

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM**PROGRAMME : DIPLOMA IN CIVIL ENGINEERING****LEVEL NAME : DIVERSIFIED****COURSE CODE : CE 1501****COURSE TITLE : ADVANCED CONSTRUCTION EQUIPMENT****PREREQUISITE : NIL****TEACHING SCHEME: TH :02; TU :00; PR :02; TOTAL CREDITS: 04 (Hrs/Week)****(1 CREDIT = 1 CLOCK HR.)****EVALUATION SCHEME:**

MARKS	THEORY			TUTORIAL/PRACTICAL			TOTAL
	TERM EXAM	PROG TEST	TOTAL	PRACT EXAM	TERM WORK	ORAL EXAM	
MAX.	80	20	100	NIL	25@	25@	150
MIN.	32	--	40	---	10	10	---

(# - External & Internal Assessment ; @ - Internal Assessment only)**TIME ALLOTTED FOR TERM EXAM : 03 HRS.****TIME ALLOTTED FOR PROGRESSIVE TEST : 01 HR.****RATIONALE :**

- ❖ Civil Engineering is mainly concerned with various types of Civil Engineering structures. It requires a lot of human resources . Today the works are required to be completed in stipulated period of time . If the construction is carried out with traditional method and equipments , it may lead to delay in time, which will increase the cost of construction . In view of speedy construction activities , it is essential to use modern Civil Engineering Equipments. Thus Civil Engineering technicians should be thoroughly familiar with the working ,application and maintenance of the wide range of various modern Civil Engineering equipments.

❖ OBJECTIVES :

- The technician should have working knowledge of various types of construction machinery
- To maintain the progress and quality of work.
- Supervision & The maintenance of machineries.

SKILLS :**❖ The student will acquire the following skills**

1. Selection of construction equipment for various types of works
2. Working of various types of construction equipments

CONTENTS :**A. THEORY :**

SR. NO.	CHAPTER		MARKS	HOURS
1.	INTRODUCTION		02	01
	1.1	Introduction about Advanced Construction Equipment.		
2.	EXCAVATION AND EARTH MOVING MACHINERY		10	04

	2.1	General consideration in Excavation, Factors affecting Choice of Equipment		
	2.2	Different types of Excavating & Earth Moving Equipments. Power Shovel, Dragline, Bull Dozer, Scraper, Clam-shell.		
	2.3	Sketches with labelling of various parts, Working principles & Uses of above types of Equipments		
3.	WATER SUPPLY & DEWATERING MACHINERY			
	3.1	Application of Pumping. Factors affecting most economical type of Pumping arrangements	10	04
	3.2	Methods of Dewatering		
	3.3	Different types of Water Supply & Dewatering Equipment Reciprocating pump, Multistage pump, Submersible pump.		
	3.4	Sketches with labelling of various parts, Working principles & Uses of above types of Equipments		
4.	HOISTING MACHINERY			
	4.1	Meaning of Hoisting, Principles of Hoisting	08	04
	4.2	Different types of Hoisting Equipment Pulley, Chain, Jacks, Derricks, Cranes, Gantry.		
	4.3	Sketches with labelling of various parts, Working principles & Uses of above types of Equipments		
5.	COMPACTION MACHINERY			
	5.1	Meaning of Compaction. Process of Compaction	08	03
	5.2	Various types of Compaction machinery Road rollers, Concrete vibrators.		
	5.3	Different types of Road roller: Smooth Wheeled roller, Sheep Foot Roller, Vibrating Rollers, Pneumatic type roller.		
	5.4	Sketches with labelling of various parts, Working principles & Uses of above types of Equipments		
6.	CRUSHING MACHINERY			
	6.1	Meaning of Crushing, Process of Crushing	06	02
	6.2	Various types of Crushing Machineries : Jaw Crusher, Hammer mill.		
	6.3	Sketches with labelling of various parts, Working principles & Uses of above types of Equipments		
7.	MIXING MACHINERY			
	7.1	Meaning & process of Mixing	06	02
	7.2	Various types of Mixing Machinery: Concrete mixers, Bitumen mixers,		
	7.3	Concrete mixing plant, Bitumen mixing plant.		
	7.4	Sketches with labelling of various parts, Working principles & Uses of above types of Equipments		
8.	DRILLING MACHINERY			
	8.1	Meaning & process of Drilling	06	02
	8.2	Various types of Drilling machinery : Percussion Drill, Rotary drill, Hydraulic drill.		
	8.3	Augers.		
	8.4	Sketches with labeling of various parts, Working principles & Uses of above types of Equipments		

9.	CONVEYING MACHINERY		06	02
	9.1	Meaning & process of Conveying		
	9.2	Various types of Conveying : Belt conveyer, Concrete pumps.		
	9.3	Sketches with labelling of various parts, Working principles & Uses of above types of equipments		
10.	PILE DRIVING MACHINERY		08	03
	10.1	Meaning & process of Pile Driving		
	10.2	Various types of Pile Driving Machinery : Drop hammer, Diesel Hammer.		
	10.3	Sketches with labelling of various parts, Working principles & Uses of above types of Equipments		
11.	PRESTRESSING MACHINERY		06	03
	11.1	General principles of Prestressing		
	11.2	Systems of Prestressing: Pretensioning, Post tensioning.		
12.	CONCRETE PAVING MACHINES.		04	02
	12.1	Introduction		
	12.2	Sketches with labeling of various parts, Working principles & Uses of Concrete Paving machines.		
Total			80	32

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:
(Term work shall consist of following lab work/assignments/visit report. Oral is based on TW)

S.No.	Title of Practical/Lab.Work/Assignments	Hrs.
1.	Journal containing Sketches (line diagrams) with labeling of various parts,operation,working principles, suitability, advantages & disadvantages of Excavation and Earth moving machinery	02
2.	Journal containing Sketches (line diagrams) with labeling of various parts,operation,working principles, suitability, advantages & disadvantages of Water supply & Dewatering machinery	04
3.	Journal containing Sketches (line diagrams) with labeling of various parts,operation,working principles, suitability, advantages & disadvantages of Hoisting machinery	02
4.	Journal containing Sketches (line diagrams) with labeling of various parts,operation,working principles, suitability, advantages & disadvantages of Compaction machinery	04
5.	Journal containing Sketches (line diagrams) with labeling of various parts,operation,working principles, suitability, advantages & disadvantages of Crushing machinery	02
6.	Journal containing Sketches (line diagrams) with labeling of various parts,operation,working principles, suitability, advantages & disadvantages of Mixing machinery	04
7.	Journal containing Sketches (line diagrams) with labeling of various parts,operation,working principles, suitability, advantages & disadvantages of Drilling machinery	02
8.	Journal containing Sketches (line diagrams) with labeling of various parts,operation,working principles, suitability, advantages & disadvantages of Conveying machinery	04

9.	Journal containing Sketches (line diagrams) with labeling of various parts, operation, working principles, suitability, advantages & disadvantages of Pile driving machinery	02
10.	Journal containing information about Systems of Prestressing: Externally & Internally Prestressed Member, Pretensioning, Post tensioning, Circular Prestressing	04
11.	Journal containing Introduction, Sketches with labeling of various parts, Operation & working principles, suitability, advantages & disadvantages of concrete paving machines.	02
Total		32

❖ **ASSESSMENT OF LABORATORY EXPERIENCES/ASSIGNMENTS :**

Continuous assessment of Term Work and Term end oral examination.

