DIRECTORATE OF TECHNICAL EDUCATION, KAHILIPARA, GUWAHATI-19

DIPLOMA PROGRAMME IN

CIVIL ENGINEERING

NEW SYLLABUS

FIFTH SEMESTER
CIVIL ENGINEERING

COURSE STRUCTURE OF CIVIL ENGINEERING 5th SEMESTER

Subject Code	Subject	Study Scheme (contact hour/week)			Evaluation Scheme									Total Mark (Th+Pr)	Credit
					Theory					Practical					
		L	T	P	ESE	Sessional (SS)			Pass (ESE+SS)	PT	PA	Pass mark(PT+PA)			
						TA	HA	Total(TA+HA)							
CV-501	Advanced Surveying	3	-	3	70	10	20	30	33	50	50	33		200	4
CV-502	Transportation Engg	3	-	3	70	10	20	30	33	25	25	17		150	4
CV-503	Design of RCC Structure	4	-	2	70	10	20	30	33					100	5
CV-504	Geotechnical & Foundation Engg	3	-	3	70	10	20	30	33	25	25	17		150	4
CV-505	Advance Building Construction & Earthquake Resistant Technology	3	-		70	10	20	30	33					100	3
CV-510	Professional Practice-III	1		2										50	2
OPTIONAL (ANY ONE)															
CV-506	Green Building	3			70	10	20	30	33					100	3
CV-507	Architectural Practices and Interior Deign	3			70	10	20	30	33					100	3
CV-508	Construction Technique & Equipment	3			70	10	20	30	33					100	3
Total		20		13											
		33											Grand Total =	850	25

Variations :- Surveying-II has been renamed as Advanced Surveying as because some advance and modern topics has been included in new syllabus.. Structural Design & drawing(RCC) has been renamed as Design of RCC Structure. Geotechnical Engineering has been renamed as Geotechnical Engineering & Foundation Engg as because some content of foundation has been added in the new syllabus. Advanced Building Construction & Earthquake Engg has been renamed as Advanced Building Construction & Earthquake Resistant Technology as because some topics related to earthquake resistant technology has been added. Three new subjects namely Green Building and Architectural practices and interior design and Construction Technique & Equipment are added as optional subjects. Content of almost all subjects have been modified

1. Course Title :- ADVANCED SURVEYING

1. Course Code :- CV-501
2. Semester :- 5th (Civil)
3. Objective of the Subject/ Courses :-

   On completion of the course, the student will be able to:

- Record the data in field book and plot the collected data.
- Find out the vertical and horizontal distances with a tachometer.
- Set out simple curve using theodolite and chain and tape.
- Prepare contour map and Compute area and volume from a given contour map
- Use of modern survey equipment- micro optic theodolite and EDM
- Apply principle of surveying and levelling for civil engineering works.

Pre-requisite:-

- Student should be perfect in drawing and sketching.
- Students should also know the basic principle and purpose of surveying.

COURSE OUTCOME (CO)

After the completion of this subject, the students will be able to:

- Use the surveying instruments like level, plane table and theodolite.
- Set out simple curves using theodolite, chain and tape.
- Find out the vertical and horizontal distances with a tacheometer.
- Use modern survey equipment like EDM.
- Describe the features of Electronic digital theodolite.
- Understand the basic principles of Total station, GPS, GIS and Remote Sensing.
- Apply principle of surveying and levelling for civil engineering works.

INTENDED LEARNING OUTCOME (ILO)

CHAPTER TITLE	After the completion of the chapter, the students will learn
Contouring	➢ Define contouring ➢ Use and handling of levels ➢ Explain the RL ➢ Methods of determining RL ➢ Curvature and refraction correction ➢ Use of contour ➢ Preparation of contour map ➢ computation of volume of earthwork and capacity of a reservoir
Theodolite surveying	➢ Difference between transit and non-transit theodolite ➢ Temporary adjustment, fundamental lines and permanent adjustment of theodolite ➢ Measurement of horizontal angle, vertical angle, interior and exterior angles, magnetic bearings of line, prolonging a line, direct angle and deflection angle ➢ Theodolite traversing by included angle, direct angle and deflection angle ➢ Traverse computation, latitudes and departures, consecutive co-ordinates and independent co-ordinates ➢ Computation of area of the traverse by various methods ➢ Balancing of traverse. ➢ Numerical problems related to theodolites
Curves	➢ Definitions and notations of different types of curves, designation of curve, elements of simple curve and uses of curves ➢ Setting out of simple curves by various methods ➢ Basic ideas of transition curves and vertical curves ➢ Numerical problems related to curves

Tacheometry survey	➢ Principle of tacheometry ➢ Essential requirements of tacheometry. ➢ Use of a theodolite as a tacheometer with staff held in vertical and fixed hair method ➢ Determination of tacheometric constants ➢ Simple numerical problems related to tacheometers
Modern method of surveying	➢ Principle, components, functions and uses of EDM ➢ Electronic digital theodolite and its features ➢ Introduction to Total station ➢ Introduction to GPS ➢ Introduction to GIS and Remote Sensing

4. Teaching Scheme (in hours/week)

Lecture	Tutorial	Practical	Total
3		3	6

5. Examination Scheme :-

Theory			Pass marks (ESE+SS)	Practical		Pass marks (PT+PA)	Total marks (Th+ Pr)	Credit
ESE	Sessional (SS)			PT	PA			
	TA	HA						
70	10	20	33/100	50	50	33/100	200	4

6. Detail course content

Chapter No	Chapter Title	Content	Duration (in hours)
1	**Contouring**	➢ Contour and contouring, contour interval and horizontal equivalence. ➢ Characteristics of contours ➢ Uses of contours ➢ Different methods of contouring and	7

		interpolation of contour ➢ Preparing and use of contour maps, computation of volume of earthwork and capacity of a reservoir, numerical problems	
2	**Theodolite surveying**	➢ Transit and non transit theodolite, terminology. ➢ Temporary adjustment, fundamental lines and permanent adjustment. ➢ Measurement of horizontal angle, vertical angle, interior and exterior angle,s, magnetic bearings of line, prolonging a line, direct angle and deflection angle. ➢ Theodolite traversing by included angle, direct angle and deflection angle. ➢ Traverse computation, latitudes and departures, consecutive co-ordinates and independent co-ordinates, ➢ Computation of area of the traverse by various methods. ➢ Balancing of traverse. ➢ Numerical problems related to theodolites.	13
3	**Curves**	➢ Definitions and notations, types of curves, designation of curve, elements of simple curve, uses of curves. ➢ Setting out of simple curves by various methods. ➢ Basic ideas of transition curves and	8

		vertical curves. ➢ Numerical problems related to curves.	
4	**Tacheometry survey**	➢ Principle of tacheometry. ➢ Essential requirement of tacheometry. ➢ Use of a theodolite as a tacheometer.with staff held in vertical and fixed hair method (no derivation) ➢ Determination of tacheometric constants. ➢ Simple numerical problems.	5
5	**Modern method of surveying**	➢ EDM: Principle, component, function and uses. ➢ Electronic digital theodolite and its features. ➢ Introduction to Total station. ➢ Introduction to GPS ➢ Introduction to GIS and Remote Sensing	5
6	**Revision/ Class test/ Seminar**	Thorough discussion on all topics after finishing the courses. At least two class test and a seminar should be taken for internal assessment	7

7. **Distribution of marks**

Chapter No	Chapter Title	Type of Question		Total Marks
		Objective Type (Compulsory)	Short/Descriptive Questions	
1	**Contouring**	5	10	15

2	**Theodolite surveying**	6	14	20
3	**Curves**	6	10	16
4	**Tacheometry survey**	3	7	10
5	**Modern method of surveying**	5	4	9
Total		25	45	70

8. Table of Specification for Theory (ADVANCED SURVEYING)

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Contouring	7	16	2	1	4	-
2	Theodolite surveying	13	29	3	3	7	-
3	Curves	8	17	3	2	3	-
4	Tacheometry survey	5	11	2	1	2	-
5	Modern method of surveying	5	11	1	1	3	-
6	Internal assesment	7	16				-
							-
		∑b=38 hrs+ 7hrs internal assessment	100				-

9. Details Table of Specification for Theory

Sl no	Topic	OBJECTIVE TYPE				SHORT/ DESCRIPTIVE ANSWER TYPE				
		K	C	A	***T***	K	C	A	HA	***T***
1	Contouring	2	1	2	***5***	3	3	4		***10***
2	Theodolite surveying	2	1	3	***6***	4	3	7		***14***
3	Curves	2	1	3	***6***	3	2	5		***10***
4	Tacheometry survey	1	1	1	***3***	2	2	3	-	***7***
5	Modern method of surveying	2	2	1	***5***	2	2			***4***
6	Internal assessment									
7										
8										
9										
10										
					25					***45***

K = knowledge; C= comprehension; A= Application ; HA= Higher than application

10. Suggested Implementation Strategies:- :- Teacher will use Black board, OHP, Smart board, video etc for effective teaching learning process .

