2016
- <http://articles.bplans.com/how-to-perform-swot-analysis/> accessed on 19th September, 2016
- <http://www.skillsyouneed.com/ips/body-language.html> accessed on 19th September, 2016
- <https://www.mindtools.com/CommSkll/PublicSpeaking.htm> accessed on 19th September 2016
- https://www.mindtools.com/pages/article/newHTE_90.htm accessed on 20th October 2016

❖ LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION

Nil

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D.S. Kulkarni	HOD, Textile Manufacture	Government Polytechnic, Nagpur.
2.	Dr. Surendra Gole	Corporate HR Trainer, Former Principal,	Nagpur Institute of Technology, Nagpur
3.	Mr. Ashish Khole	Divisional Manager	TAL - Areospace Business Unit – (Tata Group of company) Nagpur
4.	Dr. Rozina Rana	Director	ELAN Finishing School, Priyadarshini Group of Institutions
5.	Mr. Sarang Sawangikar	Asstt. Vice President(HR)	Vidarbha Power Ltd., Butibori
6.	Ms. M.M.Machale	Lecturer in English	Government Polytechnic, Nagpur
7.	Dr. S.W.Rajurkar	In-Charge, Curriculum Development Cell	Government Polytechnic, Nagpur.
8.	Mr. G.V.Gotmare	In-Charge, Curriculum Development Cell	Government Polytechnic, Nagpur.

(Member Secretary PBOS)

(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN ME/EE/EC/CM/IT/ TX/MT/PK
LEVEL NAME	: ELECTIVE COURSES
COURSE CODE	: FE501E
COURSE TITLE	: BASIC BUILDING DRAWING
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 00; TU: 00; PR: 04 (CLOCK HRs.)
TOTAL CREDITS	: 02 (1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR)
TH.TEE	: NIL
PR.TEE	: 02 HRs (Internal)
PT	: NIL

❖ RATIONALE:

Various agencies involved in engineering works use drawings as effective medium of communication. Engineering professionals of fields, other than civil engineering like mechanical, electrical, chemical, polymer mining, metallurgy etc. are required to interpret the space in the given building to assess whether their installations can be housed in the building or to specify the space requirements of their machineries, assemblies and installations. Moreover as an individual everyone of any profession wants to visualize his/her home before it is build, therefore these professionals need to study basic of building drawings such as plan, elevation and sections etc. This curriculum is designed to develop the basic skills of drawing building plan, elevation and section.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Identify different types of lines and symbols used in working drawings.
2. Prepare line plans of buildings for different orientations and with different scales.
3. Prepare plan, elevation and section of an existing building by taking measurements.
4. Develop working drawing duly considering rules, regulations and byelaws of sanctioning authority.
5. Identify the units and their sizes required in a building for serving a given purpose.
6. Interpret plan, elevation and section of building.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
NIL			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Draw different types of lines, common notations/symbols used in civil engineering and also symbols used in their field to be shown in the plan (A1size sheet).	Basics of Civil Drawing	10
2	Prepare line plans of small residential building (1BHK) for different plot orientation and with different scale on graph paper (A1size).	Drawing line plans	10
3	Prepare line plans of Public building like (Primary school building and Primary Health Centre) specifying names and sizes of different units. Prepare a separate report giving units, their sizes and justification for sizes.		10
4	Prepare a Measured drawing of institutional workshop/any small building. Show placement of machines/electrical fixtures etc.	Measured drawing	12
5	Develop a working drawing of any one of the building drawn in Practical no.2 considering rules, regulations and bye laws of local /other sanctioning authority.	working drawing	12
6	Draw plan and sectional elevation of Bifurcated/ Dog legged staircase.		06
7	Interpret dimensions and sizes of various units in the given building drawing.	Interpretation	04
Total			64

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	1, 2, 3, 4,5,6
		Journal Writing		Continuous	05	--	Journal	1, 2, 3, 4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Printouts	1, 2, 3, 4,5,6
	Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6
End Of Course		End Of The Course	Questionnaires					

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Draw to the suitable scale a detailed plan of two room building.	20
2	Dimensioning	10
3	Neatness	10
4	Viva -Voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	-	-	-	-	-	-	3	-	3	-	-
2	-	-	3	3	-	-	-	3	3	3	-	-
3	-	-	3	3	-	-	-	3	3	3	-	-
4	-	-	3	3	2	2	2	3	3	3	-	-
5	-	-	-	-	-	-	-	3	-	3	-	-
6	-	-	-	-	-	-	-	3	3	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Building Drawing: With an Integrated Approach to Built Environment	M.G. Shah, C.M.Kale and V. Y.Patki Tata McGraw-Hill Publishing Company Ltd. 4 th edition, 2002	10:0074638769
2.	Building Planning and Drawing	Dr.Kumara Swamy and A. Kameshwara Rao , Charotar Publications , 8th edition, 2015	13:9789385039126
3.	Civil Engineering Drawing and House planning	B.P.Verma, Khanna Publications, 11 th Edition,1986	13:9788174091688
4.	Civil Engineering Drawing	Gurucharan Singh, Standard Publications, 2009	13:9788180140044
5.	Civil Engineering Drawing	R. S. Malik,G.S. Meo, Computech Publications ltd./ New Asian Publications, 5 th edition, 2015	13:9788173180026

❖ **E-REFERENCES:**

1. <http://bie.telangana.gov.in/Pdf/civilenggdrawing.pdf>, accessed on 3rd September, 2016
2. <http://www.iar.unicamp.br/lab/luz/ld/Arquitetural/livros/interior%20design%20student%20handbook.pdf>, accessed on 3rd September, 2016.
3. <https://law.resource.org/pub/in/bis/S03/is.962.1989.pdf> accessed on 3rd September, 2016
4. http://civilengineering-notes.weebly.com/uploads/1/1/7/5/11750056/building_bye_laws.pdf accessed on 3rd September, 2016
5. <http://civil.emu.edu.tr/courses/civ1103/Tutorial%205.pdf> accessed on 3rd September, 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

Nil

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. R. N. Giradkar	Head of Civil Engineering Deptt.	Government Polytechnic, Nagpur.
2.	Dr. D. N. Kongre	Lecturer in Civil Engineering	Government Polytechnic, Nagpur.
3.	Mr. S. R. Kukadapwar	Lecturer in Civil Engineering	Government Polytechnic, Nagpur.
4.	Mr. M. K. Panchwate	Lecturer in Civil Engineering	Government Polytechnic, Nagpur.
5	Dr. S. J. Nikam	Lecturer in Civil Engineering	Government Polytechnic, Nagpur.
6	Mr. M. R. Shelote	Consultant Engineer	M. R. Associates, Nagpur.
7	Dr. R. N. Khapre	Associate Professor	Ramdeobaba College of Engineering and Management, Nagpur
8.	Mr. A. J. Fulzele	Assistant Secretary (Technical)	MSBTE, Regional Office, Nagpur.

(Member Secretary PBOS)

(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN CE/EE/EC/CM/IT/MT/PK/AE/TR/TX
LEVEL NAME	: FREE ELECTIVES
COURSE CODE	: FE502E
COURSE TITLE	: RAC MAINTENANCE
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 00; TU: 00; PR: 04(CLOCK HRs.)
TOTAL CREDITS	: 02 (1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE EXAM	: NIL
PR. TEE EXAM	: 02 HRs (Internal)
PT. EXAM	: NIL

❖ RATIONALE :

The knowledge of repair and maintenance of domestic refrigerator and air conditioner is helpful in daily life. One should acquire skills in carrying out basic repairs and maintenance of refrigeration and air conditioning.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Identify various components of refrigeration and air conditioner.
2. Handle various tools
3. Test and find faults in refrigerator and air conditioner
4. Diagnosis fault of refrigerator and air conditioner.
5. Practice maintenance procedure
6. Practice safety procedure.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
NIL			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practical No.	Specific Learning Outcomes (Psychomotor Domain)	Topics	Hrs.
1.	Identify the components of domestic refrigerator and write report. Report includes- -Basic concept of refrigeration -Vapor Compression Refrigeration system -COP, Ton of refrigeration	Introduction to Refrigerator	10
2.	Identify the hand tools required for maintenance of domestic refrigerator. Use tools for various applications and write report. -Specification of tools	Hand Tools	04
3.	Dismantle compressor, identify various components in compressor and write report. Report includes – -Hermitically sealed compressor - various components of compressor	Compressor	08
4.	Test Electric circuit and electrical controls used in refrigerator and report writing. Report writing includes – -Electric circuit diagram -Various controls and its function	Electric circuit of refrigerator	04
5.	Identify various faults and write report Report includes – -Various faults - Remedies	Fault finding and maintenance of refrigerator	08
6.	Run water cooler test rig and Write report. Report writing includes- -Working of water cooler -various components of water cooler	Water cooler	04
7	Identify the components of air conditioning system and write report. Report includes- -Basic concept of air conditioning -Various air conditioning systems like summer AC, winter AC, comfort AC.	Air conditioning system	08
8	Identify of various faults and write report Report includes – -Various faults - Remedies	Fault finding of air conditioner	08
9	Test Electric circuit and electrical controls used in AC and report writing.	Electric circuit of air conditioner	04