❖ **SUGGESTED IMPLEMENTATION STRATEGIES :**

1. **Lecture method**
2. **Q & A technique.**
3. **Demonstration**
4. **Field visit**

❖ **SUGGESTED LEARNING RESOURCES :**

1. **PRINT :** Text books/Reference books/Manuals/Journals.
2. **NON PRINT :** CDs / PPT / Transparencies / Charts / Models

C. SPECIFICATION TABLE :

Chapter No.	Title of Chapter	Marks (1.5 x Marks allotted to chapter)	Distribution of Marks			
			Knowledge	Comprehension	Application	Total
1	Introduction	03	03	00	00	03
2.	Excavation and earth moving machinery	15	10	02	03	15
3.	Water supply & dewatering machinery	15	10	02	03	15
4.	Hoisting machinery	12	06	02	04	12
5.	Compaction machinery	12	06	02	04	12
6.	Crushing machinery	09	05	02	02	09
7	Mixing machinery	09	05	02	02	09
8	Drilling machinery	09	05	02	02	09
9	Conveying machinery	09	05	02	02	09
10	Pile driving machinery	12	06	02	04	12
11	Prestressing machinery	09	03	02	04	09
12	Concrete paving machines.	06	02	02	02	06
Total		120	66	22	32	120

D. REFERENCE & TEXT BOOKS:

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Construction planning, Equipment and Methods	R.L. Peurifoy - Graw Hills Publication, New York.	----

2.	Construction Equipment and Management	S.C. Sharma Khanna Publisher, Delhi.	----
3.	Construction Equipment and Its Planning Application	Dr.Mahesh Varma - Melropotam Book Co.(P) Ltd., New Dehli 110002 (India)	----
4.	Construction Planning & Equipment	Dr.S.Salyanarayan & S.C. Saxena.	----

E. LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:

S.N.	Name	Designation	Institute / Industry
1.	Shri Vivek B. Dhait	Lecturer in Civil Engg.	Government Polytechnic Nagpur.
2.	Shri R.N.Giradkar	H.O.D. Civil Engg. Dept.	Government Polytechnic Nagpur.
3.	Shri. A. W. Pawde	Lecturer in Civil Engg.	Government Polytechnic Nagpur.

(Member Secretary PBOS)

(Chairman PBOS)

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COURSE CURRICULUM**PROGRAMME : DIPLOMA IN CIVIL ENGINEERING****LEVEL NAME : DIVERSIFIED****COURSE CODE : CE 1502****COURSE TITLE : MAINTENANCE & REHABILITATION OF STRUCTURES****PREREQUISITE : CE1305****TEACHING SCHEME: TH :02; TU :00; PR :02; TOTAL CREDITS: 04 (Hrs/Week)****(1 CREDIT = 1 CLOCK HR.)****EVALUATION SCHEME:**

MARKS	THEORY			TUTORIAL/PRACTICAL			TOTAL
	TERM EXAM	PROG TEST	TOTAL	PRACT EXAM	TERM WORK	ORAL EXAM	
MAX.	80	20	100	NIL	25@	25@	150
MIN.	32	--	40	---	10	10	--

(# - External & Internal Assessment ; @ - Internal Assessment only)**TIME ALLOTTED FOR TERM EXAM : 03 HRS.****TIME ALLOTTED FOR PROGRESSIVE TEST : 01 HR.****❖ RATIONALE :**

‘Repairs, Maintenance & Rehabilitation of Civil Engineering Structures’ is a Applied technology course which enable Civil Engineering students to acquire the repair, maintenance & rehabilitation skill on of any Civil Engineering structure which is needed by them when performing their job in construction industries.

This course enables the students to get the idea of failure pattern, evaluation of strength of structures, decides the remedial techniques of repairs, maintenance & rehabilitation of Civil Engineering structure.

❖ OBJECTIVES :**After completion of this course, student shall be able to -**

- Understand various types of defects in structures.
- Know the repairs and maintenance procedures of structures.
- Know the materials used for repairs of defects/ damages.

❖ SKILLS:**After completing this course students will acquire the following skills –**

- Develop the skill of
 - Repairs of any Civil Engineering Structure.
 - Maintenance of any Civil Engineering Structure
 - Rehabilitation of any Civil Engineering structure
- To get the knowledge regarding causes of failure of the various members of structures.
- Assessment of procedure / planning for the repairs & maintenance of various members of structures.