11. Text books:

Titles of the book	Name of author	NAME OF PUBLISHER
Surveying and leveling Part I & II	T.P.Kanetkar and S.V. Kulkarni	Pune VidyarthiGrihaPrakashan
Surveying and leveling Vol. I & II	Dr. B.C. Punmia	Laxmi Publication
Plane Surveying	A.M.Chandra	New Age International Publishers
Surveying & Levelling	N NBasak	Mcgraw Higher Ed

Surveying	S K Duggal	Mcgraw Higher Ed
Advanced Surveying (Total stn, GIS, Remote Sensing)	SatheesGopi N Madhu	Pearson

QUESTION PATTERN

1. The question pattern will be as per the instruction of SCTE or as per existing rules.
2. The objective type questions may be in the form of multiple choice, fill up the blanks, true or false or very short answer type

N.B:- Optional question (if any)may be of same topic in the form of either or type like below

Explain briefly the temporary adjustment of theodolite

OR

Explain briefly the permanent adjustment of theodolite.

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1: Course Title: ADVANCED SURVEYING PRACTICAL

Marks :- Practical =50 Sessional = 50 Total= 100

SKILLS TO BE DEVELOPED:

***INTELLECTUAL SKILL**:*

1) Identify the components of plane table, theodolite, and advanced survey instruments.
2) Know the working principles of these survey instruments.
3) Finding the horizontal and vertical distances.
4) Identifying errors in setting out curve and tabulating elements of a curve.

MOTOR SKILLS:

1) Taking and recording the observation in the field book.
2) Preparing drawings, maps etc. with the observed data.
3) Setting out curve for the given alignment.
4) Use Micro optic theodolite, EDM, Total Station, Digital theodolite for finding different parameters.

Instructions:-

1) Group size for Practical work should be limited to maximum 6 Students.
2) Each student from the group should handle the instrument to understand. the function of different components and use of the instrument.
3) Drawing, plotting should be considered as part of practical.
4) One full day per project is required for carrying out project work, which is to be plotted on a drawing sheet.
5) **TERM WORK** SHOULD CONSIST OF RECORD OF ALL PRACTICALS AND PROJECTS, IN FIELD BOOK AND
DRAWING SHEETS FOR THE GIVEN PROJECTS.

UNIT	TOPIC	HOUR
1	Plane table Survey :-1. Locating details by radiation and intersection method. 2. Locating details of building, road by radiation and intersection method.	06

2	Theodolite Survey 1. Handling of theodolite, Setting up at Station, Temporary adjustment 2. Measurement of horizontal and vertical angle 3. Measurement of deflection angle. 3. Closed traversing of a plot 4. To set a straight line.	14
3	To find Reduced levels & horizontal distance using theodolite as a Tacheometer.	03
4	To find constant of a given Tacheometer.	06
5	. Setting out simple circular curve by Rankine's method of Deflection angles of a given problem & plotting details of curve	06
6	Handling of a total station & GPS	05
7	Handling and use of Digital Theodolite	05

Note: video cassettes or cd's of below experiments developed by NITTTR (if available) shall be shown to the students on T. V. / L.C.D. projector prior to the conductance of above experiments.

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2. Course Title : TRANSPORTATION ENGINEERING

1. Course Code :- CV-502

1. Semester :- 5th (Civil)
2. COURSE OUTCOME (CO) :-

On completion of the course, the student will be able to:

- Explain the various stages of work for highway alignment.
- Able to design road and interpret the relevant IRC codes and highway project drawings.
- Organize and supervise road projects.
- Identify the suitability of road materials.
- Carry out traffic volume study.
- Organize and coordinate road repairing and maintenance job.

CO	ILO
CO-1 Explain the various stages of work for highway alignment.	1 . Explain the importance of road in India 2 . State the history of road and Road development in India 3 . Classify of roads according to Nagpur Plan and Third development plan . 4 . Explain the IRC specification of roads. 5 . Prepare a road project 6 . Explain and implement the various stages of highway alignment and construction
CO-2 Able to design road and interpret the relevant IRC codes and highway project drawings	1 . Draw road cross sections in embankment and in cutting. 2 . Explain the Cross sectional elements- right of way, boundary line, Building line, control line, carriage way, shoulder, berm. Recommended land width for different classes of roads. Recommended speeds. 3 . Explain Width of roadway for single lane and Two lanes roads in a) Plain and rolling terrain and b) mountainous and steep terrain. Width of carriage way. 4. Explain and design Pavement camber or cross fall (objects and methods), recommended values of camber for different types of roads.

	5 . Explain and design Gradient, classifications of gradients, IRC specification on gradients for roads in different terrain, grade compensation at curves in hill roads. 6 . State Super Elevation, objects, derivation of formula and related problems, Methods of providing Super-elevation
CO-3 Organize and supervise road projects.	1 . Estimate the quantity of materials required in road construction 2. Organize the labour related to the road construction 3 . Supervise the project 4 . Maintain the quality of construction
CO-4 Identify the suitability of road materials.	1 .Explain th types of road material. 2 . Judge the quality of materials in the site 3 . Test the quality of materials and judge its suitability 4 . Perform various test on aggregates like CBR, Impact , Los Angles Abrasion, Water absorption etc and interpret the results.
CO-5 Carry out traffic volume study.	1 . State different traffic control devices 2 . Explain and identify the different road signs 3 . Explain the necessity of traffic island 4 . State road signals and marking 5 . Study the traffic volume.
CO-6 Organize and coordinate road repairing and maintenance job.	1 . Explain the Necessities of maintenance of road 2 . State the Types of maintenance and their operation Maintenance of WBM 3 . Explain the maintenance of Bituminous and cement concrete road. 4 . Estimate the cost of maintenance 5 . State the condition of road surface 6 . Supervise the maintenance work

3. Teaching Scheme (in hours/week)

Lecture	Tutorial	Practical	Total
3		3	6

4. Examination Scheme :-

Theory			Pass marks (ESE+SS)	Practical		Pass marks (PT+PA)	Total marks (Th+ Pr)	Credit
ESE	Sessional (SS)			PT	PA			
	TA	HA						
70	10	20	33/100	25	25	17/50	150	4

5. Course content

unit	Topic	Contact hr
1	**Introduction:** Importance of road in India ;History of road and Road development in India ;Classification of roads according to Nagpur Plan and Third development plan ;Classification of urban roads as per IRC; IRC specification of roads.	**2 hours**
2	**Investigation for road project :** Reconnaissance, Preliminary and location survey for a road project. Detailed Survey for cross drainage L sections and C/S Fixing the alignment of road, factors affecting alignment of road. land acquisition plan; Survey for availability of construction material.	**3 hours**
3	**Geometric Design of Highway:** Road cross sections in embankment and in cutting. Cross sectional elements- right of way, boundary line, Building line, control line, carriage way, shoulder, berm. Recommended land width for different classes of roads. Recommended speeds. Width of roadway for single lane and Two lanes roads in a) Plain and rolling terrain and b) mountainous and steep terrain. Width of carriage way.	**10 hours**