	Report writing includes – -Electric circuit diagram -Various controls and its function		
10	Identify the components of car air conditioning system and write report. Report includes- -Basic concept of car air conditioning -function of various components of car AC	Car Air Conditioning system	04
Skill Assessment			02
Total Hrs.			64

❖ **SPECIFICATION TABLE FOR THEORY PAPER:**

NIL

❖ **QUESTION PAPER PROFILE FOR THEORY PAPER:**

NIL



❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	1, 2, 3, 4,5,6
		Journal Writing		Continuous	05	--	Journal	1, 2, 3, 4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Printouts	1, 2, 3, 4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Drawing of Sketch, selection of equipment's, procedure etc.	20
2	Performance	10
3	Conclusion	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	-	3	-	-	-	-	3	3	-	-	-
2	-	-	3	3	-	-	-	3	-	3	-	-
3	-	-	3	3	-	-	-	3	3	3	-	-
4	-	-	3	3	1	-	-	3	3	3	-	-
5	-	-	3	3	-	-	-	3	3	3	-	-
6	-	-	3	3	1	-	-	3	3	3	-	-

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Refrigeration and air conditioning servicing	S. Kumar, New Heights Publication New Delhi	--
2.	Refrigeration and Air Conditioning	R.S. Khurmi, S.Chand and Co.	81-219-1687-9
3.	Refrigeration and Air Conditioning	C.P. Arrora, Tata Mc-Graw Hill,	0-07-451515-2
4.	Refrigeration and Air Conditioning	Manohar Prasad, New Age Publications.	13: 9788122414295
5.	Refrigeration and Air Conditioning	P.N. Ananthanarayanan; Tata McGraw Hill	0074620088

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

1. Air conditioning trainer kit
2. Water cooler trainer kit
3. Ice plant trainer kit
4. Window Air conditioner
5. Split air conditioner
6. Domestic Refrigerator
7. Car air conditioning trainer kit

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1	Prof. O. V. Sarode	Head, Mechanical Engineering	Government Polytechnic, Nagpur
2	Dr. S. W. Rajurkar	Lecturer, Mechanical Engineering	Government Polytechnic, Nagpur.
3	Prof. D. J. Ghode	Lecturer, Mechanical Engineering	Government Polytechnic, Nagpur.
4	Prof. K. S. Thekedar	Lecturer, Mechanical Engineering	Government Polytechnic, Nagpur.
5	Er. A.M.Onkar	Chief Executive Officer	Onkar Furnitures, MIDC, Nagpur
6	Shri. G.F.Potbhare	Principal	NIT, Polytechnic, Nagpur
7	Dr.S.S.Baraskar	Lecturer in Mechanical Engineering	Govt. Polytechnic, Arvi

(Member Secretary PBOS)

(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN CE/ME/AE/PK/MT/EC/IT/CM /TX
LEVEL NAME	: ELECTIVE COURSES
COURSE CODE	: FE503E
COURSE TITLE	: ELECTRICAL MAINTENANCE
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 00; TU: 00; PR: 04(CLOCK HRs.)
TOTAL CREDITS	: 02(1 TH/TU CREDIT = 1 CLOCK HR., 1PR CREDIT =2CLOCK HR.)
TH. TEE	: NIL
PR. TEE	: 02 HRs (Internal)
PT.	: NIL

❖ RATIONALE:

Electricity is a basic need of human beings. All are dealings with the different electrical gadgets as well as electrical installations in day to day life. Therefore, the knowledge of electrical maintenance is must for all the peoples. One should have ability to acquire skills in carrying out repairs of electrical gadgets with accuracy and maintain the electrical installations. This course imparts the practical skills of electrical maintenance.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Use electrical maintenance tools and equipment's.
2. Use fire-fighting equipment on different types of fires.
3. Test, Repair and maintain the domestic appliances.
4. Locate and repair the faults in electrical installation.
5. Identify the faults.
6. Follow safety precautions.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
Nil			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	Identify electrical measuring instruments, sources, ICDP/ICTP, switches, loads, wires and execute safety precautions in laboratory.	Electrical Safety	4
2	Use firefighting equipment on different fire.		4
3	Identify different electrical maintenance tools and electrical accessories.	Maintenance Tools	4
4	Test single phase and three phase supply using test lamp and identify phase and neutral using test lamp.		4
5	Perform continuity, open circuit, short circuit and earth fault test using series test board.		4
6	Test and find fault in an automatic/ semiautomatic/ steam electric iron/toaster/room heater/hot plate	Domestic Appliances	4
7	Test, find faults and repair ceiling fan.		4
8	Test, find faults and repair electric mixer.		4
9	Identify different wiring systems in the premises & prepare list of accessories required for each.	Electrical Installation	4
10	Test & measure insulation resistance of Electrical lab wiring installation by using megger.		4
11	Measure the earth resistance of earth electrode by using earth tester.		4
12	Connect single phase and three phase energy meter to load and note the reading.		4
13	Prepare a wiring of two lamp controlled by two one way switch by using conduit wiring.		6
14	Fix ICDP/M CB/ DB/ELCB on wiring board & connect it to supply.		4
15	Locate the fault in electrical installation		4
Skill Assessment			2
Total Hrs			64

❖ **SPECIFICATION TABLE FOR THEORY PAPER:**

Not Applicable

❖ **QUESTION PAPER PROFILE FOR THEORY PAPER:**

Not Applicable

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	1, 2, 3, 4,5,6
		Journal Writing		Continuous	05	--	Journal	1, 2, 3, 4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Printouts	1, 2, 3, 4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Drawing circuit diagram/selection of equipment's/writing procedure etc.	10
2	Performance	20
3	Result	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	-	3	3	3	-	-	3	3	3	-	-
2	-	-	3	3	3	-	-	3	3	3	-	-
3	-	-	3	3	3	-	-	3	3	3	-	-
4	-	-	3	3	3	-	-	3	3	3	-	-
5	-	-	3	3	3	-	-	3	-	3	-	-
6	-	-	-	-	3	-	-	3	3	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Electrical Design Estimating and Costing	K.B. Raina and Dr. S.K. Bhattacharya, New Age International (P) Ltd. (2010)	10: 8122403638 13: 978-8122403633
2.	Study of Home Appliances	K. B. Bhatiya, Khanna Publication 2010 Edition.	1234567146703
3.	Home Appliances Servicing	E.P. Anderson, Audels	030114

❖ **E-REFERENCES:**

- <http://nptel.ac.in/courses/108108076/1> , assessed on 18th January 2016
- <http://www.electrical4u.com> , assessed on 18th January 2016
- <https://www.youtube.com/watch?v=A9KSGAnjo2U>, assessed on 18th January 2016
- <http://www.electricaltechnology.org/2015/09> assessed on 30 Jan 2016
- www.slideshare.net/bawaparam/made-by-param assessed on 30 Jan 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

1. Electrical Maintenance Tool Kit.
2. Megger 500V Hand driven
3. Earth tester 3 spike.
4. Digital Multi-meter

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Dr. C.S.Thorat	Principal	Government Polytechnic, Nagpur.
2.	K.M.Gaidhane	I/C, Head of Electrical Engineering	Government Polytechnic, Nagpur.
3.	R.I.Kamble	Lecturer in Electrical Engineering	Government Polytechnic, Nagpur.
4.	S.P.Thote	Lecturer in Electrical Engineering	Government Polytechnic, Nagpur.
5.	Dr. R.S.Surjuse	Lecturer in Electrical Engineering	Government Polytechnic, Nagpur.
6	G.V.Gotmare	Lecturer in Electrical Engineering	Government Polytechnic, Nagpur.
7	H,N.Kharkar	Lecturer in Electrical Engineering	Government Polytechnic, Nagpur.
8	N.H.Adkine	Lecturer in Electrical Engineering	Government Polytechnic, Nagpur.
9	A.P. Gandhi	Lecturer in Electrical Engineering	Government Polytechnic, Nagpur.
10	Bhashkar Bale	Dy. Executive Engineer,	MSTCL, Nagpur
11	R.Y.Ghormade	Head of Electrical Engineering	Dharampeth Polytechnic, Nagpur
12	DR. S.S.Bharatkar	Lecturer in Electrical Engineering	Government Polytechnic, Amaravati.