CONTENTS :**A. THEORY :**

SR. NO.	CHAPTER	MARKS	HOURS
1.	INTRODUCTION	10	04

	1.1	Meaning of – i) Repairs ii) maintenance & iii) Rehabilitation of Civil Engineering Structure		
	1.2	Necessity of - i) Repairs ii) maintenance & iii) Rehabilitation of Civil Engineering Structure		
	1.3	Types of - i) Repairs ii) maintenance & iii) Rehabilitation of Civil Engineering Structure.		
2.	INSPECTION, IDENTIFICATION & DIAGNOSIS			
	2.1	COMMON DEFECTS AND FAILURE WITH POSSIBLE CAUSES IN BUILDING, Roads, Bridges, Railway tracks, Cannels and C. D. works, Tunnels and special structures like service reservoirs, Water supply, Sewerage, Stron water drains.	12	05
3.	MATERIALS USED FOR REPAIRS			
	3.1	Epoxy resin, epoxy mortar, polypropylene, poly-sulphate, silicon, Gypsum cement mortar polymer concrete composites, sealants, membrane overlays, fiber reinforcement concrete, emulsions and paints.	12	04
4.	COMMON CAUSES OF DEFECTS/DAMAGES IN CIVIL ENGG. STRUCTURE			
	4.1	Damages due to – i) Earthquake ii) Fire iii) Flood iv) Crack in Plasters, Brickwork, Concrete etc iv) Corrosion v) Advance damage / defect detection technique.	08	04
5.	TECHNIQUES FOR REPAIRS			
	5.1	Types of techniques adopted.		
	5.2	Physical examination of common defects/damages.		
	5.3	Structural and non structural repairs. i) Guniting & grouting, shotcreting ii) Methods of corrosion protection iii) Mortar repairs of cracks. iv) Shoring & underpinning etc.	14	05
6.	REPAIRS & MAINTANANCE OF COMMON ITEMS OF CIVIL ENGINEERING ITEMS OF WORKS			
	6.1	Foundation – i) Types ii) Remedies iii) Process of foundation iv) Examination of existing foundation		
	6.2	Masonry walls works - i) Cracks in walls ii) Causes of cracks iii) Dampness in walls & causes iv) Prevention of cracks.		
	6.3	Plastering works – i) Cracks in plaster ii) Causes of cracks iii) Prevention of cracks.		
	6.4	Flooring works - i) Types of floors ii) Sinking of floors iii) Technique adopted to restrict sinking etc.		
	6.5	R.C.C. works - i) Concrete properties – strength, permeability, thermal properties & cracking ii) Effect due to climate, Temperature, Chemicals etc iii) Remedies of RCC work.		
	6.6	Roads - i) Bitumen Road ii) Concrete Roads.		
	6.7	Bridges		
	6.8	Cannels / Reservoirs		
7.	STRENGTHENING METHODS:			
	7.1	Cantilevers, beams, slabs, walls, columns, foundation	04	02
Total			80	32

B.**LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:**

(Term work shall consist of following lab work/assignments/visit report. Oral is based on TW)

S.No.	Title of Practical/Lab.Work/Assignments	Hrs.
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1.	Visit and inspect the site where defects / damages are occurs and classify the types of defects / damages and suggest the method of repairing.	12
2.	Case study on any three of the following – a) Items of works related to building. b) Water treatment plant / sewage treatment plant/ overhead tanks. c) Roads – i) Bitumen Roads ii) Concrete Roads d) Cannel / reservoirs.	10
3.	Market survey of various materials used in repairs of civil Engineering structures & method of application.	05
4.	Seminar on any type of repair work.	05

❖ **ASSESSMENT OF LABORATORY EXPERIENCES/ASSIGNMENTS :**

Continuous assessment of Term Work and Term end oral/ practical examination.

❖ **SUGGESTED IMPLEMENTATION STRATEGIES :**

1. **Lecture method**
2. **Q & A technique.**
3. **Demonstration**
4. **Case study**
5. **Seminars**
6. **Field visit**

❖ **SUGGESTED LEARNING RESOURCES :**

1. **PRINT :** Text books/Reference books/Manuals/Journals.
2. **NON PRINT :** CDs / PPT / Transperencies / Charts / Models

C. SPECIFICATION TABLE :

Chapter No.	Title of Chapter	Marks (1.5 x Marks allotted to chapter)	Distribution of Marks			
			Knowledge	Comprehension	Application	Total
1.	Introduction	15	05	05	05	15
2.	Inspection, Identification & Diagnosis	18	06	06	06	18
3.	Materials Used For Repairs	18	06	06	06	18
4.	Common Causes Of Defects/Damages In Civil Engg. Structure	12	04	04	04	12
5.	Techniques for Repairs	21	07	07	07	21
6.	Repairs & Maintenance Of Common Items Of Civil Engineering Items Of Works	30	10	10	10	30
7.	Strengthening methods	06	02	02	02	06
Total		120	40	40	40	120

D. REFERENCE & TEXT BOOKS:

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Maintenance and Repairs of Buildings	P. K. Guha, New Central Book Agency	----
2.	Maintenance Engineering for Civil Engineers	B. S. Nayak, Khanna Publisher	----
3.	Building Construction	Sushil Kumar, Standard Publisher	----
4.	Theory & Practices of concrete Technology	M. S. Shetty, S. Chand & Co. New Dehli	----

E. LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:

S.N.	Name	Designation	Institute / Industry
1.	Mr. S. R. Ukey	Lect. in Civil Engg.	G. P. Nagpur
2.	Mr. R. N. Giradkar	H. O. D. Civil Engg. Dept.	Govt. Polytechni, Nagpur

(Member Secretary PBOS)

(Chairman PBOS)

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COURSE CURRICULUM**PROGRAMME : DIPLOMA IN CIVIL ENGINEERING****LEVEL NAME : DIVERSIFIED COURSES****COURSE CODE : CE 1503****COURSE TITLE : WASTE WATER TREATMENT & SOLID WASTE MANAGEMENT****PREREQUISITE : NIL****TEACHING SCHEME: TH :02; TU :00; PR :02; TOTAL CREDITS: 04 (Hrs/Week)****(1 CREDIT = 1 CLOCK HR.)****EVALUATION SCHEME:**

MARKS	THEORY			TUTORIAL/PRACTICAL			TOTAL
	TERM EXAM	PROG TEST	TOTAL	PRACT EXAM	TERM WORK	ORAL EXAM	
MAX.	80	20	100	NIL	25@	25@	150
MIN.	32	--	40	---	10	10	--

(# - External & Internal Assessment ; @ - Internal Assessment only.)**TIME ALLOTTED FOR TERM EXAM : 03 HRS.****TIME ALLOTTED FOR PROGRESSIVE TEST : 01 HR.**

- ❖ **RATIONALE:** Wastes are generated in cities, industries and in agriculture as well. The disposal of untreated waste materials is causing pollution of environment and it is necessary for diploma engineering technician to know how the various wastes can be safely treated so as to require minimum energy & transportation and the treated waste should become environment friendly.

❖ **OBJECTIVES :****After completing this course students will be able to–**

- The student should be able to understand and collect data of amount of
- waste generated by a city/town/village by its different activities.
- He should be able to analyse the wastes in suitable categories so as to recycling of the waste.
- He should be able suggest some safe treatment for disposal of the waste generated by human activities.
- He should be able to carry out some small experiments to convert waste into wealth or seek advice from Scientists and Engineers working in organisations as NEERI, MERI etc.

❖ **SKILLS :****Students will acquire the following skills:**

1. Collect the data of different waste generated by city/town /by its different activities.
2. Analyze the quantity and quality of waste generated by human activities i.e. industrial and residential area.
3. Suggest the recycle and reuse of waste generated by industrial and residential area.
4. Suggest the safe waste disposal treatment to the waste generated by industrial and residential area.