	Pavement camber or cross fall (objects and methods), recommended values of camber for different types of roads. Gradient, classifications of gradients, IRC specification on gradients for roads in different terrain, grade compensation at curves in hill roads. Super Elevation- objects, derivation of formula and related problems, Methods of providing Super-elevation Transition curve, objects of providing transition curves, types of curves used, factors affecting lengths of transition curve. Widening of pavement on curve- its necessity and method of providing it. Vertical curve summit curve and valley curve. Sight distance, perception time, brake reaction time, lag time, lag distance, braking distance. Types of sight distance- stopping site distance, intermediate sight distance and overlooking sight distance.	
4	**Construction of Road Pavements and Materials**: Types of road material and Test: Soil, Bitumen, Cement Concrete. Test on soil sub grade: CBR test, Test on aggregate: Los angles Abrasion test, Impact and shape test. Test on bitumen: Penetration, Ductility and softening point test. Pavement- Objective of pavement, structure of pavement, function of pavement components, types of pavement. Water bound Macadam Roads – Definitions, materials, procedure of construction, advantage and disadvantages, quantity estimate. Bituminous Materials- i) bitumen, asphalt and Tar ii) source of bitumen, iii) Types of bitumen- straight run, oxidized, cut back, emulsion and Primer, iv)Types of Tar. Bituminous road construction- Types- i) surface dressing(single coat & two coats)- functions, materials, construction, quantities of materials ii) grouting(semi grout and full grout)- functions, materials, construction and quantities of materials, iii) premix type (premix chipping carpet, premix macadam and premix concrete)- function, materials, construction and quantities of materials, related machineries and plants. Pavement distress- nature, causes and remedies. Cement concrete roads- i) advantages and disadvantages ii) comparisons between bituminous and cement concrete pavements, iii) pavement joint-	**11 hours**

	necessity, types, joint sealer, joint filler, dowel bar, mud pumping.	
5	**Traffic Engineering:** Traffic volume study Traffic control devices- road signs, marking, signals, Traffic Island. Road Intersections- intersection at grades and grade separator intersections.	**3 hours**
6	**Hill Roads:** Parts and functions of hill road. Components, types of curves, Hill road formation; Section of hill roads.	**2 Hours**
7	**Drainage of roads:** Surface drainage- side gutter, catch water drains, surface drainage, necessity. Sub surface drainage- necessity, longitudinal and cross drains	**2 Hours**
8	**Maintenance and repair of roads :** Necessities of maintenance of road; Types of maintenance and their operation Maintenance of WBM, Bituminous and cement concrete road.	**2 hours**
9	**Introduction to Airport Engineering :** Introduction & Role of Civil Engineer. Terminology. Layout of airport & function of different units. Airport Grading and Drainage	**3 hours**
10	Revision/ Class test/ Seminar Thorough discussion on all topics after finishing the courses. At least two class test and a seminar should be taken for internal assessment	**6**

6. **Distribution of marks:-**

Chapter No	Chapter Title	Type of Question		Total Marks
		Objective Type (Compulsory)	Short/ Descriptive Questions	
1	Introduction	2		2
2	Investigation for road project	4		4

3	Geometric Design of Highway	5	12	17
4	Construction of Road Pavements and Materials	4	12	16
5	Traffic Engineering	4	6	10
6 & 7	Hill Roads and drainage of road	4	6	10
8 & 9	Maintenance and repair of roads & Introduction to Airport Engineering	2	9	11
Total		25	45	70

9.0 Table of Specification for Theory (TRANSPORTATION ENGINEERING)

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Introduction	2	5	1	1		-
2	Investigation for road project	3	7	1	2		-
3	Geometric Design of highway	10	22	2	3	5	-
4	Construction of road pavements and materials	11	24	2	4	5	-
5	Traffic Engineering	3	7	1	1	1	-
6	Hill Road	2	5	1		1	-
7	Drainage of Roads	2	5	1		1	-
8	Maintenance and repair of roads	2	5	1		1	
9		Introduction to Airport Engineering	3	7	1	1	1

10		Internal assessment	6	13			
			∑b=38 hrs+ 6hrs internal assessment	100			

10. Details Table of Specification for Theory

Sl no	Topic	OBJECTIVE TYPE				SHORT/ DESCRIPTIVE ANSWER TYPE				
		K	C	A	***T***	K	C	A	HA	***T***
1	Introduction	1	1		***2***					
2	Investigation for road project	2	2		***4***					
3	Geometric design of highway	2	1	2	***5***	2	3	7		***12***
4	Construction of road pavements and materials	2	1	1	***4***	3	2	7	-	***12***
5	Traffic Engineering	2	1	1	***4***	2	1	3		***6***
6& 7	Hill roads & Drainage road	2	1	1	***4***	2	1	3		***6***
8& 9	Maintenance and repair of roads & Introduction to Airport	1	1		***2***	2	2	5		***9***
					25					***45***

K = knowledge; C= comprehension; A= Application ; HA= Higher than application

11. Suggested Implementation Strategies:- :- Teacher will use Black board, OHP, Smart board, video etc for effective teaching learning process .

12. Books:

1. Highway Engineering by Khanna & Justo
2. Transportation engineering by Vazirani&Chandola
3. Road, railways and Bridges by Birdi& Ahuja
4. International Codes IRC 36 – 1970, IRC 16 –1965, IRC 20 -1966

QUESTION PATTERN

1. The question pattern will be as per the instruction of SCTE or as per existing rules.

2. The objective type questions may be in the form of multiple choice, fill up the blanks, true or false or very short answer type

N.B:- Optional question may be of same topic in the form of either or type like below

Explain briefly the CBR test

OR

Explain briefly the Impact test.

xxxxxxxxxxxxxxxxxxxxxx

2:COURSE Title: TRANSPORTATION ENGINEERING PRACTICAL

Marks Practical =25 Sessional=25

Practical

Skills to be developed:

INTELLECTUAL SKILLS:

a. Identify properties and qualities of road materials.

b. Interpret test results.

c. Follow IS procedure of testing.

MOTOR SKILLS:

a. Measure the quantities accurately.

b. Handle the instruments carefully.

Instructions:

Group size for a particular job be restricted within 3 students.

Laboratory sheet is to be submitted immediately after the end of each practical.

Following laboratory are tests to be carried out during the semester.

1. Determination of California Bearing ratio of the sub grade soil
2. Determination of Penetration values of Bitumen
3. Determination of softening point of Bitumen
4. Determination of ductility of bitumen
5. Determination of viscosity of tar/ bitumen.
6. Determination of elongation and flakiness index of road aggregate.
7. Determination of impact value and crushing value of road. aggregate.
8. Determination of abrasion value of road aggregate.

Note: video cassettes or cd's of below experiments developed by NITTTR (ifavailable) shall be shown to the students on T. V. / L.C.D. projector prior to theconductance of above experiments

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3. Course Title : DESIGN OF RCC STRUCTURES (duration of Exam= 4 hrs)

2. Course Code: : Cv-503
3. Semester : Fifth
4. Objective of the subject/ Course : Design of RCC structures presents the concept of design and drawing of RCC elements to decide the size, amount of reinforcement required and check whether the adopted section will perform safely and satisfactorily during the intended life.