 (Member Secretary PBOS)

 (Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

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COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN CE/EE/ME/CM/IT/PK/AE/TX/TR
LEVEL NAME	: PROFESSIONAL ELECTIVE
COURSE CODE	: FE504E
COURSE TITLE	: HOBBY ELECTRONICS
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 00; TU: 00; PR: 04(CLOCK HRs.)
TOTAL CREDITS	: 02(1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE EXAM	: NIL
PR. TEE EXAM	: 02 HRs
PT. EXAM	: NIL

❖ RATIONALE:

Some students may be interested in interdisciplinary approach therefore it is felt that diploma holder those who have interest in "Hobby Electronics Circuits" must have minimum competency and knowledge of it, so later on some student may take up it as business. Therefore this course has been kept as one of free elective interdisciplinary course in the curriculum.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

- 1 Identify different electronics components.
- 2 Handle electronics circuit development tools & test and measuring equipments.
- 3 Select the hobby electronics circuits as per requirements.
- 4 Test the electronics components and circuits.
- 5 Develop the simple electronics hobby project.
- 6 Present electronics project.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
NIL			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Hrs.
1	Identify and understand different electronics components. -like. resistor, capacitor, inductor, diode, transistor, relay etc.	04
2	Observe and draw Symbols and unit of measurement for electronics parameters like voltage, current, resistor, capacitor, inductor etc.	04
3	Identify the applications of basic electronics test and measuring equipments. Like multimeter LCR meter, Cathode Ray Oscilloscope, Function generator etc.	08
3	Perform the basic handling skill of electronics circuit development tools like soldering gun, de-soldering pump etc	04
4	Test different electronics components like resistor, capacitor, inductor, diode, relay etc.	08
5	Identify simple electronics Hobby circuits by referring journals, websites, and hobby electronics manuals.	04
6	Arrange electronics component and PCB (general purpose) for selected circuit and their testing.	08
7	Prepare component layout of selected electronics circuit.	04
8	Mount and solder electronics components on PCB (general purpose)	08
9	Perform Testing, fault finding, rectification of fault. of circuit.(Test the circuit for performance and rectify the fault)	06
10	Perform the final testing of circuit & packaging.	04
Skill Assessment		02
Total Hrs		64

❖ **SPECIFICATION TABLE FOR THEORY PAPER:**

NIL

❖ **QUESTION PAPER PROFILE FOR THEORY PAPER**

NIL

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	1, 2, 3, 4,5,6
		Journal Writing		Continuous	05	--	Journal	1, 2, 3, 4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Printouts	1, 2, 3, 4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
2	Performance–Demonstration of project work	25
5	Viva voce	25
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	-			-	-		3	-	3	-	-
2	-	-	3	3	-	-	3	3	-	3	-	-
3	-	-			-	-	3	3	-	3	-	-
4	-	-	3	3	-	-		3	-	3	-	-
5	-	-	3	3	-	-	3	3	-	3	-	-
6	-	-	3	3	-	-		3	1	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Electronic For You	Journal	--
2.	Electronics Material And Components	Dr. MadhuriA. Joshi, , Shroff Publisher & Dist. Pvt. Ltd. 3 rd Edition,	10: 8173669007 13: 9788173669002
3.	Data Books Of Electronic Components & Devices	Business Promotion Bureau	--

❖ **E-REFERENCES:**

- ❖ Websites www.electronicprojects.com , assessed on 4th May 2016
- ❖ Websites www.circuittoday.com assessed on 4th May 2016
- ❖ Websites www.electroschematics.com assessed on 4th May 2016
- ❖ Websites www.hobbyelectronics.in assessed on 4th May 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

1. Digital Multi-meter
2. LCR-Q meter
3. Cathode Ray Oscilloscope
4. Soldering Gun.
5. De-soldering Pump.
6. Nose Plier

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	S.S.Tadas	HOD, Electronics Telecomm. Engg.	Government Polytechnic, Nagpur.
2.	A.A.Ali	Lecturer (Selection Gr.) Electronics Telecomm. Engg.	Government Polytechnic, Nagpur.
3.	D.A.Brahmankar	Lecturer (Selection Gr.) Electronics Telecomm. Engg	Government Polytechnic, Nagpur.
4.	U.M.Ramteke	Lecturer (Selection Gr.) Electronics Telecomm. Engg	Government Polytechnic, Nagpur.
5.	Mr. Sandip V Darwhekar	Director	Beta Computronics Pvt Ltd , Nagpur
6.	Mrs. Gazzala Ali	Head Electronics	Anjuman Polytechnic , Nagpur
7.	Mr S M Kale	Lecturer Electronics	Government Polytechnic, Gadchiroli.

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GOVERNMENT POLYTECHNIC, NAGPUR.

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COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN CE/ME/EE/EC/IT/CM/AE/MT/TX
LEVEL NAME	: ELECTIVE COURSES
COURSE CODE	: FE505E
COURSE TITLE	: BASIC PACKAGING TECHNOLOGY
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 00; TU: 00; PR: 04(CLOCK HRs.)
TOTAL CREDITS	: 02(1 TH/TU CREDIT = 1 CLOCK HR., 1PR CREDIT =2CLOCK HR.)
TH. TEE	: NIL
PR. TEE	: 02 HRs (Internal)
PT.	: NIL

❖ **RATIONALE:**

Packaging is the need of every manufactured commodity. Safe delivery of product to end user through package has got many expectations. Packaging has a various functions and aspects. Packaging process starts as soon as finished product is ready. The package with the product is subjected to various situational hazards. The success of packaging largely depends on how these hazards have been considered and taken care of. This all requires a panoramic or holistic view about the field of packaging.

The concept & technology of packaging has taken years together to develop to where it is today, through evolution of technology, market and business. In spite of being a value to the business and developing economy, packaging by virtue of consuming resources, creating solid waste and pollution, is posing a grave threat to the environment.

❖ **COURSE OUTCOMES:**

After completing this course students will be able to -

1. Collect various primary and secondary packages.
2. Identify the packaging materials and appreciate their properties.
3. Identify product characteristics of a packaged product.
4. Estimate the hazards to the package along with its contents.
5. Record by testing/ measurement/ observation various parameters of a package.
6. Search web resources on environmental issues related with packaging.

❖ **COURSE DETAILS:****A. THEORY :**

Unit Number and Name	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
Nil			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	Introduction to Packaging. - Form suitable number of groups of students. - Collect 05 empty packages/ containers of different products. (Primary & Secondary packages) Products may be assigned by the course teacher. - Prepare a list of the packages and the products they contained. - Submit the list along with the collection.	Introduction	02
2.	Assort the collection of various packages by the class into primary and secondary packaging. - Classify the collected packages into Primary, Secondary & Primary as well as Secondary packaging. - Classify the collected packages into Rigid, semi-rigid and flexible packaging. - Note down the classification. - Identify the material/ materials of the packages. - Measure the physical parameters/ characteristics of the packages/ packaging material such as dimensions, weight, thickness, size, etc. - Prepare a power point presentation on it. - Attach the print out of above presentation in the Journal.	Packaging Materials	12
3.	Identify the product properties/ characteristics and estimate packaging functions. - Select appropriate number of products from the collection. - Identify various physical/ physiochemical properties of the products influencing its packaging. - Predict the functions of the packaging material and the package. - Classify predicted functions into Technical/ Primary and Commercial/ Secondary functions of packaging. - Prepare a brief report on it and attach in the Journal.	Product Characteristics	10
4.	Identify the fitness for use of the product contain by its packaging.		

	• Collect at least one package each of – one Perishable food and one Pharmaceutical Product. • Examine the date of manufacture, expiry/best before. • Note down above information and collect the information on usage of unfit products.	Packaging Communication	04
5.	Judge the hazards of handling, warehousing and transportation. • Observe the printed communication on the package and find out the manufacturer and its geographical location. • Trace out the method of handling, warehousing and transportation. • Outline the distribution channel. • Estimate the hazards to the products and packaging due to of handling, warehousing and transportation. • Interpret material handling instructions as printed on the packaging. • Write a report.	Packaging Hazards	12
6.	Carryout following tests on packaging materials and dummy packages. • Drop test. [IS : 7028 (Part 4) – 1987] • Puncture resistance test. (T 803 om-88) • Rolling test [IS : 7028 (Part 5) – 1987] • Vibration test. IS : 7028 (Part 2) - 2002 • Box compression test. (T 804 om-89) • Analyse the test results.	Package Testing	10
7.	Conduct a Survey/ Case study on environmental burdens caused by Packaging. • Select a Packaging Industry. • Visit to the industry or search information through web resources. • Gather information on different operations performed by the industry. • Study the impact of those operations on environment. • Appreciate 3-R concept (Reduce, Reuse and Recycle) • Prepare presentation.	Survey	12
Skill Assessment			02
Total			64

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	1, 2, 3, 4,5,6
		Journal Writing		Continuous	05	--	Journal	1, 2, 3, 4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Printouts	1, 2, 3, 4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Identification	10
2	Drawing / flowchart/schematics/symbols	10
3	Procedure/involvement/performance	10
4	Viva voce	20
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	-	3	-	-	-	-	3	3	3	-	-
2	-	-	-	-	-	-	-	3	3	3	-	-
3	-	-	-	-	-	-	-	3	3	3	-	-
4	-	-	3	-	-	-	-	3	3	3	-	-
5	-	-	3	2	-	-	2	3	3	3	-	-
6	-	-	-	-	1	1	-	3	3	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Fundamentals Of Packaging	F.A. Paine, Newnes-Butterworth, 1973	13: 9780408001076
2.	Packaging users Handbook	F.A. Paine, Springer; 1991	13: 9780751401516
3.	The Packaging Media	F.A. Paine, Blackie Academic & Professional, 1977	13: 9780216901919
4.	Packaging In The Environment	edited by Geoffrey M. Levy	13: 9780751400915
5.	The Wiley Encyclopedia of Packaging Technology.	Marilyn Bakker, John Wiley & Sons Inc. Canada	0471-80940-3
6.	Fundamentals of Packaging Technology	S. Natrajan, M. Govindrajan, B. Kumar, 2E, PHI LPL, Delhi, 2014	978-81-203-5054-0