CONTENTS :**A. THEORY :**

SR. NO.	CHAPTER		MARKS	HOURS
1.	INTRODUCTION		06	02
	1.1	Classification of Wastes according to state: Gaseous, liquids, solids, Harmful and harmless to environment etc.		
2.	WASTE WATER FROM RESIDENTIAL AREAS :		16	06
	2.1	Quantity and quality of waste water generated from residential area, sewage treatment plant, advanced biological treatments given to the biodegradable waste. Reuse of waste water generated in residential area.		
3.	WASTE WATER FROM INDUSTRIES:		14	05
	3.1	Harmful constituents present in the waste water of the following different industries viz physical, chemical and biological qualities , methods for minimizing the waste water generation , recycle reuse of the waste water , safe disposal treatment and economical biological treatment from water based industry such as Thermal power plant, Dairy Industry & Textile unit.		
4.	WASTE WATER FROM AGRICULTURAL & OPEN AREAS		10	04
	4.1	Quality of waste water from different crops such as Rice, wheat, sugar constituents present in this crop i.e. Insecticides, pesticides, urea, ammonium sulphate and fertilizer, and its safe disposal Treatment, water conservation Techniques use in open area.		
5.	SOLID WASTE FROM RESIDENTIAL, COMMERCIAL, INSTITUTIONAL & CONSTRUCTION AREAS:		14	06
	5.1	Quantity and quality of solid waste generated from residential, Commercial, Institutional& Construction area – Methods of collection, recycle and reuse of the solid waste, composting and incineration and solid waste management plan.		
6.	SOLID WASTE FROM INDUSTRIES:		12	06
	6.1	Harmful Quantity and quality of solid waste generated by important industries such as thermal power stations, Textile units, Construction industry, Hotels, Hospital, and other industries in the district. Recycle and reuse and safe disposal treatment of each of the above industries,		
7.	SOLID WASTES FROM AGRICULTURAL ACTIVITY		08	03
	7.1	Quality of waste generated by different crops, i.e. Rice and sugarcane, methods adopted for recycle and reuse of the solid waste and its disposal treatment.		

Total	80	32
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LIST OF PRACTICALS/LABORATORY EXPERIMENTS/ ASSIGNMENTS:**B.****(Term work shall consist of following lab work/assignments/visit report. Oral is based on TW)**

S.No.	Title of Practical/Lab.Work/Assignments	Hrs.
	Student shall visit the industries and collect the data about quality & quantity of waste generated. The report shall consist of-	
1.	Quality & quantity of waste generated.	06
2.	Process of the industry (flow diagram)	04
3.	Adopted treatment process for waste disposal.	04
4.	Recycled & reuse suggestion for process change	06
5.	Suggested Economical biological treatment with flow diagram.	06
6.	Seminar on any one of above report.	06
	Total	32

❖ **ASSESSMENT OF LABORATORY EXPERIENCES/ASSIGNMENTS :**

Continuous assessment of Term Work and Term end oral examination.

❖ **SUGGESTED IMPLEMENTATION STRATEGIES :**

1. **Lecture method**
2. **Improved lecture method.**
3. **Q & A technique.**
4. **Case study**
5. **Seminars**
6. **Field visit**

❖ **SUGGESTED LEARNING RESOURCES :**

1. **PRINT :** Text books/Reference books/Manuals/Journals.
2. **NON PRINT :** CDs / PPT / Transperencies / Charts / Models

C. SPECIFICATION TABLE :

Chapter No.	Title of Chapter	Marks (1.5 x Marks allotted to chapter)	Distribution of Marks			
			Knowledge	Comprehension	Application	Total
1.	Introduction	09	05	04	-	09

2.	Waste water from residential areas	24	06	09	09	24
3.	Waste water from industries	21	05	08	08	21
4.	Waste water from agricultural & open areas	15	03	06	06	15
5.	Solid waste from residential, commercial, institutional & construction areas	21	05	08	08	21
6.	Solid waste from industries	18	04	07	07	18
7.	Solid waste from Agricultural activity	12	02	05	05	12
Total		120	30	47	43	120

D. REFERENCE & TEXT BOOKS:

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Waste water Treatment –	M.N.RAO, A.K.Dutta Oxford and IBH Publishing Co. Pvt. Ltd.	----
2.	Environmental pollution and protection	Garg, Bansal and Tiwana	----
3.	Pollution control in process industries	S.P.Mahajan	----
4.	Solid waste management	Timmy, Katyal, Satake, Bhide	----
7.	Waste water engineering	Dr B.C.Punmia, Arun Kumar Jain, Ashok Kumar Jain Laxmi Publications(P) Ltd.	978-81-318-0596-1

E. LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:

S.N.	Name	Designation	Institute / Industry
1.	Mr. S. K. Rangari	Lecturer in Civil Engg.	G. P. Nagpur
2.	Mr. R.N.Giradkar	HOD Civil Engineering	G. P. Nagpur

(Member Secretary PBOS)

(Chairman PBOS)

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COURSE CURRICULUM**PROGRAMME : DIPLOMA IN CIVIL ENGINEERING****LEVEL NAME : DIVERSIFIED COURSES****COURSE CODE : CE1504****COURSE TITLE : ENVIRONMENTAL POLLUTION CONTROL****PREREQUISITE : NIL****TEACHING SCHEME: TH :02; TU :00; PR :02; TOTAL CREDITS: 04 (Hrs/Week)****(1 CREDIT = 1 CLOCK HR.)****EVALUATION SCHEME:**

MARKS	THEORY			TUTORIAL/PRACTICAL			TOTAL
	TERM EXAM	PROG TEST	TOTAL	PRACT EXAM	TERM WORK	ORAL EXAM	
MAX.	80	20	100	NIL	25@	25@	150
MIN.	32	--	40	---	10	10	--

(# - External & Internal Assessment ; @ - Internal Assessment only)**TIME ALLOTTED FOR TERM EXAM : 03 HRS.****TIME ALLOTTED FOR PROGRESSIVE TEST : 01 HR.****❖ RATIONALE :**

The basic structure of English through grammar enhances, holistic development as an individual as well as individuals role in industry. Proficiency in English language (reading, writing, speaking & listening) enables a technician to develop good rapport with others and also helps him/her in his/her professional career as well as in society throughout.

❖ OBJECTIVES :**After completing this course students will –**

- To understand the different type of pollution.
- To know the human act contributing to pollution.
- To follow the legal provision enacted in pollution control act of the stake the national level bodies.
- To enjoy the benefit of technology without suffering the evils of pollution.