COURSE OUTCOME AND INTENDED LEARNING OUTCOMES

COURSE OBJECTIVES	**INTENDED LEARNING OUTCOMES** (***After attending the course the students will be able to***…….)	Associated Skill
To make the students familiar with the properties of P.C.C and R.C.C	Define P.C.C and R.C.C	remember
	Differentiate between PCC and RCC	analyse
	Identify situations where PCC and RCC are used	analyze
	State the permissible stresses of construction materials.	understand
To understand the concept of Limit State Design in RCC	Define each types of Limit States	remember
	List the points of difference s between LSD and WSM design	remember
	State the FOS adopted for Material and Loads	understand
	Measure the characteristic strength from a set of strength data of construction materials	evaluate
	State types of loads on a structure.	understand
To familiarize the design considerations of RCC structure	Label the effective depth, neutral axis, concrete cover, Lever arm, effective span for beams and slab.	apply
	Derive expressions for compressive and Tensile forces and ultimate moment capacity of a flexural member.	create
	justify the benefit of LSM over WSM in a flexural member.	evaluate
	Pick appropriate clauses relevant to effective depth,	apply

	effective span, control of deflection etc. from IS :456-2000	
	Link concrete cover with durability of Reinforced cement concrete	apply
To be able to analyze and Design RCC beams as per IS:456-2000	Classify under reinforced, Over Reinforced and balanced Sections.	analyze
	Choose the relevant clauses of IS: 456-2000 in analysis of RCC beams.	apply
	Asses the situations for singly reinforced and doubly reinforced sections.	evaluate
	Relate Ultimate Moment capacity, Shear capacity with BM and Shear force respectively for simply supported beams, cantilever beams, Tee beams, L Beams.	apply
	Analyze and design reinforced concrete flexural Members like beams and slabs.	evaluate
	Integrate the design outcomes in drawings.	create
	Modify sections as per situational demand.	create
To be equipped with the knowledge of shear stress and bond stress and codal provision of safety against them	Analyze and Design for vertical and horizontal shear in RCC	evaluate
	Calculate and apply development lengths for compressions and tension reinforcement.	apply
	Organize bar curtailments in beams as per codal provisions.	create
	Calculate anchorage value for tensile reinforcement in beams.	apply
	Compose Limit sate of Collapse and Limit state of Serviceability in a complete beam design problem.	create
To be able to perform analysis and design of RCC slab	Explain One way, Two way and Flat slab	remember
	Describe the behavior of One way and Two slab under transverse loading.	understand
	Analyze and design one way and two way reinforced concrete slab	analyze

	Sketch the reinforcement patterns in one way and two way slabs	apply
	Check limit state of serviceability for slab.	analyze
To be able to perform analysis and design of Column	Define Long column and short column.	remember
	Explain the importance of slenderness ratio for compression member	apply
	Calculate the effective length of column from end conditions	analyze
	Analyze and design of short axially loaded square, rectangular and circular column.	analyze
	Draw the detailed drawing using the design outcomes.	apply
To be able to perform analysis and design of Column footing.	State the types of footing and their selection criteria.	remember
	Calculate the soil pressure under footing with the knowledge of bearing capacity	apply
	Perform structural design of isolated footing for BM, One way shear, Punching shear.	analyze
	Draw the detailed drawing using the design outcomes	apply
To develop concept of Pre Stressed Concrete	Define pre stressed concrete.	remember
	Differentiate Pre Stressed concrete from RCC	understand
	State the advantage and disadvantage of pre stressed concrete.	understand
	Illustrate the method of pre tensioning and post tensioning.	understand

5. Teaching Scheme (In hours)

Lecture	Tutorial	Practical	Total
4		---	4

6. Examination Scheme:

Theory			Pass marks (ESE+SS)	Practical		Pass marks (PT+PA)	Total marks (Th+ Pr)	Credit
ESE	Sessional (SS)			PT	PA			
	TA	HA						
70	10	20	33/100				100	5

7. Detailed of Course Content:

Chapter No.	Chapter Title	Content	Duration (Hrs)
1.	**Properties of Concrete and steel**		2
		Function of concrete and steel in R.C.C., Difference between P.C.C. and R.C.C.; Types of bars, available bar diameter, properties of steel, Grades of concrete and steel, Permissible stresses and related terms	
2.	**Fundamentals of Limit State Method**		3
		Method of design- brief description of Limit state method, working stress method and Method based on experimental approach (as per IS-456-2000). Principle and types of limit states , Assumptions and stress block parameters, Comparison of Limit state method and working stress method, Characteristic strength and loads, Design loads, partial safety factors, Different types of loads as per IS 875.	
3.	**General design considerations (IS:456-2000)**		2
		Familiarization with IS:456-2000, Effective depth, depth of neutral axis, lever arm, effective span, nominal cover, minimum and maximum reinforcement, Control of deflection,	
4.	**Reinforced Concrete beams**		14
	4.1	Under reinforced, balanced and over reinforced section, singly reinforced and doubly reinforced sections, necessity of doubly	

		reinforced sections, types of beams, only basic concept of T and L- beams. Basic concept of cantilever beam.	
	4.2	Calculation of Moment of resistance of singly reinforced sections (only simply supported Rectangular sections)	
	4.3	Design for size and area of steel of singly reinforced section and detailing. (only simply supported Rectangular sections)	
	4.4	Calculation of Moment of resistance of doubly reinforced sections(only simply supported Rectangular sections)	
	4.5	Design for size and area of steel of doubly reinforced sections and detailing(only simply supported Rectangular sections)	
5.	**Limit state of collapse –Shear and Bond**		6
	5.1	Necessity of shear reinforcement, Nominal and permissible shear stress, shear reinforcement: vertical stirrups, lateral ties, bond stress, development length, lap length, curtailment of bars, anchoring of bars (only brief description of all above)	
	5.2	Design of shear reinforcement as per IS:456-2000	
6.	**Reinforced Concrete Slabs (only** simply supported)		12
	6.1	Brief description of One way and two way slab.	
	6.2	Design for size and area of steel of one way slab and detailing	
	6.3	Design for size and area of steel of two way slab and detailing	
7.	**Reinforced Concrete Column (only** short and axially loaded column)		8
		Long and short column, slenderness ratio, design and drawing of only axially loaded short square, rectangular and circular column.	
8.	**Design of footings**		8
		Types of footings, Safe bearing capacity of soil, Design and detailing of square and rectangular isolated footing of uniform thickness	
9.	**Basic concept of Pre stressed concrete**		2
		Definition, principle, advantages and disadvantages of pre stressed concrete, Materials used in pre stressed concrete, Methods of pre stressing- pre tensioning and post tensioning , tendons **(No Numerical)**	
9.	**Class Test**		3

8. Distribution of Marks:

Chapter No.	Chapter Title	Type of question		Total Marks
		Objective type (Compulsory)	Short/Descriptive Questions	
1.	Properties of Concrete and steel	3	--	3
2.	Fundamentals of Limit State Method	4	--	4
3.	General design considerations (IS:456-2000)	3	--	3
4.	Reinforced Concrete beams	5	10	15
5.	Limit state of collapse –Shear and Bond	--	5	5
6.	Reinforced Concrete Slabs	2	10	12
7.	Reinforced Concrete Column	4	10	14
9.	Basic concept of Pre stressed concrete	2	--	2
	Total	25	45	70

9.0 Table of Specification for Theory (DESIGN OF RCC STRUCTURE)

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Properties of concrete and steel	2	3	1	1		-
2	Fundamentals of limit state method	3	6	2	1		-

3	General design consideration(IS:456-2000)	2	3	1		1	-
4	Reinforced concrete beams	14	23	3	2	9	-
5	Limit state of collapse –Shear and bond	6	10	2	1	3	-
6	Reinforced concrete slabs(only simply supported)	12	20	1	3	8	-
7	Reinforced concrete column(only short and axially loaded column)	8	13	2	2	4	-
8	Design of footings	8	13	2	2	4	
9	Basic concept of pre-stressed concrete	2	3	1	1		
10	Internal assessment	3	6				
		∑b=57 hrs and 3 hrs internal assessment	100				-

10.Details Table of Specification for Theory

Sl no	Topic	OBJECTIVE TYPE				SHORT/ DESCRIPTIVE ANSWER TYPE				
		K	C	A	***T***	K	C	A	HA	***T***
1	Properties of concrete and steel	2	1		***3***					-
2	Fundamentals of limit state method	2	1	1	***4***					-
3	General design consideration(IS:456-2000)	1	1	1	***3***					-
4	Reinforced concrete beams	1	1	3	***5***	2	2	6		***10***
5	Limit state of collapse –Shear and bond				-	1	1	3		***5***
6	Reinforced concrete slabs(only simply supported)	1	1		***2***	2	2	6		***10***
7	Reinforced concrete column(only short and axially loaded column	1	1	2	***4***	2	2	6		***10***
8	Design of footings	1		1	***2***	2	3	5		***10***
9	Basic concept of pre-stressed concrete	1	1		***2***					-
10	Internal assessment				-					-
					25					***45***

K = knowledge; C= comprehension; A= Application ; HA= Higher than application

N.B :-

1. The question pattern will be as per the instruction of SCTE or as per existing rules.

2. The objective type questions may be in the form of multiple choice, fill up the blanks, true or false or very short answer type

11. Suggested Implementation Strategies:-

a) All the design should be in Limit state method.

b) The structural detailing should be drawn in the answer script itself (No need of separate drawing sheet).

c) The duration of each class should not be more than 2hrs.

d)

12. Suggested Learning Resource: -

Teacher will use Black board, OHP, Smart board, video etc for effective teaching learning process. Models of various RCC elements with reinforcement detailing should be shown for better understanding and concept.