❖ **E-REFERENCES:**

1. <http://www.iip-in.com/site/default.aspx>
2. <https://books.google.co.in/books?isbn=0470541385>
3. <http://pkt.jinakarn.com/ept.pdf>
4. <http://www.boschpackaging.com/en/pa/homepage/homepage.html>
5. <https://www.youtube.com/watch?v=LbxXpP9ysjo>

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

1. Bursting Strength tester
2. Box compression strength tester
3. Drop tester
4. Universal testing machine
5. Puncture testing machine
6. Edge compression tester

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Prof. R.S.Raool	I/C, Head of Packaging Technology	Government Polytechnic, Nagpur.
2.	Prof. A.S.Bhagat	Lecturer in Packaging Technology	Government Polytechnic, Nagpur.
3.	Prof. Imran K.Syed	Lecturer in Packaging Technology	Government Polytechnic, Nagpur.
4.	Prof. A.P.Pardey	Lecturer in Paper and pulp	Government Polytechnic, Nagpur.
5.	Prof. S.N.Madhugiri	Academician, Ex Principal & Retired Head of	Dharmapeth Polytechnic Nagpur & Dept. Packaging Technology G.P.Nagpur
6.	Prof. P.P Sargaonkar	Consultant & Retired Lecturer in Packaging Technology	Government Polytechnic, Nagpur.
7.	Prof. M.S.Deshpande	BTE Repetitive & Lecturer in Mechanical Engineering	Government Polytechnic, Bramhapuri.
8.	Shri. Suresh Thakur	Industry Expert, Managing Director,	Palekar Food Products, MIDC, Amravati.

 (Member Secretary PBOS)

 (Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

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COURSE CURRICULUM

PROGRAMME : DIPLOMA IN CE/ME/EE/EC/CM/IT/AE/PK/TX
LEVEL NAME : ELECTIVE COURSES
COURSE CODE : FE506E
COURSE TITLE : INDUSTRIAL METALLURGICAL PRACTICES
PREREQUISITE : NIL
TEACHING SCHEME : TH: 00; TU: 00; PR: 04(CLOCK HRS.)
TOTAL CREDITS : 02(1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE EXAM : NIL
PR. TEE EXAM : 02 HRS (Internal)
PT. EXAM : NIL

❖ RATIONALE:

A technician comes across the various problems in metallurgical industries. Also, at the work place, it is always necessary, to tackle the problem so that the sound metallurgical product can be obtained by application of suitable metallurgical engineering techniques. Hence, the basic knowledge of various industrial metallurgical practices is necessary for a technician. This course helps to impart the basic knowledge to technician for increasing the productivity and a sound metallurgical product.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Draw sketches of different tools/machines in metallurgical shops/labs
2. Use of tools and machinery in different metallurgical labs/shops.
3. Operate different equipments/machineries used in basic Metallurgical labs/shops
4. Perform inspection and testing of metallurgical products.
5. Prepare sample for microscopic examination.
6. Choose proper tool for different metallurgical processes.

❖ COURSE DETAILS:

A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
NIL			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	Observe the demonstration of hand tools, machine Tools and equipments used in pattern making and mouldings shops and draw the sketches and write specifications, details, applications of above tools.	Pattern making and Moulding	02
2.	Prepare sand mould by using any one pattern (mould to be prepared by group of 2 to 4 students depending on volume of work)		08
3.	Observe the demonstration of hand tools, machine Tools and equipments used in casting shop and draw the sketches and write specifications, details, applications of above tools.	Casting	02
4.	Prepare one casting related to mould prepared. (any one type of casting to be prepared by group of 2 to 4 students depending on volume of work)		08
5.	Observe the demonstration of hand tools, machine Tools and equipments used in metal working operations (rolling, wire drawing, etc) and draw the sketches and write specifications, details, applications of above tools.	Metal working	02
6.	Perform practical related to any one metal working operations		08
7.	Observe the demonstration of hand tools, machine Tools and equipments used in heat treatment Shop and draw the sketches and write specifications, details, applications of above tools.	Heat treatment	2
8	Prepare sample for Performing heat treatment operation and conduct any one heat treatment to steel/cast iron sample		8
9	Observe the demonstration of hand tools and equipments used in testing and inspection lab and draw the sketches and write specifications, details, and applications of above tools.	Testing and inspection	2
10	Carry out various necessary testing and write the test report for any one metallurgical product.		8
11	Observe the demonstration of hand tools, machine Tools and equipments used in metallographic lab and draw the sketches and write specifications, details, applications of above tools.	Metallography	2
12.	Prepare one sample for metallographic examination and examine the sample under metallurgical microscope and draw the structure.		8
Skill Assessment			4
Total Hrs.			64

❖ **SPECIFICATION TABLE FOR THEORY PAPER:**

Nil

❖ **QUESTION PAPER PROFILE FOR THEORY PAPER:**

Nil

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	1, 2, 3, 4,5,6
		Journal Writing		Continuous	05	--	Journal	1, 2, 3, 4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Printouts	1, 2, 3, 4,5,6
	Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6
End Of Course		End Of The Course	Questionnaires					

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Drawing diagram/ selection of equipment's/ writing procedure etc.	10
2	Performance	20
3	Calculation/Result/ Drawing Graphs(if any)	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	-	-	3	-	-	-	3	-	3	-	-
2	-	-	3	3	-	-	-	3	3	3	-	-
3	-	-	3	3	-	-	-	3	3	3	-	-
4	-	-	3	3	-	-	-	3	3	3	-	-
5	-	-	3	3	-	-	-	3	3	3	-	-
6	-	-	3	3	-	-	-	3	3	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Principles of metal castings	Dr. P.C. Mukharjee	81-20300716-X
2.	Foundry Engineering	Shrinivasan	81-7409-026-6
3.	Introduction to Physical Metallurgy	Sidney H. Avner McGraw-Hill international edition, 2 nd edition	0-07-085018-6
4.	Testing of materials by	Prof. A.V.K. Suryanarayana.	81-20300716-X
5	The Testing & Inspection of Engineering materials,	H. E. Davis, G. E. Troxell, McGraw Hill	81-7409-026-6
6	Mechanical Metallurgy	George Dieter, McGraw Hill,	0-07-084453-4
7	Heat treatment Principles and techniques	T.V. Rajan , C.P. Sharma, Prentice Hall of India Pvt. Ltd, 12 th edition	81-20300716-X

❖ **E-REFERENCES:**

<http://books.google.co.in/books/isbn=9380026757> , assessed on

17th March 2016

<http://www.youtube.com/watch?v=101M1kaZIFg> , assessed on 27th April 2016

http://www.youtube.com/watch?v=1HuxDVpy_iv , assessed on 27th April 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

1. Patterns
2. Foundry tools
3. Welding Transformer (Oil Cooled) Three Phase
4. Pit type furnace
5. Mould boxes
6. Crucibles
7. Muffle furnace
8. Mould shaking machine
9. Draw bench
10. Rolling mill
11. Grinder
12. Polishing machine
13. Hardness tester
14. Microscopes
15. NDT equipments

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	K.L.Meshram	Head of the Dept Department of metallurgical Engineering	Government Polytechnic, Nagpur.
2.	Ms. V.C. Humney	Lecturer in Metallurgical Engineering	Government Polytechnic, Nagpur.
3	S.M.Waikar	Lecturer Metallurgical Engineering	Government Polytechnic, Nagpur
4.	Y.Y. Mahajan	Assist. Professor , Metallurgy & Material Science	VNIT Nagpur
5	S.B.Varadpande	Managing director	Orange city alloys Pvt. Ltd Nagpur
6	Y. K. Gaiky	Lecturer Mechanical Engineering	Government Polytechnic, Sakoli

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GOVERNMENT POLYTECHNIC, NAGPUR.