❖ SKILLS :**After completing this course students will –**

1. Understand the different type of pollutant in the environment .
2. Know the human acts contributing to the pollution & its treatment provided to make the environment pollution free.
3. Know the environmental acts and its ill effect & legal provision to mitigate the pollution.

CONTENTS :**A. THEORY :**

SR. NO.	CHAPTER	MARKS	HOURS
1.	INTRODUCTION	06	02

	1.1	Impact of industrialization & modernization – Environmental pollution		
	1.2	Types of pollution- Water pollution, Air pollution, Land pollution, Noise pollution.		
	1.3	Pollution control aspect.		
2.	AIR POLLUTON			
	2.1	Causes of air pollution		
	2.2	Types of pollutant, characteristics of important air pollutant	09	03
	2.3	Effect on human Plant and animals		
	2.4	Air pollution control by zoning, use of tall stacks, using source correction method, use of controlling equipment.		
3.	WATER POLLUTION			
	3.1	Source and type.	09	04
	3.2	Effects.		
	3.3	BOD, COD		
	3.4	Advanced WW treatment.		
	3.5	Prevention and Control		
4.	SOLID WASTE			
	4.1	Classification of solid waste.	09	04
	4.2	Method of disposal		
	4.3	Biomedical waste, hazardous waste		
	4.4	Principal of solid waste management		
5.	LAND POLLUTION			
	5.1	Sources and types	09	04
	5.2	Standards, Effect		
	5.3	Prevention and control		
6.	RADIO ACTIVE POLLUTION			
	6.1	Sources	09	04
	6.2	Effect on Human, Plant and animals		
	6.3	Measure for radio active pollution		
7.	NOISE POLLUTION			
	7.1	Noise pollution and its effect.	09	03
	7.2	Sources		
	7.3	Expensive level and standard and impacts.		
	7.4	Noise control and measure		
8.	THERMAL POLLUTION			
	8.1	Source	09	04
	8.2	Effect		
	8.3	Prevention and measure		
9.	ENVIRNMENTAL PROTECTION ACT			
	9.1	Environmental Protection Act and Prevention of Water, air and noise Pollution Act.	05	02
10.	ENVIRONMENT AT EDUCATION			
	10.1	Formal and non-formal education	06	02
	10.2	Role of Govt. and Non-Govt. Organization		
	Total		80	32

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:
(Term work shall consist of following lab work/assignments/visit report. Oral is based on TW)

S.No.	Title of Practical/Lab.Work/Assignments	Hrs.
1.	Visit to different construction site's to study noise pollution and water pollution caused due to construction activity.	08
2.	Visit to sewerage treatment plant.	06
3.	Garbage disposal plant for the city and one industry prepare reports of methods adopted, problems faced by the workers, managers and human beings –residing sites.	06
4.	The problems caused by a particular industry will be taken up as a small project and the students will visit NEERI and try to suggest a scheme in consultation with scientists working at NEERI.	08
5.	Seminar on any topic of curriculum	04
	Total	32

❖ **ASSESSMENT OF LABORATORY EXPERIENCES/ASSIGNMENTS :**

Continuous assessment of Term Work and Term end oral examination.

❖ **SUGGESTED IMPLEMENTATION STRATEGIES :**

1. **Lecture method**
2. **Improved lecture method.**
3. **Q & A technique.**
4. **Demonstration**
5. **Case study**
6. **Seminars**
7. **Field visit**

❖ **SUGGESTED LEARNING RESOURCES :**

1. **PRINT :** Text books/Reference books/Manuals/Journals.
2. **NON PRINT :** CDs / PPT / Transparencies / Charts / Models

C. SPECIFICATION TABLE :

Chapter No.	Title of Chapter	Marks (1.5 x Marks allotted to chapter)	Distribution of Marks			
			Knowledge	Comprehension	Application	Total
1.	Introduction	09	04	03	02	09
2.	Air pollution	13	08	03	02	13
3.	Water pollution	14	08	03	03	14
4.	Solid waste	13	08	03	02	13
5.	Land pollution	14	08	03	03	14
6.	Radioactive pollution	13	08	03	02	13
7.	Noise pollution	14	08	03	03	14
8.	Thermal pollution	13	08	03	02	13
9.	Environmental pollution act.	8	03	02	03	08
10.	Environmental education	09	04	03	02	09
Total		120	67	29	24	120

D. REFERENCE & TEXT BOOKS:

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Air pollution	M.N. Rao, H.V.N.Rao	----
2.	Pollution control in process industries	S.P. Mahajan	----
3.	Environmental pollution	Timnay, Katyal , M. Satake	----
4.	Environmental pollution and protection	Garg Bansal Etal	----

E. LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:

S.N.	Name	Designation	Institute / Industry
1.	Mr. R. N. Giradkar	H. O. D. Civil Engg. Dept	G. P. Nagpur
2.	Mr. A. W. Pawde	Lecturer in Civil Engg.	G. P. Nagpur

(Member Secretary PBOS)

(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM**PROGRAMME : DIPLOMA IN CIVIL ENGINEERING****LEVEL NAME : DIVERSIFIED COURSES****COURSE CODE : AM 1501****COURSE TITLE FOUNDATION ENGINEERING****PREREQUISITE AM 1306****TEACHING SCHEME: TH :02; TU:00 ; PR :02; TOTAL CREDITS: 04 (Hrs/Week)****(1 CREDIT = 1 CLOCK HR.)****EVALUATION SCHEME:**

MARKS	THEORY			TUTORIAL/PRACTICAL			TOTAL
	TERM EXAM	PROG TEST	TOTAL	PRACT EXAM	TERM WORK	ORAL EXAM	
MAX.	80	20	100	NIL	25@	25@	150
MIN.	32	--	40	---	10	10	---

(# - External & Internal Assessment ; @ - Internal Assessment only)**TIME ALLOTTED FOR TERM EXAM : 03 HRS.****TIME ALLOTTED FOR PROGRESSIVE TEST : 01 HR.****❖ RATIONALE:-**

This course requires pre-requisite knowledge of the course 'Soil Mechanics'.

Supervision of earthwork in the construction of dams, roads, embankments etc. Pavements and foundation of other civil engineering structures is one of the important functions of a technician. The basic knowledge of properties of soil and its behavior is therefore essential. All the structures transmit the loads through the foundations. Therefore the knowledge of foundation is utmost important and essential.

❖ OBJECTIVE:-

The students should be able to

1. To recommend the type of foundation suitable for structure.
2. To evaluate load carrying capacity of soil using available soil properties.

❖ SKILLS:-

The students will be able to

- 1) Know the types of foundations
- 2) Understand the relevant concepts.
- 3) Use the relevant I. S. codes.
- 4) To select suitable type of foundation for different structures.