RECOMMENDED BOOKS

1. Reinforecd Concrete- Limit State Design- Ashok K. Jain
2. R.C.C. Design and Drawing- Neelam Sharma
3. Structural design and drawing- N. Krishna Raju
4. Prestressed Concrete- Krishna Raju
5. IS:456-2000: code of practice for plain and reinforced concrete
6. IS:875-1987: code of practice for design loads
7. SP 34 handbook on concrete reinforcement and detailing
8. IS: 13920-1993: Ductile detailing of reinforced concrete structures subjected to seismic forces-code of practice

(***Answer should be done only on answer script. No drawing sheet shall be supplied. Exam should be conducted in Class room instead of drawing hall)***

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

4: Course Title :- GEO TECHNICAL & FOUNDATION ENGINEERING

(Duration of Exam= 3 hrs)

2. Course Code :- CV-504
3. Semester :- 5th (Civil)
4. COURSE OUTCOME (CO)

On completion of the course, the student will be able to:

a	Explain soil as three phase system and establish relationship between properties of soil
b	Determine properties of soil by following standard test., procedure and plot particle size distribution curve
c	Determine permeability by constant head and falling head test using Darcy's Law
d	Obtain OMC & MDD for any soil sample by performing Proctor Compaction test
e	Calculate shear strength of soil, and bearing capacity of soil
f	Collect soil samples in field and test in the laboratory

INTENDED LEARNING OUTCOME (ILO)

CHAPTER TITLE	After the completion of the chapter, the students will learn
Introduction	➢ IS definition of soil ➢ Importance of soil studies in civil engineering as construction material and as foundation bed for structures ➢ Process of formation of soil and different types of soil on the basis of process of formation ➢ Soil map of India
Properties of soil	➢ Soil as a three phase system ➢ Concept of water content and determination of water content by oven drying method as per IS code.

	➢ Definitions of void ratio, porosity and degree of saturation, density index, unit weight of soil mass – bulk unit weight, dry unit weight, unit weight of solids, saturated unit weight, submerged unit weight ➢ Determination of bulk unit weight and dry unit weight by core cutter method and sand replacement method as per IS code ➢ Definition of specific gravity and its determination by pycnometer. ➢ Inter relationship between void ratio, porosity, specific gravity, water content, degree of saturation, unit weight, dry unit weight etc. ➢ Simple numerical problems related to index properties of soil ➢ Consistency of soil, stages of consistency, Atterberg's limits of consistency viz. liquid limit, plastic limit and shrinkage limit, plasticity index, liquidity index, Determination of liquid limit, plastic limit and shrinkage limit as per IS code ➢ Physical significance of consistency limits, simple numerical problems ➢ Particle size distribution, mechanical sieve analysis as per IS code, particle size distribution curve, effective diameter of soil, uniformity coefficient and coefficient of curvature, well graded and uniformly graded soils ➢ Particle size classification of soils and IS classification of soil
Permeability and Seepage analysis	➢ Definition of permeability ➢ Darcy's law of permeability, definition of coefficient of permeability, typical values of coefficient of permeability for different soil ➢ Factors affecting permeability ➢ Determination of coefficient of permeability by constant head and falling head permeability tests, simple problems to determine coefficient of permeability ➢ Definition of seepage velocity, definition of seepage pressure, definition of phreatic line, definition of flow lines and equipotential lines

	➢ Definition of flow net, characteristics of flow net, application of flow net
Shear strength of soil	➢ Definition of shear strength, importance of shear strength, shear failure of soil, field situation of shear failure ➢ Concept of shear strength of soil ➢ Components of shearing resistance of soil – shear parameters, cohesion, internal friction ➢ Coulomb equation for shear strength ➢ Laboratory determination of shear strength of soil – Direct shear test
Bearing Capacity of soil	➢ Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure ➢ Terzaghi's analysis of bearing capacity ➢ Effect of water table on bearing capacity ➢ Field methods for determination of bearing capacity – Plate load test and standard penetration test. Test procedures as Per IS:1888 & IS:2131 ➢ Typical values of bearing capacity from building code IS:1904 ➢ Factors affecting bearing capacity of soil ➢ Definition of active earth pressure and passive earth pressure ➢ Settlement – Definition of uniform and differential settlement, effect of differential settlement on structure ➢ Empirical correlation between bearing capacity and SPT values
Compaction and Stabilization of Soil	➢ Concept of compaction ➢ Necessity of compaction ➢ Difference between compaction and consolidation ➢ Standard proctor test – test procedure as per IS code ➢ Compaction curve, optimum moisture content, maximum dry density, zero air voids line ➢ Modified proctor test ➢ Factors affecting compaction ➢ Field methods of compaction – rolling, ramming and vibration Determination of field density of soil

	➢ Concept of soil stabilization, necessity of soil stabilization and different methods of soil stabilization – mechanical soil stabilization, lime stabilization, cement stabilization, bitumen stabilization, fly-ash stabilization
Site investigation and Sub Soil Exploration	➢ Necessity of site investigation and sub-soil exploration ➢ Types of exploration – general, detailed ➢ Method of site exploration - open excavation and boring, preparation of bore hole log, criteria for deciding the location and number of test pits and bores holes
Foundation Engineering	➢ Introduction, definitions, objectives and requirements of foundation Criteria for selection of type of foundation ➢ Types of foundations - Shallow and Deep foundations ➢ Shallow foundation - definition and sketch of different shallow foundation ➢ Deep foundation - types and definition of different deep foundation ➢ Pile foundation - Introduction and uses of piles

5. Teaching Scheme (in hours/week) Total contact hours : L 45 hrs. T 15 hrs. P 45 hrs.

Lecture	Tutorial	Practical	Total
3		3	6

6. Examination Scheme :-

Theory			Pass marks (ESE+SS)	Practical		Pass marks (PT+PA)	Total marks (Th+ Pr)	Credit
ESE	Sessional (SS)			PT	PA			
	TA	HA						
70	10	20	33/100	25	25	17/50	150	4