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COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN CE/ME/EE/EC/AE/MT/PK/TX
LEVEL NAME	: ELECTIVE COURSES
COURSE CODE	: FE507E
COURSE TITLE	: COMPUTER NETWORK
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 00; TU: 00; PR: 04(CLOCK HRs.)
TOTAL CREDITS	: 02(TH/TU CREDIT = 00 CLOCK HR., 1PR CREDIT = 2 CLOCK HR.)
TH. TEE	: NIL
PR. TEE	: 02 HRs (Internal)
PT.	: NIL

❖ RATIONALE:

The world in the information era has become network centric. A Computer networks has been growing with rapid technological progress. Computer communication through networking becomes essential part of our life. We can manage many application like Air Line Reservation, Railway Reservation, E-banking, E-Governance, On-Line shopping, E-learning etc. by clicking mouse button from our own place. Because of this, world become the global village. By considering importance of networking towards all aspects of our life, we here introduce basic concept of networks, network classification, network topologies, network devices, Transmission media, Network reference models, concept of TCP/IP.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Identify network and network topologies.
2. Connect and handle different networking devices.
3. Identify network architecture and physical media used to connect computers in network.
4. Identify E-Commerce and E-Governance website on the internet.
5. Use and share Network Recourses.
6. Use various Internet and Intranet Applications

❖ **COURSE DETAILS:****A. THEORY: NIL**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
NIL			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	Identify different types of network.	1.Introduction to Computer network and topologies	2
2.	Identify different network topologies.		2
3.	Connect and identify different Transmission Media.		4
4.	Connect and identify different network controlling devices like hub, switches etc.		4
5.	Connect computers in star topology by using wired media and with any network device (eg. Hub)		4
6.	Install and configure LAN card.	2.Local Area Network	4
7.	Prepare a Straight Cable and Network Cross over Cable and test by Line Tester.		4
8.	Share different devices like printer, scanner etc. over LAN network.	3.Applications & Uses of Computer network	2
9.	Share a printer on a network & print a document on it from a different computer on a network		2
10.	Share files and directories from one computer to other computer on the network.		2
11.	Install Win Messenger on LAN network.		2
12.	Create ID on Win messenger.		2
13.	Communicate through Win Messenger over LAN network.		4
14.	Connect through WAN network	4.Wide Area Network	4
15.	Create Email-ID on any WAN software like Gmail, Rediff, Yahoo etc.		4
16.	Communicate through any WAN software.		4
17.	Search information on the internet.		2
18.	Identify different E-commerce website on the internet like amazon.com, ebay.com etc.	5.Concepts of E-Commerce	2
19.	Connect through any E-commerce website on the internet and learn the procedure to buy books.		2
20.	Identify different E-Governance website on the internet like irctc.co.in etc.	6. Introduction to E-Governance	2
21.	Connect through E-governance railway website on the internet and learn the procedure for online railway reservation.		2
Skill Assessment			4
Total Hrs.			64

❖ **SPECIFICATION TABLE FOR THEORY PAPER:NIL**❖ **QUESTION PAPER PROFILE FOR THEORY PAPER:NIL**

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	1, 2, 3, 4,5,6
		Journal Writing		Continuous	05	--	Journal	1, 2, 3, 4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Printouts	1, 2, 3, 4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Selection, writing steps, installation etc.	10
2	Connection and configuration.	10
3	Performance	20
5	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	-	3	-	-	-	-	3	3	3	-	-
2	-	-	3	3	-	-	-	3	3	3	-	-
3	-	-	3	3	-	-	-	3	3	3	-	-
4	-	-	3	-	-	-	-	3	3	3	-	-
5	-	-	3	3	-	-	-	3	3	3	-	-
6	-	-	3	3	-	-	-	3	3	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Computer Networks	Andrew S Tannenbaum, Tata McGraw-Hill Edition, 2012	9780132126953
2.	Fundamentals of computer	E Balaguruswamy, Tata McGraw-Hill Education Pvt. Ltd., 2009	9780070141605
3.	Computer Basics	Micheal Miller, Tata McGraw-Hill Edition, 2012	0789734206
4.	Complete Reference Networking	Craig Zacker, Tata McGraw-Hill Edition	0132126958

❖ **E-REFERENCES:**

<http://www.pcworld.com/article/116583/article.html> , assessed on 20th April 2016

<http://www.computerstepbystep.com/computer-maintenance.html> , assessed on 20th April 2016

<https://www.youtube.com/watch?v=a0rEXzyX0-8>, assessed on 20th April 2016

❖ **LIST OF MAJOR COMPONENTS/DEVICES WITH THEIR SPECIFICATION.**

1. Operating System(Windows 98/2000/XP/7/8/8.1/10)
2. CPU Intel core i3/i5/i7
3. Hub(4 port USB hub, TB-226)
4. Switches
5. Connectors(RJ45/BNC/AUI/FIBER)
6. Printers(INK JET/LASER)
7. Scanner(FLAT BED)
8. Crimps, Strips and cut tools(HT-200R, HT-2008R)

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1	Mr. S.P. Lambhade	Head of Computer Engineering	Government Polytechnic, Nagpur.
2	Dr. Mrs. A.R. Mahajan	Head of Information Technology	Government Polytechnic, Nagpur.
3.	Ms. Shifa S. Sayyed	Lecturer in Information Technology	Government Polytechnic, Nagpur.
4.	Mrs. V A Raje	System Analyst(Lecturer in Computer Engineering)	Government Polytechnic, Nagpur.
5.	Ms. Gayatri B. Chavan	Lecturer in Computer Engineering	Government Polytechnic, Nagpur.
6.	Shri. Atul Upadhyay	COE	Vista computers, Ramnagar, Nagpur
7.	Shri N. V Chaudhri	Asst. Professor (CSE)	DBACEO ,Wanadongri, Nagpur
8.	Shri Manoj Jethawa	HOD, Computer Science	Shri DattaMeghe Polytechnic, Nagpur

(Member Secretary PBOS)

(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA INCE/ME/EE/EC/PK /TR/AE/TX/MT
LEVEL NAME	: ELECTIVE COURSES
COURSE CODE	: FE508E
COURSE TITLE	: PC ARCHITECTURE AND MAINTENANCE
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 00; TU: 00; PR: 04(CLOCK HRs.)
TOTAL CREDITS	: 02(1 TH/TU CREDIT = 1 CLOCK HR., 1PR CREDIT = 02 CLOCK HR.)
TH. TEE	: NIL
PR. TEE	: 02 HRs (Internal)
PT.	: NIL

❖ RATIONALE:

As computers are heavily used for most of the activities like office automation, database management etc, the repair and maintenance of computer and its peripheral devices is becoming an essential part of the information technology. This course will enable the student to assemble different types of computer system and maintenance of different supporting equipments like printer, scanner, etc.

❖ COURSE OUTCOMES:

After completing this course students will be able to –

1. Assemble and de-assemble computer system.
2. Perform different setting on various types of printers.
3. Install various types of software's.
4. Install operating system and device drivers in system.
5. Handle computer system hardware.
6. Maintain peripheral devices.

❖ **COURSE DETAILS:****A. THEORY:**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
NIL			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	Identify all the peripheral devices.	1. Pc Motherboard And Its Components	2
2.	Identify all components mounted on motherboard.		2
3.	Perform Basic Input/output System (BIOS) setting and configuration setup using Complementary Metal Oxide Semiconductor (CMOS).		4
4.	Install CDRom drive to system.	2. Storage Devices And Interfacing	2
5.	Copy data on CD, DVD		2
6.	Install different types of cards such as Video Graphics Array (VGA) or Super Video Graphics Array (SVGA) display ,sound card ,LAN card, multimedia cards etc.	3.Display Devices And Interfacing	2
10.	Perform different printer settings on different types of printers. Write down the function of each switch.	4. Input And Output Devices	4
11.	Format, partition and install a Hard Disk Drive (HDD).		4
12.	Identify components of Hard Disk Drive (HDD) as a storage device.		2
13.	Connect scanner, scan documents and pictures on the scanner available in your lab. Sample printout be attached		4
14.	Install Internal and External Modem		4
16.	Per form Internet installation.		2
17.	Connect Switched Mode Power Supply (SMPS) and identify different parts of SMPS.	5. Power Supplies	4
18.	Connect Uninterrupted Power Supply (UPS) and write down function of it.		2
19.	Connect speakers and microphones to system.		2
20.	Assemble, de-assemble computer system.	6.Troubleshooting And Tools	4
21.	Identify installed computer peripherals and test their working using diagnostic software		4
22.	Find faults related to Monitor, CPU, Hard disk, Printer and other peripherals.		4
23.	Form a pico based net using Bluetooth devices and transfer data.		4
24.	Create bootable CD and Install an operating system		2
Skill Assessment			4
Total hours			64

❖ **SPECIFICATION TABLE FOR THEORY PAPER:NIL**❖ **QUESTION PAPER PROFILE FOR THEORY PAPER:NIL**

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	1, 2, 3, 4,5,6
		Journal Writing		Continuous	05	--	Journal	1, 2, 3, 4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Printouts	1, 2, 3, 4,5,6
	Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6
End Of Course		End Of The Course	Questionnaires					