❖ CONTENTS:-

A. THEORY

SR. NO.	CHAPTER		MARKS	HOURS
1	INTRODUCTION TO FOUNDATIONS		10	04
	1.1	Definition and requirements of good foundation		
	1.2	Type of foundations		
	1.3	Requirements of satisfactory foundations		
	1.4	Minimum dimension of shallow foundations		
	1.5	Determination of depth of foundation by soil exploration, open trial pit, boring		
2	BEARING CAPACITY		15	06
	2.1	Terminology of bearing capacity of shallow foundations		
	2.2	Terzaghi's theory		
	2.3	I. S. Code equation of bearing capacity. (I.S.6403)		
	2.4	Plate load test, Standard Penetration Test		
3	SETTLEMENT OF SHALLOW FOUNDATION		15	06
	3.1	Causes of settlement and its effect. Components of total settlement		
	3.2	Terzaghi's theory of consolidation		
	3.3	Settlement limitations as per IS: 1904		
	3.4	Methods of settlement prevention, concept of ground improvement Introduction to sand piles, preloading, compaction use of geotextiles.		
4	FOUNDATION IN BLACK COTTON SOIL & PILE FOUNDATIONS		15	06
	4.1	Reasons for difficulties for foundation in Black Cotton soil		
	4.2	Types of foundation in black cotton soil, strap, raft, combined and pile foundation.		
	4.3	Classification and uses of pile foundations		
	4.4	Static analysis formula		
5	STABILITY OF SLOPES		10	05
	5.1	Different methods of determination of stability of slopes		
	5.2	Slip circle analysis		
6	SOIL STABILIZATION		10	03
	6.1	Use of sand piles, micro piles		
	6.2	Use of geosynthetics		
7	LIQUEFACTION OF GROUND DUE TO EARTHQUAKE		05	02
	7.1	Introduction to phenomena of liquefaction. Causes and ways to prevent liquefaction.		
		Total	80	32

LIST OF PRACTICALS / LABORATORY EXPERIMENTS:

B. (Term work shall consist of following lab work/assignment/visit report. Oral is based on TW)

S.No.	Title of Practical / Lab.Work / Assignments	Hrs.
1	Standard Penetration Test	03
2	Direct Shear Test	02
3	Triaxial Test	02

4	Free swell index	05
5	California Bearing Ratio	05
6	Plate Load Test	05
7	Swell Test	05
8	Minimum 02 Field / Lab. Visits	05
	Total	32

❖ **ASSESSMENT OF LABORATORY EXPERIMENTS:**

Continuous assessment of Term Work and oral examination.

❖ **SUGGESTED IMPLEMENTATION STRATEGIES :**

1. **Lecture method**
2. **Assignments**
3. **Q & A technique.**
4. **Demonstration**

❖ **SUGGESTED LEARNING RESOURCES :**

1. **PRINT** : Text books / Reference books / Manuals / Journals.
2. **NON PRINT** : CDs / PPT / Transparencies / Charts / Models

C. SPECIFICATION TABLE :

Chapter No.	Title of Chapter	Marks (1.5 x Marks allotted to chapter)	Distribution of Marks			
			Knowledge	Comprehension	Application	Total
1	Introduction to foundations	15	05	05	05	15
2	Bearing capacity	23	07	08	08	23
3	Settlement of shallow foundation	23	07	08	08	23
4	Foundation in black cotton soil & pile foundations	23	07	08	08	23
5	Stability of slopes	15	05	05	05	15
6	Soil Stabilization	15	05	05	05	15
7	Liquefaction of ground due to earthquake	08	02	03	03	08
	Total	122	38	42	42	122

D. REFERENCE & TEXT BOOKS:

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Design aids in soil Mechanics & Foundation Engg.	S. R. Kaniraj, Tata MacGraw Hill, New delhi	----
2.	Soil Mechanics & Foundation	B. C. Punmia, Laxmi	----

	Engg.	Publications	
3	Textbooks of soil Mechanics	Dr. S. B. Sehagal, Metropolitan Book Co. Pvt. Ltd.	----
4	Foundation Analysis and Design	J.E.Bowles, Tata McGraw-Hill	0079122477
5	Foundation Engineering	S. P. Brahma, Tata McGraw-Hill	----
6	Soil Mechanics & Foundation Engg.	V. N. S. Murthy, U.B.S.Publishers and distributors New Delhi	----
7	Soil Mechanics	Almsingh, CBS Publishers & Distributors, New delhi	----
8	Foundation Engineering	Dr. B. J Kasmalkar, Pune Vidyarthi Griha Prakashan, Pune	----

E. LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:

S.N.	Name	Designation	Institute / Industry
1.	Shri. Y. K. Chandarana	HOD Applied Mechanics Dept.	Govt. Polytechnic, Nagpur
2.	Shri. S. S. Dikey	Lecturer in Applied Mechanics Dept.	Govt. Polytechnic, Nagpur
3.	Shri. A. G. Bhaiswar	Lecturer in Applied Mechanics Dept.	Govt. Polytechnic, Nagpur

(Member Secretary PBOS)

(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

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COURSE CURRICULUM**PROGRAMME : DIPLOMA IN CIVIL ENGINEERING****LEVEL NAME : DIVERSIFIED COURSES****COURSE CODE : AM 1502****COURSE TITLE EARTHQUAKE ENGINEERING****PREREQUISITE AM 1305****TEACHING SCHEME: TH :02; PR :02; TOTAL CREDITS: 04 (Hrs/Week)****(1 CREDIT = 1 CLOCK HR.)****EVALUATION SCHEME:**

MARKS	THEORY	TUTORIAL/PRACTICAL			TOTAL		
	TERM EXAM	PROG TEST	TOTAL	PRACT EXAM	TERM WORK	ORAL EXAM	TOTAL
MAX.	80	20	100	NIL	25@	25@	150
MIN.	32	--	40	---	10	10	---

(# - External & Internal Assessment ; @ - Internal Assessment only)

TIME ALLOTTED FOR TERM EXAM : 03 HRS.**TIME ALLOTTED FOR PROGRESSIVE TEST : 01 HR.****❖ RATIONALE:-**

Himalayan region, Indo-Gangetic plain, Western India, Kutch & Kathiawar regions are geologically unstable parts of the country. A major part of the peninsular India experienced strong Earthquakes. Therefore the design of earth quake resistant structures taking into account seismic data from studies of the Indian Earthquakes has become essential particularly in view of the intense construction activity all over the country. To serve this purpose, the course “**Earthquake Engineering**” is being introduced for final year **Civil Engineering** Diploma students.