7. Detailed Course Content

Chapter No	Chapter Title	Content	Duration (in hours)
1	**Introduction**	1.1 IS definition of soil, Importance of soil studies in Civil Engineering as construction material, as foundation bed for structures, Formation of soil, Residual soil, Transported soil, Soil map of India.	02
2	Properties of soil	2.1 Soil as a three phase system 2.2 Water content, Determination of water content by oven drying method as per IS code. 2.3 Void ratio, porosity and degree of saturation, density index, Unit weight of soil mass – bulk unit weight, dry unit weight, unit weight of solids, saturated unit weight, submerged unit weight, Determination of bulk unit weight and dry unit weight by core cutter method and sand replacement method as per IS code, Specific gravity, determination of specific gravity by pycnometer. 2.4 Inter relationship between void ratio, porosity, specific gravity, water content, degree of saturation, unit weight, dry unit weight etc. Simple Numerical problems 2.5 Consistency of soil, stages of consistency, Atterberg's limits of consistency viz. Liquid limit, plastic limit and shrinkage limit, plasticity index. Liquidity index, Determination of liquid limit, plastic limit and shrinkage limit as per IS code. Physical significance of consistency limits. Simple numerical Problem. 2.9 Particle size distribution, mechanical sieve analysis as per IS code, particle size distribution	10

		curve, effective diameter of soil, Uniformity coefficient and coefficient of curvature, well graded and uniformly graded soils. 2.10 Particle size classification of soils & IS classification of soil	
3	Permeability and Seepage analysis	3.1 Definition of permeability 3.2 Darcy's law of permeability, coefficient of permeability, typical values of coefficient of permeability for different soil 3.3 Factors affecting permeability 3.4 Determination of coefficient of permeability by constant head and falling head permeability tests, simple problems to determine coefficient of permeability. 3.5 Definition of seepage velocity, Definition of seepage pressure, Definition of phreatic line, Definition flow lines and equipotential lines. 3.6 Definition Flow net, Characteristics of flow net, application of flow net (No numerical problems)	10
4	Shear strength of soil	4.1Definition of shear strength, Importance of shear strength, Shear failure of soil, field situation of shear failure 4.2 Concept of shear strength of soil 4.3 Components of shearing resistance of soil – Shear parameters, cohesion, internal friction 4.4 Coulomb equation for Shear strength 4.5 Purely cohesive and cohesion less soils	06

		4.6 Laboratory determination of shear strength of soil – Direct shear test,	
5	Bearing Capacity of soil	**Bearing Capacity of Soils** 5.1 Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure 5.2 Terzaghi's analysis and assumptions made. 5.3 Effect of water table on bearing capacity 5.4 Field methods for determination of bearing capacity – Plate load test and standard penetration test. Test procedures as Per IS:1888 & IS:2131 5.5 Typical values of bearing capacity from building code IS:1904 5.6 Factors affecting bearing capacity of soil. 5.6 Definition of active earth pressure and passive earth pressure, 5.7 Settlement – Definition of Uniform and Differential Settlement; Effect of differential settlement on structure. 5.8 Empirical correlation between bearing capacity and SPT values.	07
6	Compaction and Stabilization of Soil	6.1 Concept of compaction, Necessity of compaction, Difference between compaction and consolidation 6.2 Standard proctor test – test procedure as per IS code, Compaction curve, optimum moisture content, maximum dry density, Zero air voids line. 6.3 Modified proctor test 6.4 Factors affecting compaction 6.5 Field methods of compaction – rolling,	07

		ramming & vibration and 6.6 Determination of field density of soil. 6.7 Concept of soil stabilization, necessity of soil stabilization 6.8 Different methods of soil stabilization – Mechanical soil stabilization, lime stabilization, cement stabilization, bitumen stabilization, fly-ash stabilization	
7	Site investigation and Sub Soil Exploration	7.1 Necessity of site investigation & sub-soil exploration. 7.2 Types of exploration – General , detailed. 7.3 Method of site exploration open excavation & boring, Preparation of bore hole log . 7.4 Criteria for deciding the location and number of test pits and bores holes 7.5 Disturbed & undisturbed soil samples for lab testing.	06
8	Foundation Engineering	Foundation - Introduction - Definitions - Objectives - Requirements of foundation - Criteria for selection of type of foundation Types of foundations - Shallow and Deep foundations Shallow foundation- Definition and sketch of different shallow foundation Deep foundation :- Types and definition of different deep foundation. Pile foundation :-Introduction - Uses of piles	05
9	Revision, Class test and Seminar	Thorough discussion on all topics after finishing the courses. At least two class test and a seminar should be taken for internal assessment	07

8. Distribution of Marks/ Table of Specifications

Chapter No	Chapter Title	Type of Question		Total Marks
		Objective Type (Compulsory)	Descriptive Questions	
1	Introduction	1	-	1
2	Properties of Soil	4	10	14
3	Permeability & seepage analysis	4	10	14
4	Shear Strength of soil	2	5	07
5	Bearing Capacity of soil	4	5	09
6	Compaction and Stabilization of Soil	4	5	09
7	Site investigation and Sub Soil Exploration	4	5	09
8	Foundation Engineering	2	5	07
Total		10	45	70

9.0 Table of Specification for Theory (GEOTECHNICAL & FOUNDATION ENGINEERING)

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Introduction	2	3	1	1		-
2	Properties of soil	10	17	2	3	5	-
3	Permeability and seepage analysis	10	17	2	3	5	-
4	Shear strength of soil	6	10	2	2	2	-

5	Bearing capacity of soil	7	12	2	2	3	-
6	Compaction and stabilization of soil	7	12	2	2	3	-
7	Site investigation and sub soil exploration	6	10	2	1	3	-
8	Foundation engineering	5	7	2	1	2	
9	Internal assessment	7	12	2	2	3	
		∑b=53 hrs+ 7hrs internal assessment	100				-

10 Details Table of Specification for Theory

Sl no	Topic	OBJECTIVE TYPE				SHORT/ DESCRIPTIVE ANSWER TYPE				
		K	C	A	***T***	K	C	A	HA	***T***
1	Introduction	1			***1***					***-***
2	Properties of soil	2	1	1	***4***	2	2	6		***10***
3	Permeability and seepage analysis	2	1	1	***4***	2	2	6		***10***
4	Shear strength of soil	1	1		***2***	1	1	3		***5***
5	Bearing capacity of soil	2	1	1	***4***	2	1	4		***7***
6	Compaction and stabilization of soil	1	1	2	***4***	2	1	6		***9***
7	Site investigation and sub soil exploration	2	1	1	***4***	2	1	6		***9***
8	Foundation engineering	1	1		***2***	2	1	4		***7***
9	Internal assessment									

10										
					25					***45***

K = knowledge; C= comprehension; A= Application ; HA= Higher than application

11. Suggested Implementation Strategies:- :- Teacher will use Black board, OHP, Smart board, video etc for effective teaching learning process .
12. Suggested Learning Resource :-
    a. Book list

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Dr. B. C. Punmia	Soil Mechanics & Foundation Engineering		Standared Book house, New Delhi
Murthi	Soil Mechanics & Foundation Engineering		Tata McGraw Hill, New Delhi
B.J. Kasmalkar	Soil Mechanics		Pune vidhyartiGriha, Pune.
DrGopalranjan	Soil Mechanics & Foundation Engg		
DrAlom Singh	Soil Mechanics & Foundation Engineering		
A.K. Upadhya	Soil & Foundation Engineering		S.K Kataria& Sons

QUESTION PATTERN

1. The question pattern will be as per the instruction of SCTE or as per existing rules.
2. The objective type questions may be in the form of multiple choice, fill up the blanks, true or false or very short answer type

N.B:- Optional question may be of same topic in the form of either or type like below

Explain briefly the Standard Proctor Test

OR

Explain briefly the Modified Proctor Test

4: Course Title :- GEO TECHNICAL & FOUNDATION ENGINEERING (PRACTICAL)

Practical

Skills to be developed:

Intellectual Skills:

a. Identify properties of soil.
b. Interpret test results.
c. Follow IS procedure testing

Motor Skills:

a. Measure the quantities accurately
b. Handle the instruments carefully.

List of Practical (any ten)

1. Determination of water content of given soil sample by oven drying method as per IS code.
2. Determination of bulk unit weight dry unit weight of soil in field core cutter method as per IS code
3. Determination of bulk unit weight dry unit weight of soil field by sand replacement method as per IS Code
4. Determination of Liquid limit & Plastic limit of given soil sample as per IS Code.
5. Determination of given size distribution of given soil sample by mechanical sieve analysis as per IS Code.
6. Determination of coefficient of permeability by constant head test
7. Determination of coefficient of permeability by falling head test practical (Live demo or prerecorded demo)
8. Determination of shear strength of soil using direct shear test.
9. Determination of shear strength of soil using Laboratory Vane shear test
10. Determination of MDD & OMC by standard proctor test on given soil sample as per IS Code.
11. Determination of CBR value of given soil sample.