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Writing steps, selection, procedure	10
2	Performance	20
3	knowledge/block diagram/connection	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	-	3	3	-	-	-	3	3	3	-	-
2	-	-	3	3	-	-	-	3	3	3	-	-
3	-	-	3	3	-	-	-	3	3	3	-	-
4	-	-	3	3	-	-	-	3	3	3	-	-
5	-	-	3	3	-	-	-	3	3	3	-	-
6	-	-	3	3	-	-	-	3	3	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Upgrading and repairs PCS	Pearson, Scott Mueller, 20 th Edition, 2012	13: 9780789747103
2.	Troubleshooting Your PC	Mr. David Stone & Alfred Poor, Prentice Hall India, 2000	13: 9780735614901
3.	A+ Complete	David Groth, BPB Publication, 2006	13: 9780782128024
4.	Computer Installation and Servicing	Balasubramaniam, Tata McGraw Hill Education Pvt. Ltd, Reprint, 2011	13: 9781259082467

❖ **E-REFERENCES:**

<http://www.pcworld.com/article/116583/article.html> , assessed on 26th April 2016

<http://www.computerstepbystep.com/computer-maintenance.html> , assessed on 26th April 2016

<https://www.youtube.com/watch?v=a0rEXzyX0-8>, assessed on 26th April 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

1. Operating System(Windows 98/2000/XP/7/8/8.1/10)
2. CPU Intel core i3/i5/i7
3. Fiber optics cable(LSFH Polymer)
4. Unshielded Twisted pairs cable(CAT 1 to CAT5)
5. Connectors(RJ45/BNC/AUI/FIBER)
6. Printers(INK JET/LASER)
7. Scanner(FLAT BED)
8. Crimps, Strips and cut tools(HT-200R, HT-2008R)

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1	Dr. Mrs. A.R. Mahajan	Head of Information Technology	Government Polytechnic, Nagpur.
2	Mr. S.P. Lambhade	Head of Computer Engineering	Government Polytechnic, Nagpur.
1.	Ms.I.G.Lokhande	Lecturer in Information Technology	Government Polytechnic, Nagpur.
2.	Mrs.V.A.Raje	Lecturer in Computer Engg.	Government Polytechnic, Nagpur.
3.	Mrs.D.P.Chanmanwar	Lecturer in Information Technology	Government Polytechnic, Nagpur.
4.	Shri. Atulupadhyay	COE	Vista computers, Ramnagar, Nagpur
5.	Shri N. V Chaudhri	Asst. Professor (CSE)	DBACEO ,Wanadongri, Nagpur
6	Shri Manoj Jethawa	HOD, Computer Science	Shri Datta Meghe Polytechnic, Nagpur

(Member Secretary PBOS)

(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN CE/ME/EE/AE/PK/MT/EC/IT/CM /TR
LEVEL NAME	: FREE ELECTIVE COURSES
COURSE CODE	: FE509E
COURSE TITLE	: FABRIC SELECTION AND CARE
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 00; TU: 00; PR: 04(CLOCK HRs.)
TOTAL CREDITS	: 02(1 TH/TU CREDIT = 1 CLOCK HR., 2 PR CREDIT = 1 CLOCK HR.)
TH. TEE EXAM	: NIL
PR. TEE EXAM	: 02 HRs (Internal)
PT. EXAM	: 01 HR

❖ RATIONALE:

Clothes are as important as food and shelter. You use them for covering, protecting and even decorating yourself. You must be having different types of clothes for different occasions like your casual attire, office wear, party dresses, and your night suit and so on. In this course technology and science behind selection of right fabric and its care is illustrated.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Judge the fibres by means of a physical test.
2. Select the yarn and fabric.
3. Illustrate and draw care labels in Textiles.
4. Identify the different methods for different stain removal from textiles.
5. Perform stain removal on fabric.
6. Suggest precaution for storage of textiles.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs
NIL			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practic als	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	Prepare textile fibre classification chart.	Fibre	4
2.	Detect the fibre type by means of physical test.		6
3.	Select the different types of yarn and fabric	Yarn	4
4.	Prepare chart of classification of yarn with their end uses.		6
5.	Identify different fabric formation methods.	Fabric	4
6.	Draw the plain and twill weaves on graph paper.		6
7.	Judge quality of textiles based on fibre, yarn and weave.	Selection of Textiles	4
8.	Prepare a chart of removal of different types of stain in a fabric and		6
9.	Perform stain removal on a given fabric.	Care of Textiles	4
10.	Draw care label symbols with instructions for fabrics.		6
11.	Collect 10 garment samples and note the care labels instructions	Maintenance of textiles	4
12.	Prepare the list of precautions necessary for storage of textiles.		6
Skill Assessment			4
Total Hrs.			64

❖ **SPECIFICATION TABLE FOR THEORY PAPER:**

Nil

❖ **QUESTION PAPER PROFILE FOR THEORY PAPER:**

Nil

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	1, 2, 3, 4,5,6
		Journal Writing		Continuous	05	--	Journal	1, 2, 3, 4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Printouts	1, 2, 3, 4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF JOB EVALUATION:**

S.N.	Description	Max. Marks
1	Chart preparation	10
2	Analysis of fabric samples	20
3	Draw symbols/diagrams / sketches	10
4	Viva voce	10
Total		50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	-	3	3	-	-	-	3	3	3	-	-
2	-	-	3	3	-	-	-	3	3	3	-	-
3	-	-	3	3	1	-	-	3	3	3	-	-
4	-	-	3	3	-	-	-	3	3	3	-	-
5	-	-	3	3	-	-	-	3	3	3	-	-
6	-	-	3	3	-	-	-	3	3	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1	Textile Fabrics:: Their Selection And Care From The Standpoint Of Use, Wear, And Launder ability,	George Henry Johnson : Harper & Brothers (1927)	B000863N32
2	Textiles	Sara J. Kadolph, Pearson Prentice Hall, 2007	0131187694, 9780131187696
3	Fabric Care	Noemia, D Souza : New Age international, 1998	978-81-224-1143-0
4	Fundamentals of Textile and their care	Sushila Dantiyagi : Orient Longman private limited, 2006	8125010270

❖ **E-REFERENCES:**

1. <http://www.textileassociationindia.org/> assessed on 20/9/2016
2. <http://www.fiber2fashion.org/>
3. <http://www.nift.ac.in/>
4. www.itamma.org/
5. <http://www.fabriclink.com/> assessed on 20/9/2016
6. <http://download.nos.org/srsec321newE/321-E-Lesson-22.pdf> assessed on 20/9/2016
7. <http://download.nos.org/srsec321newE/321-E-Lesson-26.pdf> assessed on 20/9/2016

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. D. S. Kulkarni	Head of Textile Department	Government Polytechnic, Nagpur.
2.	Dr. S. B. Muttagi	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
3.	Mr. S. G. Gaikwad	Lecturer in Textile Technology	Government Polytechnic, Nagpur
4.	Dr. C. P. Kapse	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
5.	Mrs. L. S. Chakraborty	Lecturer in Textile Technology	Government Polytechnic, Nagpur.
6.	Prof. G.S. Kakad	Head of Textile Department	JDIT, Yavatmal
7.	Mr. R.N.Yadav	President	RSR Mohota Spinning and Weaving Mill

 (Member Secretary PBOS)

 (Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN CE/ME/EE/EC/CM/TX/MT/PK/IT/TR
LEVEL NAME	: ELECTIVE COURSES
COURSE CODE	: FE510E
COURSE TITLE	: TWO AND FOUR WHEELER TECHNOLOGY
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 00; TU: 00; PR: 04(CLOCK HRs.)
TOTAL CREDITS	: 02 (1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE	: NIL
PR. TEE	: 02 HRs (Internal)
PT.	: NIL

❖ RATIONALE:

Today majority of people using a vehicle and it becomes a common need of daily life. Therefore, it is felt that one must have knowledge about the various systems and their functional importance and working in the context of automobile and its maintenance. The course aims to impart basic skills and understanding of two and four -wheeler systems basic components their working principle and basic maintenance procedure. Hence, this course has been offered for student of various diploma programme as one of the Allied Courses as “Credit Non-Exam Course”

❖ COURSE OUTCOMES:

After completing this course students will be able to–

- Identify various systems of two wheeler.
- Identify various systems of four wheeler.
- Use different tools required for preliminary maintenance of vehicle.
- Practice to drive two and four wheeler vehicle or simulator.
- Practice various technique and procedure for finding general fault and repair them
- Prepare a report on Motor Vehicle Rules, Road Signals safety and precautions etc.