❖ OBJECTIVE:-

The students should be able to

- 1) To know seismic zones of India..
- 2) To understand structural and reinforcement detailing for earthquake resistant structures.
- 3) To understand magnitude and intensity of earthquake.

❖ SKILLS:-

Students will be able to-

1. Understand causes of Earthquake & principles of seismic waves.
2. Understand factors affecting damage to the Building.
3. Supervise Earthquake resistant non engineered structure.
4. Use Ductile detailing for structures.
5. Understand Retrofitting of damaged/old structures.

CONTENTS:-**B. THEORY**

SR. NO.	CHAPTER	MARKS	HOURS
1	TERMINOLOGY		
	1.1 Focus, Epicenter, Focal depth, foreshocks, aftershocks, magnitude & intensity of Earthquake		
	1.2 Natural period, fundamental natural period, nodal natural period, response spectrum, seismic mass, seismic weight, structural response factor, time history analysis, zone factor, zero period acceleration.		
	1.3 Terminology for earthquake Building—Base, base dimensions, centre of mass, centre of stiffness, design eccentricity, design seismic base shear (Vb), diaphragm, dual system, height of floor, height of structure, joint, lateral force resisting element, moment resisting frame, number of storey's (n), principal axes, P-Δ effect, shear wall, soft storey, static eccentricity, storey drift, storey shear, weak storey.	15	05
2	CAUSES, MEASUREMENT & EFFECTS OF EARTQUAKE		
	2.1 Formation of earth & its cores. Formation, types & movement of tectonic plates, Elastic rebound theory, Type of earthquake & Faults.		
	2.2 Factors affecting seismic load-Soil foundation factor Fs, Occupancy importance factor I, Stiffness & damping of structures (C).		
	2.3 Seismic Waves- Types, behavior, measurement of earthquake shaking & it's working principle, Seismogram and Accelogram & its significance.		
	2.4 Ground shaking, Ground failure, Tsunami & fire.	08	04
3	STRUCTURAL PERFORMANCE DURING EARTQUAKE		
	3.1 Factors affecting damage- Building configuration, opening size, rigidity distribution, ductility, foundation, construction quality.		
	3.2 Failure mechanism due to earthquake.- Free standing masonry walls subjected to ground motion in its own plane & out of plane, wall enclosure, Roofs & floors, long building with roof trusses.	10	04
4	GENERAL PLANNING & DESIGN ASPECTS		
	4.1 Plan of Building- symmetry, regularity, separation of blocks, simplicity, enclosed area, separate building for different functions.		
	4.2 Choice of site- Stability of slopes, loose sand.	10	05
	4.3 Structural design.		
	4.4 Requirement of structural safety.		
5	DAMAGE & COLLAPSE OF R.C.C. BUILDING		
	5.1 Sliding of roof off support, falling of infill walls, crushing of column ends, short column effect, diagonal cracking of column beam joint, pulling out of reinforcing bars, foundation sinking & tilting.		
	5.2 Care in concrete construction- measuring materials, mixing materials, formwork, placing of reinforcement, casting & compacting concrete, curing of concrete, construction joints.	12	05

6	DUCTILE DETAILING		10	03
	6.1	Sketches with reinforcement details of Columns, Beams & Beam-Column connection showing longitudinal steel, splicing of steel, transverse steel, stirrups.		
7	IS 1893 : 2002		15	06
	7.1	Assumptions in Earth quake resistant design of structures, Load combination & increase in permissible stresses.		
	7.2	Simple Numericals on-- Design horizontal seismic coefficient (A_h), Design seismic base shear (V_b), Vertical distribution of base shear to different floor levels.		
		TOTAL	80	32

B. LIST OF PRACTICALS / LABORATORY EXPERIMENTS:
(Term work shall consist of following lab work/assignment/visit report. Oral is based on TW)

S. No.	Title of Practical / Lab. Work / Assignments	Hrs.
1	Four plates on Ductile detailing	12
2	Six plates on Retrofitting of structures	12
3	Two reports on failure & damage of structures in earthquake and their retrofitting.	08
TOTAL		32

❖ **ASSESSMENT OF TERM WORK:**

Continuous assessment of Term Work and oral examination.

❖ **SUGGESTED IMPLEMENTATION STRATEGIES :**

- Lecture method**
- Assignments**
- Q & A technique.**
- Videos, photographs and reports on past earthquakes and behavior of structures during earthquake.**

❖ **SUGGESTED LEARNING RESOURCES :**

- PRINT :** Text books / Reference books / Manuals / Journals.
- NON PRINT :** CDs / PPT / Transparencies / Charts / Models

C. SPECIFICATION TABLE :

Chapter No.	Title of Chapter	Marks (1.5 x Marks allotted to chapter)	Distribution of Marks			
			Knowledge	Comprehension	Application	Total
1	Terminology	23	08	08	07	23
2	Causes, measurement & effects of E.Q.	12	04	04	04	12
3	Structural performance during E.Q.	15	05	05	05	15
4	General planning & design aspects	15	05	05	05	15
5	Damage & collapse of R.C.C. building	18	06	06	06	18

6	Ductile detailing	15	05	05	05	15
7	IS 1893 : 2002	23	08	08	07	23
	Total	121	41	41	39	121

D. REFERENCE & TEXT BOOKS:

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Design of R.C.C	B.C.Punmia	----
2.	Limit State Design	A.K.Jain	----
3.	Guide lines for Earth quake resistant Non- Engineered construction	By-NICEE	----
4.	IS 13920 : 1993	BIS	----
5.	IS 1893 : 2002	BIS	----

E. LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:

S.N.	Name	Designation	Institute / Industry
1.	Shri. Y. K. Chandarana	HOD Applied Mechanics Dept.	Govt. Polytechnic, Nagpur
2.	Shri. A. G. Bhaiswar	Lecturer in Applied Mechanics Dept.	Govt. Polytechnic, Nagpur

(Member Secretary PBOS)

(Chairman PBOS)

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM**PROGRAMME : DIPLOMA IN CIVIL ENGINEERING****LEVEL NAME : DIVERSIFIED COURSES****COURSE CODE : AM 1503****COURSE TITLE : ADVANCED CONCRETE TECHNOLOGY****PREREQUISITE : AM 1304****TEACHING SCHEME: TH :02; PR :02; TOTAL CREDITS: 04 (Hrs/Week)****(1 CREDIT = 1 CLOCK HR.)****EVALUATION SCHEME:**

MARKS	THEORY			TUTORIAL/PRACTICAL			TOTAL
	TERM EXAM	PROG TEST	TOTAL	PRACT EXAM	TERM WORK	ORAL EXAM	
MAX.	80	20	100	NIL	25@	25@	150
MIN.	32	--	40	---	10	10	---

(# - External & Internal Assessment ; @ - Internal Assessment only)

TIME ALLOTTED FOR TERM EXAM : 03 HRS.**TIME ALLOTTED FOR PROGRESSIVE TEST : 01 HR.****❖ RATIONALE:-**

Concrete is the most widely used construction material in all types of civil engineering structures. Now a days science and technology is changing rapidly. New techniques are developed in the field of concreting processes. Technicians are required to supervise these concreting processes. Therefore knowledge of these processes will give upper hand to the technicians.