12. Determination of shear strength of soil using unconfined compressive strength.
13. Determination of shear strength of soil using tri-axial shear test.

Note: video cassettes or cd's of below experiments developed by NITTTR (if available) shall be shown to the students on T. V. / L.C.D. projector prior to the conductance of above experiments.

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5: Course Title :-ADVAVCED BUILDING CONSTRUCTION & EARTHQUAKERESISTANT TECHNOLOGY

1. Course Code :- CV-505
2. Semester :- 5th (Civil)
3. COURSE OUTCOME (CO)

On completion of the course, the student will be able to:

a	Set out foundation trenches properly
b	Supervise pile foundation work
c	Plan and orient a building effectively
d	Install firefighting equipment
e	Supervise the reinforcement detailing of structure.
f	Explain and perform retrofitting in structure
g	Use and interpret IS: 13920-1993 code of practice

INTENDED LEARNING OUTCOME (ILO)

CHAPTER TITLE	After the completion of the chapter, the students will learn
Excavation	➢ Setting out foundation trenches. ➢ Excavation of foundation and timbering of trenches. ➢ Methods and precautions including dewatering of foundationtrenches.
Pile foundation	➢ Advantages of pile foundation. ➢ Pile driving and about pile driving equipment and accessories. ➢ Methods of pile driving and their suitability in different site conditions.
Building Planning & Orientation	➢ Building bye-laws for different types of buildings in different zones. ➢ National building code 2005. ➢ Principle of planning of building.
Fire Protection	➢ Different fire extinguishing systems and their uses at specific cases.

& Building Acoustics	➢ Fire detection and alarm system. ➢ Fire resistant construction of walls and columns, floors and roofs, wall openings. ➢ Exit requirement of residential and institutional building ➢ Echo, reverberation, sound absorption and absorbents. ➢ Conditions for good acoustics of a hall, treatment of interior surface of hall. ➢ Sound insulation, sound insulating materials, sound insulating wall construction.
Earthquake	➢ Structure of earth. ➢ Seismic Zone of India and its map. ➢ Brief idea of Tectonic plate. ➢ Causes of earthquake. ➢ Magnitude and Intensity of earthquake, Richter scale. ➢ Effect of earthquake.
Seismic Performance of RCC building	➢ Flow of inertia forces. ➢ Strong column weak beam analogy. ➢ Irregularities of building and their effects on performance during earthquake. ➢ Introduction to importance of seismic resistant construction. ➢ Seismic design philosophy. ➢ General principle of earthquake resistant building.
Ductile detailing of RCC building	➢ Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces as per IS: 13920-1993.
Strengthening and retrofitting of existing structure	➢ Introduction and need of retrofitting. ➢ Methodology for seismic retrofitting. ➢ Grouting, Guniting, Shotcrete, Confining the masonary, Inserting new walls, Jacketing of column and beam, Use of fibre reinforced polymer/ plastic (FRP), Adding of shear walls, Infill wall and Bracing.

4. Teaching Scheme (in hours/week) Total contact hours : Lecture 45 hrs. Tutorial 15 hrs

Lecture	Tutorial	Practical	Total
3			3

5. Examination Scheme :-

Theory			Pass marks (ESE+SS)	Practical		Pass marks (PT+PA)	Total marks (Th)	Credit
ESE	Sessional (SS)			PT	PA			
	TA	HA						
70	10	20	33/100				100	3

6. Detailed Course Content

Chapter No	Chapter Title	Content	Duration (in hours)
1	**Excavation**	1.1 Setting out foundation trenches. 1.2 Excavation of foundation and timbering of trenches. 1.3 Methods and precautions including dewatering of foundation trenches (excavation in Waterlogged areas)	03
2	Pile foundation	2.1 Advantages of pile foundation 2.1 Pile driving and pile driving equipment and accessories 2.2 Methods of pile driving and their suitability in different site conditions	04
3	Building Planning & Orientation	3.1 Building bye-laws for different types of buildings in different zones. 3.2 National building code 2005 3.3 Principle of planning of building	05
4	Fire Protection & Building	4.1 Different fire extinguishing systems and their uses at specific cases	08

	Acoustics	4.2 Fire detection and alarm system 4.3 Fire resistant construction of walls and columns, floors and roofs, wall openings. 4.4 Exit requirement of residential and institutional building 4.5 Echo, reverberation, sound absorption and absorbents. 4.6 Conditions for good acoustics of a hall, treatment of interior surface of hall. 4.7 Sound insulation, sound insulating materials, sound insulating wall construction.	
5	Earthquake	5.1 Introduction to earthquake, Structure of earth, Seismic Zone of India and its map, Brief idea Of Tectonic plate , Causes of earthquake, 5.2 Magnitude and Intensity of earthquake, Richter scale 5.3 Effect of earthquake	05
6	Seismic Performance of RCC building	6.1 Flow of inertia forces 6.2 Strong column weak beam analogy 6.3 Irregularities of building- Vertical and Horizontal , Effect of irregularities on performance during earthquake. 6.4 Introduction to importance of seismic Resistant construction 6.5 Seismic design philosophy 6.6 General principle of earthquake resistant building	10
7	Ductile detailing of	7.1 Through discussion of IS: 13920-1993	10

	RCC building	(code of practice for Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces).	
8	Strengthening and retrofitting of existing structure	8.1 Introduction and need of retrofitting 8.2 Methodology for seismic retrofitting 8.3 Retrofitting of structure- Grouting, Guniting, Shotcrete, Confining the masonary, Inserting new walls, Jacketing of column and beam, Use of fibre reinforced polymer/ plastic (FRP), Adding of shear walls, Infill wall and Bracing.	08
9	Revision, Class test and Seminar	Thorough discussion on all topics after finishing the courses. At least two class test and a seminar should be taken for internal assessment	07

7. Distribution of Marks

Chapter No	Chapter Title	Type of Question		Total Marks
		Objective Type (Compulsory)	Short/ Descriptive Questions	
1	Introduction	2	-	2
2	Pile foundation	2	5	7
3	Building Planning & Orientation	3	5	8
4	Fire Protection & Building Accoustics	3	5	8
5	Earthquake	3	5	8
6	Seismic Performance of RCC building	4	10	14
7	Ductile detailing of	4	10	14

	RCC building			
8	Strengthening and retrofitting of existing structure	4	5	9
Total		25	45	70

9.0 Table of Specification for Theory

(ADVANCED BUILDING CONSTRUCTION & EARTHQUAKE RESISTANT TECHNOLOGY)

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Excavation	3	5	1	1	1	-
2	Pile foundation	4	7	2	1	1	-
3	Building planning& orientation	5	8	2	1	2	-
4	Fire protection & building acoustics	8	13	2	3	3	-
5	Earthquake	5	8	2	1	2	-
6	Seismic performance of RCC building	10	17	3	2	5	-
7	Ductile detailing of RCC building	10	17	3	2	5	
8	Strengthening and retrofitting of existing structure	8	13	2	2	4	-
9	Internal assessment	7	12	2	2	3	
		∑b=53 hrs+	100				-

		7hrs internal assessment					

10 . Details Table of Specification for Theory

Sl no	Topic	OBJECTIVE TYPE				SHORT/ DESCRIPTIVE ANSWER TYPE				
		K	C	A	***T***	K	C	A	HA	***T***
1	Excavation	1	1		***2***					***-***
2	Pile foundation	1		1	***2***	2	1	2		***5***
3	Building planning& orientation	2	1		***3***	2	1	2		***5***
4	Fire protection & building acoustics	2	1		***3***	2	1	2		***5***
5	Earthquake	2	1		***3***	2	1	2		***5***
6	Seismic performance of RCC building	2	1	1	***4***	3	2	5		***10***
7	Ductile detailing of RCC building	2	1	1	***4***	2	3	5		***10***
8	Strengthening and retrofitting of existing structure	2	1	1	***4***	2	1	2		***5***
9	Internal assessment									
10										
					25					***45***

K = knowledge; C= comprehension; A= Application ; HA= Higher than application

11. Suggested Implementation Strategies:- Teacher will use Black board, OHP, Smart board, video etc for effective teaching learning process.