❖ COURSE DETAILS:

❖ A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
NIL			

❖ **B. PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:**

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Identify the various systems of two wheeler and write report. Report includes- -Classification of two wheeler -Block diagram of various system of two wheeler -function of various systems.	Introduction to Automobile	04
2	Identify the various systems of four wheeler and write report. Report includes- -Classification of four wheeler -Block diagram of various system of four wheeler -function of various systems.		06
3	Use off hand tools and special tools required for maintenance of two and four wheeler vehicle.		06
4	Prepare a report on Motor Vehicle act and traffic signs. Reports includes- -Various motor act. -Driving license requirement. -Traffic signs. -Insurance of vehicle.	Motor Vehicle Act	10
5	Practice four wheeler driving training on simulator.		20
6	Identify below mention faults in two wheeler and repair them. 1) Starting Problem. 2) Mileage Problem. 3) Pick-up Problem. 4) Abnormal sound from Engine and Transmission System.	Fault finding and maintenance of Automobile	08
7	Identify below mention faults in Four wheeler and repair them. 5) Starting Problem. 6) Mileage Problem. 7) Pick-up Problem. 8) Abnormal sound from Engine and Transmission System.		08
Skill Assessment			02
Total hours			64

❖ **SPECIFICATION TABLE FOR THEORY PAPER:NIL**❖ **QUESTION PAPER PROFILE FOR THEORY PAPER:NIL**

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	1, 2, 3, 4,5,6
		Journal Writing		Continuous	05	--	Journal	1, 2, 3, 4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Printouts	1, 2, 3, 4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Drawing of Sketch, selection of equipment's, procedure etc.	20
2	Performance	10
3	Conclusion	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	-	-	-	-	-	-	3	3	3	-	-
2	-	-	-	-	-	-	-	3	3	3	-	-
3	-	-	-	3	3	-	-	3	3	3	-	-
4	-	-	3	3	3	-	3	3	3	3	-	-
5	-	-	3	3	3	3	-	3	3	3	-	-
6	-	-	-	-	3	3	3	3	3	3	-	-

1-Slight (Low) 2-Moderate (Medium) 3 –Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Automobile Engineering Vol.I	Dr. Kripal Singh, Standard Publishers Distributors, 13th Edition, 2013	97881801419669
2	Automotive Mechanics	S. Srinivisan, Tata McGraw – HILL, 2nd Edition, 2003	9780070494916
3.	Basic Automobile Engineering	Nakra CP , Dhanpat Rai Publishing Company (P) Limited, 2009	9788187433224
4.	Automotive Mechanics	S. Srinivisan, Tata McGraw – Hill, 2 nd Edition, 2003	9780070494916
5	The Motor vehicle Act	Government Publication, 1989.	Government Publication

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS**

- ❖ Air compressor-1 HP 3 phase, Max Pressure: 4, 95 kg/cm², 70 ltr.
- ❖ Engine Crane –Hydraulic, 2 ton Capacity.
- ❖ Bottle/Floor/Scissor Jacks- 3 ton Capacity.
- ❖ Two Post Lift- Capacity 3.5 Ton, Max Lifting ht - 1830 mm, Min Lowering height - 110 mm, Post height - 3700 mm Lifting time - 55 Secs, Width between posts : 2800 mm, with 1 HP / 2 HP power pack 1 or 3 phase
- ❖ Air hydraulic press - Capacity: 30 Ton. Air pressure: 100-140 PSI. 2 Press plates included (designs may vary) Air inlet fitting: 1/4" NPT
- ❖ Socket/ Impact wrenches- 1/4", 3/8", 1/2" and 3/4"
- ❖ Torque wrenches- 3/8", 1/2" and 3 NM, Ratcheting type/Click-type.
- ❖ Driving simulator.
- ❖ Road signs.
- ❖ Vehicle with two paddle control.

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Dr.K.S.Dixit	I/C, Head of Automobile Engineering	Government Polytechnic, Nagpur.
2.	Mr. S.D.Thakre	Lecturer in Automobile Engineering	Government Polytechnic, Nagpur.
3.	Mr. R.B.Tirpude	Lecturer in Automobile Engineering	Government Polytechnic, Nagpur.
4.	Mr. Syed J.M.	Lecturer in Automobile Engineering	Government Polytechnic, Nagpur.
5.	Mr. V.S.Kumbhar	Lecturer in Automobile Engineering	Government Polytechnic, Nagpur.
6	Mr. A.R.Yadgire	Lecturer in Automobile Engineering	Government Polytechnic, Nagpur.

 (Member Secretary PBOS)

 (Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME : DIPLOMA IN CE/ME/AE/PK/MT/EC/IT/CM /TX
LEVEL NAME : FREE ELECTIVES
COURSE CODE : FE511E
COURSE TITLE : ENERGY CONSERVATION AND MANAGEMENT
PREREQUISITE : NIL
TEACHING SCHEME : TH: 00; TU: 00; PR: 04(CLOCK HRS.)
TOTAL CREDITS : 02(1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)
TH. TEE : NIL
PR. TEE : 02 HRS (Internal)
PT. : NIL

❖ RATIONALE:

Energy conservation is a scientific and basic tool to make balance in different forms of energies. This course imparts the awareness, knowledge and practical skills/ techniques of energy conservation in various sectors. After completion of this course diploma engineering students must use various techniques and methods of energy conservation. Also they should be able to perform energy audit and its implementation.

COURSE OUTCOMES:

After completing this course students will be able to–

1. Determine losses in Mechanical System
2. Use different methods of energy conservation
3. Collect information related to star rating equipment
4. Use energy conservation equipment for energy audit
5. Design efficient illumination scheme for energy conservation
6. Prepare energy audit report.

❖ COURSE DETAILS:

THEORY:

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
Nil			

A. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs
1.	Use different dynamometers and tachometer for measurement of power of rotating shaft.	Mechanical Measurement	4
2	Use RDT PT100 thermal sensor and its module for measurement of temperature at different stages in IC engine.		2
3	Use anemometer and measure quantity of air supplied to IC Engine.		2
4	Determine Volumetric and overall efficiency of two stage reciprocating compressor by conducting trial on test rig.	Mechanical Performance Measurement	4
5	Determine overall efficiency of centrifugal pump and plot operating characteristics by using centrifugal test rig.		4
6	Calculate coefficient of performance by conducting trial on vapour compression refrigeration test rig.		4
7	Collect performance information of 5 stars and 2 stars, same brand split AC and compare the results in terms of energy consumption.	Basic of Energy Conservation	2
8	Calculate electric bill for electric water heating system. Compare it with cost of solar water heating system and calculate payback period of solar water heating system.		2
9	Connect voltmeter, ammeter and wattmeter in electric circuit to measure voltage, current and power required for energy audit.		2
10	Determine losses of single phase Transformer at No load, Half load and Full load by conducting load test.		2
11	Use power guard meter for measurement of different electrical quantities		2
12	Calculate payback period of energy efficient motor. Compare losses of energy efficient motor with similar capacity conventional motor.	Energy Conservation Methods	4
13	Calculate energy saving by using energy efficient equipments like automatic Star – Delta starter for three phase induction motor		4
14	Calculate energy saving in lighting system by retrofitting tube lights with LED lamps. Also calculate payback period.		4
15	Measure illumination level of different places with the help of Digital Lux Meter		4
16	Design illumination Scheme for any one of the following by using energy efficient luminaries; a) Flat b) Bungalow c) Independent House		4
17	Mini project Prepare Energy audit report of any institute/Industry/Hospital/Residence/small workshop.		4

18	Prepare report on visit to cogeneration system.		4
19	Prepare detail report and give presentation in the class on any one of the following topics , i) Energy conservation and Environmental issues ii) Market survey on energy efficient luminaries iii) Market survey on energy efficient motors and transformers. iv) Energy tariff system in India v) Energy conservation equipments vi) Energy Management vii) Energy Audit viii) Energy conservation act 2003		4
Skill Assessment			2
Total Hrs			64

❖ **SPECIFICATION TABLE FOR THEORY PAPER:**

Not Applicable

❖ **QUESTION PAPER PROFILE FOR THEORY PAPER:**

Not Applicable



❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	1, 2, 3, 4,5,6
		Journal Writing		Continuous	05	--	Journal	1, 2, 3, 4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Printouts	1, 2, 3, 4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6	
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Drawing circuit diagram, selection of equipments, writing procedure etc.	10
2	Performance	20
3	Calculation, Result, Drawing Graphs (if any)	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	-	3	-	3	3	-	3	-	3	-	-
2	-	-	3	-	3	3	-	3	-	3	-	-
3	-	-	-	-	-	3	-	3	3	3	-	-
4	-	-	3	2	3	-	-	3	3	3	-	-
5	-	-	3	-	-	-	-	3	-	3	-	-
6	-	-	3	-	3	3	-	3	3	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Generation and Utilization of Electrical Energy	D.Srilatha S.Sivnagraju M.Balasubbareddy Pearson , New Delhi	8131798771, 9788131798775
2.	India – The Energy Sector	P.H. Hederson, University Press,	
3.	Energy management Handbook	W.CTurner, Wiley Press	10: 142008870X
4.	Efficient Use and management of electricity in industry.	B.G. Desai, J.S.Rana, A.V. Dinesh, R. Paraman, Devki Energy Consultancy PVT Ltd	
5.	Renewable Energy Technologies- A Practical guide for beginners	Chetan Singh Solanki, Prentice-Hall of India PVT. Ltd., First, 2008.	978-81-203-3434-2
6	Chetan Singh Solanki, Prentice-Hall of India PVT. Ltd., First, 2008.	Renewable Energy Technologies- A Practical guide for beginners	-978-81-203-3434-2-