❖ OBJECTIVE:-

The students should be able to

3. Develop overall understanding of advanced concreting operation.
4. Understand the working the machineries.
5. Develop supervisory skills in all advanced concreting fields.

❖ SKILLS:-

The students will be able to

1. Proportion the concrete mixes by various methods.
2. Select the proper admixture for concrete
3. Select appropriate concrete according to the nature of work and site conditions.

CONTENTS :**A. THEORY :**

SR. NO.	CHAPTER	MARKS	HOURS
1	CONCRETE MIX PROPORTIONING:	10	06

	1.1	Introduction, factors affecting choice of mix proportion.		
	1.2	Methods of concrete mix design, trial and adjustment method, ACI method, IS method, rapid method, computer aided mix design. Comparison of methods.		
	1.3	Mix design of ordinary, standard and high strength concrete. Simple numerical problems based on it.		
2	CONCRETE ADMIXTURE:		08	03
	2.1	Definition of admixtures, functions of admixtures, IS classification,		
	2.2	Types of admixtures, accelerators, retarders, air entraining and water reducing. plasticizers, super plasticizers, hyper plasticizers, special admixtures, uses of admixtures.		
3	POZZOLONIC MATERIALS (FLY ASH CONCRETE):		10	04
	3.1	Physical properties of pozzolonic materials like fly ash, rice husk ash, Metakaolin, silica fume and natural pozzolona.		
	3.2	Ecological concept behind using fly ash, advantages & disadvantages of pozzollona concrete, properties of concrete influenced by pozzolona.		
4	SPECIAL CONCRETE:		10	04
	4.1	Properties, ingredients required, advantages & disadvantages of- Light weight concrete, Lightweight aggregate concrete & foamed concrete, Autoclaved aerated concrete, No fines concrete, High strength concrete, Refractory concrete, High density & radiation shield concrete, Polymer concrete, Fibre reinforced concrete, self compacting and roller compacted concrete.		
	4.2	Applications of special concretes.		
5	READY MIXED CONCRETE:		10	03
	5.1	Definition of ready mixed concrete, types of plants, truck mixer efficiency, transit duration, effect of prolonged agitation, quality control acceptance and compliance.		
	5.1	Applications, advantages and disadvantages of RMC.		
6	PRE-CAST CONCRETE:		10	04
	6.1	Definition of precast concrete, process diagram showing manufacture of precast products, layout of plant for manufacture of precast products, review of small and large products, special formwork requirements, methods of compaction, curing and handling of components.		
	6.2	Application, advantages & disadvantages of precast concrete.		
7	PRE-STRESSED CONCRETE:		10	04
	7.1	Definition of pre-stressed concrete, concept of pre-stress, material requirement, methods of pre-stressing, losses in pre-stress, simple numericals.		
	7.2	Application, advantages & disadvantages of prestressed concrete.		
8	SPECIAL PROCESS AND TECHNOLOGY FOR PARTICULAR TYPE OF CONCRETE:		12	04
	8.1	Sprayed concrete, underwater concrete, grouts, grouting and grouted concrete, slip-form construction, pumped concrete, concrete for liquid retaining structures, vacuum process, concrete coating and surface treatments.		
TOTAL			80	32

B. LIST OF PRACTICALS/LABORATORY EXPERIMENTS:
(Term work shall consist of following lab work/assignment/visit report. Oral is based on TW)

S.No.	Title of Practical/Lab.Work/Assignments	Hrs.
1	Mix design of at least TWO grades of concrete by TWO different methods	10
2	Strength comparison of fly ash concrete & normal concrete for different proportion of fly ash (at least TWO).	12
3	Report on minimum TWO visits to 1) Ready mix concrete plant, 2) Special concreting operations, 3) Precast concrete unit.	10
	TOTAL	32

❖ **ASSESSMENT OF LABORATORY EXPERIMENTS:**

Continuous assessment of Term Work and oral examination.

❖ **SUGGESTED IMPLEMENTATION STRATEGIES :**

1. **Lecture method**
2. **Assignments**
3. **Q & A technique.**
4. **Demonstration**

SUGGESTED LEARNING RESOURCES :

1. **PRINT :** Text books/Reference books/Manuals/Journals.
2. **NON PRINT :** CDs / PPT / Transperencies / Charts / Models

C. SPECIFICATION TABLE :

Chapter No.	Title of Chapter	Marks (1.5 x Marks allotted to chapter)	Distribution of Marks			
			Knowledge	Comprehension	Application	Total
1.	Concrete mix design.	15	4	3	8	15
2.	Concrete admixture	12	4	4	4	12
3.	Pozzolonic materials (fly ash concrete)	15	4	3	8	15
4.	Special concrete	15	4	3	8	15
5.	Ready mix concrete	15	4	3	8	15
6.	Pre-cast concrete	15	4	3	8	15
7.	Pre-stressed concrete	15	4	3	8	15
8.	Special	18	6	4	8	18

	processes and technology for particular type of concrete					
Total		120				120

D. REFERENCE & TEXT BOOKS:

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Advanced concrete technology Vol I ,II, III & IV	John Newman Pub. Butterworth Heinemann U.K.	----
2.	Concrete Technology (4 th Edition)	M.L. Gambhir Pub. Tata McGraw-Hill, New Delhi.	----
3	Concrete Technology	M.S. Shetty Pub. S. Chand & Company.	----
4	Concrete, Properties Microstructure & Materials	P.k.Meheta & Poul Montiero. Pub. Indian Concrete Institute Chennai.	----

E. LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:

S.N.	Name	Designation	Institute / Industry
1.	Y. K. CHANDARANA	HOD Applied Mechanics Dept.	Govt. Polytechnic, Nagpur
2.	A. G. BHAISWAR	Lecturer in Applied Mechanics Dept.	Govt. Polytechnic, Nagpur

(Member Secretary PBOS)

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