7	Non-Conventional Energy Resources	D.S.Chauhan, S.K.Srivastava, New Age International (P) Ltd. Publishers, Second 2011.	13:978-81-224-1768-5
8	Renewable Energy Sources & Conversion Technology	N.K. Bansal, Kleemann, Meliss	0074600230, 9780074600238.
9	Illuminating Engineering	Kamlesh Roy, Laxmi Publication, 2006	9789380386553

❖ **E-REFERENCES:**

1. www.bee.india.nic.in , accessed on 11th November, 2016
2. www.mnes.nic.in , accessed on 11th November, 2016
3. www.energymanagertraining.com , accessed on 11th November, 2016
4. www.greenbusiness.com , accessed on 11th November, 2016
5. www.worldenergy.com , accessed on 11th November, 2016
6. www.mahaurja.com , accessed on 11th November, 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

1. Lux meter
2. Ammeter MI 0-5-10 A
3. Voltmeter MI 0-150-300 V
4. Wattmeter 0-3000 W
5. Digital Multi-meter
6. Rheostat assorted sizes
7. PV Solar panel
8. Energy efficient motors
9. Energy efficient transformer
10. Energy efficient luminaries
11. Energy efficient Equipments /Devices
12. Power Guard Meter (For measurement of V, I, W, VA, PF, KWh)

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Dr. C.S.Thorat	Principal	Government Polytechnic, Nagpur.
2.	Mr. O. V. Sarode	I/C, Head of Mechanical Engineering	Government Polytechnic, Nagpur
3.	Mrs. K.M.Gaidhane	I/C, Head of Electrical Engineering	Government Polytechnic, Nagpur.
4.	Mr. A.R. Shaikh	Lecturer in Mechanical Engineering	Government Polytechnic, Nagpur.

4.	Mrs.S.P.Thote	Lecturer in Electrical Engineering	Government Polytechnic, Nagpur.
5.	Dr. R.S.Surjuse	Lecturer in Electrical Engineering	Government Polytechnic, Nagpur.
6	Mr.G.V.Gotmare	Lecturer in Electrical Engineering	Government Polytechnic, Nagpur.
7	Mr.N.H.Adikine	Lecturer in Electrical Engineering	Government Polytechnic, Nagpur.
8	Bhashkar Bale	Dy. Executive Engineer,	MSTCL, Nagpur
9	R.Y.Ghormade	Head of Electrical Engineering	Dharampeth Polytechnic, Nagpur
10	DR. S.S.Bharatkar	Lecturer in Electrical Engineering	Government Polytechnic, Amaravati.

(Member Secretary PBOS)

(Chairman PBOS)



GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	: DIPLOMA IN CE/ME/AE/PK/MT/EC/IT/CM /TX/TR
LEVEL NAME	: ELECTIVE COURSES
COURSE CODE	: FE512E
COURSE TITLE	: LEARNING ABILITY DEVELOPMENT
PREREQUISITE	: NIL
TEACHING SCHEME	: TH: 00; TU: 00; PR: 04(CLOCK HRs.)
TOTAL CREDITS	: 02(1 TH/TU CREDIT = 1 CLOCK HR., 1PR CREDIT =2CLOCK HR.)
TH. TEE	: NIL
PR. TEE	: 02 HRs (Internal)
PT.	: NIL

❖ RATIONALE:

Learning ability of an engineer or professional is essential through the level at which he/she has developed and persuades his/her hobby. It enhances the creativity. Hobby is integral and important part of human personality. Hobby is best for recreation which rejuvenates a person. To obtain maximum benefits from hobby the overall understanding and competency in performance is utmost important.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Develop learning ability through hobby.
2. Appreciate importance of hobby in developing learning ability.
3. Choose related equipments, consumables and gears.
4. Maintain related equipments.
5. Carry out setting of equipment.
6. Exhibit learning through performance.

❖ **COURSE DETAILS:****A. THEORY :**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
Nil			

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	Present following: Learning ability development through hobby.	Introduction	4
2	Collect information about present scenario of related field – Experts in India, Experts in your city	Awareness Development	4
3	Demonstrate different related equipments.	Demonstration	4
4	Demonstrate Performance.		4
5	Practice setting up related instruments	Practice	4
6	Practice performance –level I		20
7	Practice performance –level II		16
8	Practice tuning and preliminary maintenance of related instruments.		4
Skill Assessment			4
Total Hrs			64

❖ **SPECIFICATION TABLE FOR THEORY PAPER:**

Not Applicable

❖ **QUESTION PAPER PROFILE FOR THEORY PAPER:**

Not Applicable

❖ **ASSESSMENT AND EVALUATION SCHEME:**

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	1, 2, 3, 4,5,6
		Journal Writing		Continuous	05	--	Journal	1, 2, 3, 4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Printouts	1, 2, 3, 4,5,6
	Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form		1, 2, 3, 4,5,6
End Of Course		End Of The Course	Questionnaires					

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Practical on setting up / tuning related instruments	10
2	Performance –level I	20
3	Performance –level II	10
4	Viva voce	10
	TOTAL	50

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	-	-	-	-	-	-	-	-	3	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	3	3	-	3	-	3	3	3	-	-
4	-	-	3	3	-	3	-	3	3	3	-	-
5	-	-	3	3	-	3	-	3	3	3	-	-
6	-	-	3	3	-	-	-	3	3	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
NIL			

❖ **E-REFERENCES:**

- ❖ <https://en.wikipedia.org/wiki/Hobby>
- ❖ www.justdial.com/Nagpur/Hobby
- ❖ nagpur.quikr.com

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

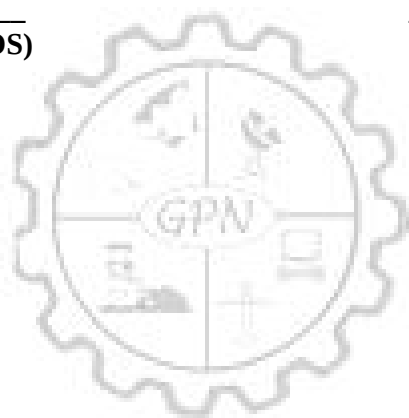
- ❖ As per requirement of related field.

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Dr. C.S.Thorat	Principal	Government Polytechnic, Nagpur.
2.	Dr. K.S.Dixit	Head of Automobile Engineering	Government Polytechnic, Nagpur.
3.	Mr. S.A.Telang	Lecturer in Automobile Engineering	Government Polytechnic, Nagpur.
4.	Mr. R.B.Tirpude	Lecturer in Automobile Engineering	Government Polytechnic, Nagpur
5.	Mr. J.M.Syed	Lecturer in Automobile Engineering	Government Polytechnic, Nagpur

(Member Secretary PBOS)

(Chairman PBOS)



Vision of the Textile Manufactures Program

To become a Centre of Excellence in imparting skill based Textile Technology Education

Mission of the Textile Manufactures Program

- M1 :** To impart high quality Textile Technology education and professional ethics to students.
- M2 :** To adopt the best pedagogical methods in order to maximize knowledge transfer.
- M3 :** To have adequate mechanisms to enhance understanding implementation of theoretical concepts in practice.
- M4 :** To provide the best facility, infrastructure, and environment to the students and faculty members, creating an ambience conducive for excellence in Textile Technology education.

Program Educational Objectives - PEOs

- PEO1** : To acquire a strong background in basic science, mathematics, engineering science and technical arts and ability to use these tools in Textile Technology process.
- PEO2** : To develop the ability to demonstrate technical competence in the field of Textile Technology process and develop solutions to the problems in Textile Technology process.
- PEO3** : To attain the qualities of professional leadership to deliver effectively in a multi disciplinary team and domains
- PEO4** : To produce technicians who ensures social responsibility and environmental concern.
- PEO5** : To attain professional excellence through life-long learning and produce technicians who ensure professional, ethical and moral behaviour.

Program Specific Outcomes - PSOs

- PSO1** : Select raw materials, machines, process parameters to impart desired quality of textile product and services at minimum cost.
- PSO2** : Apply new methods / management techniques to produce textile products.

Program Outcomes

- PO1 : Basic Knowledge:** Ability to apply knowledge of basic Mathematics, Science and Engineering to solve the engineering problems.
- PO2 : Discipline Knowledge:** Ability to discipline specific knowledge to solve core and/or applied engineering problems.
- PO3 : Experiments and Practice:** Ability to plan and perform experiments and practices and use the results to solve engineering problems.
- PO4 : Engineering Tools:** Apply appropriate technologies and tools with understandings of limitations.
- PO5 : The Engineer and Society:** Demonstrate knowledge to assess the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.
- PO6 : Environment and Sustainability:** Understand the impact of engineering solutions in societal and environmental context, and demonstrate knowledge and need for sustainable development.
- PO7 : Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
- PO8 : Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse/multidisciplinary teams.
- PO9 : Communication:** An ability to communicate effectively.
- PO10: Life-long learning:** Recognise the need for, and have preparation and the ability to engage in independent and life-long learning in context of technological changes.



GOVERNMENT POLYTECHNIC

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