12. Suggested Learning Resource :-

a. Book list

Name of Authors	Titles of the Book	Edition	Name of the Publisher
NeelamSarma	Earthquake Resistant Building Constructin		SK Kataria& Sons
BL Gupta/ Amit Gupta	Principle of Earthquake Resistant Design of Structure & tsunami		Standard Publisher Distributor.
Krinitzsky	Fundamental of Earthquake Resistant Construction		Wiley
Paulay	Seismic Design of RCC & Masonry Building		Wiley
BIS	Relevant IS Code		BIS

QUESTION PATTERN

N.B:- Optional question may be of same topic in the form of either or type like below

1. The question pattern will be as per the instruction of SCTE or as per existing rules.

2. The objective type questions may be in the form of multiple choice, fill up the blanks, true or false or very short answer type

Q no:- Explain briefly the process of Grouting

Or

Explain briefly the process of Jacketing a column.

Xxxxxxxxxxxxxxxxxxxxxxxx

6:Course Title :- PROFESSIONAL PRACTICE-III

1. Course Code :- Cv-510
2. Semester :- 5th (Civil)
3. Rationale of the Subject/ Courses :-

To develop general confidence, ability to communicate and attitude, in addition to basic technological concepts through Industrial visits, expert lectures, seminars on technical topics and group discussion.

Course Objectives (CO)

The Student will be able to:

k) Acquire information from different sources.
l) Prepare notes for given topic.
m) Present given topic in a seminar.
n) Interact with peers to share thoughts.
o) Prepare a report on industrial visit, expert lecture.

INTENTED LEARNING OUTCOMES (ILO)

Sl.No.	Course outcomes	Indented Learning Outcome
1.	CO-1: Acquire information from different sources	1. Identify the different sources to be visited for knowledge hunting from Civil Engg point of view. 2. State the importance of the source 3. Collect the required information from the source 4. Discuss the details of the source 5. Structured industrial visit and preparation of report of a. Nearby Road under construction b. Nearby hydroelectric power plant c. Nearby dam or retaining wall d. Nearby RCC Chowkat construction plant

		e. Nearby steel structures
2.	CO-2: Prepare notes for given topic.	1. Identification of an important topic 2. Group discussion 3. Note preparation on that topic 4. Presentation of the selected topic
3.	CO-3: Present given topic in a seminar	1. State the importance of seminar 2. Preparation of lecture by PPT 3. Fluency in communication 4. Presentation of any topic in front of audiences
4.	CO-4: Interact with peers to share thoughts.	1. Explain the importance of interaction 2. Explain of brain storming 3. Advantage of brain storming. 4. State importance of sharing thoughts
5	CO-5 Prepare a report on industrial visit, expert lecture.	1. Importance of industry institute interaction 2. State relation between industry and technology 3. Structured visit of important industry 4. Acquiring knowledge from expert lecture. 5. Report preparation on brick factory, cement factory etc.

4. Teaching Scheme (in hours/week) Total contact hours : 90 hrs.

Lecture	Tutorial	Practical	Total
1		2	3

5. Examination Scheme :-

Theory			Pass marks (ESE+SS)	Practical		Pass marks (PT+PA)	Total marks (PT+ PA)	Credit
ESE	Sessional (SS)			PT	PA			
	TA	HA						2
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UNIT	TOPIC/ACTIVITIES	CONTACT HRS
1	Industrial and site visit : Structured industrial visit and site visit shall be arranged and report of the same should be submitted by individual student (Any two of the following) 1.11 Nearby Road under construction 1.12 Nearby hydroelectric power plant 1.13 Nearby dam or retaining wall 1.14 Nearby RCC Chowkat construction plant 1.15 Nearby steel structures 1.16 Any other nearby industry related Civil Engineering.	10
2	Guest Lectures : Lectures by Professional / Industrial Expert / Student Seminars based on information search to be organized from any TWO of the following areas: 2.1 Earthquake resistant technology 2.2 Modern method of surveying 2.3 Modern construction equipment 2.4 Interior design of building 2.5 Non Destructive testing 2.6 Any other relevant topic related to Civil Engg.	6
3	Information search : Information search can be done through manufacturer's catalogue, websites, magazines, books etc. and submit a report **any one** topic. Following topics are suggested j) **Surveying by total station** k) Retrofitting of structures l) Ready mix concrete m) Foundation of structure	6

	n) Seismic performance of RCC building o) Recent trend of green building concept p) Effect of earthquake on structures q) Any other topic suggested by teacher	
4	Student Activities and Seminar : The students in a group of 3 to 4 will perform any one of the following activities and same will be presented in seminar 4.10 Collect all IS code of practices related to Civil Engineering 4.11 Collect soil samples from nearby five locations and test some physical properties and prepare a report 4.12 Use NDT equipment available in your institute in an existing RCC building and prepare a report. 4.13 Discuss the function and performance of heavy equipment used in modern construction 4.14 Handling and use of modern surveying equipment 4.15 Any other relevant field selected by teachers	8

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7: Course Title :- GREEN BUILDING (Elective)

1. Course Code :- CV-507
2. Semester :- 5th (Civil)
3. Course Objective (CO)

   On completion of the course, the student will be able to:

a	Explain the benefit of green building conception
b	Design a green building
c	Manage the water and energy
d	Recycle the waste materials
e	Maintained the air quality and hygienic condition inside the building

CO/ CHAPTER	INTENDED LEARNING OBJECTIVE (ILO)
CO-1 Explain the benefit of green building conception	1. Define of Green Building, 2. Explain the benefits of Green Building, 3. Components/features of Green Building 4. Site selection of green building 5. Energy Efficiency, Water Efficiency, Material Efficiency, 6. Indoor Air Quality
CO-2 Design a green building	1.Define Landscaping, 2. Explain the building form, 3. Explain orientation, building envelope and fenestration 4. Passive heating and cooling techniques
CO-3 Manage the water and energy	1. Define Water reducing fixtures, 2. Explain Rainwater harvesting and techniques, 3. Water and waste water management, 4. Management of Solid waste. 5. Explain of renewable energy 6. Use and advantage of solar energy 7. Use of high performance glass

CO-4 Recycle the waste materials	1. Importance of recycle of materials 2. Use of Various types of eco-friendly materials, 3. Use of flyash bricks, recycled ceramic tiles, recycled glass tiles, porcelain tiles, wood, steel, aluminum and renewable materials, agrifibre
CO-5 Maintained the air quality and hygienic condition inside the building	1. Importance of natural air ventilation system in dwelling house 2. Importance of Indoor Air Quality 3. Different types of low VOC materials, 4. Day lighting. 5. Rating system in green building conce

4. Teaching Scheme (in hours/week)

Lecture	Tutorial	Practical	Total
3			3

5. Examination Scheme :-

Theory			Pass marks (ESE+SS)	Practical		Pass marks (PT+PA)	Total marks (Th+ Pr)	Credit
ESE	Sessional (SS)			PT	PA			
	TA	HA						
70	10	20	33/100				100	3

6. Detailed Course Content

Chapter no	Chapter title	Content	Remarks if any
	1.0	**Introduction to Green Building** 1.1 Definition of Green Building, 1.2 Benefits of Green Building, 1.3 Components/features of Green Building – Site selection, Energy	6 hrs

		Efficiency, Water Efficiency, Material Efficiency, Indoor Air Quality.	
	2.0	**Design Features for Green Building** 2.1 Landscaping, building form, orientation, building envelope and fenestration 2.2 Passive heating and cooling techniques	6 hrs
	3.0	**Water and Waste Water Management** 3.1 Water reducing fixtures, 3.2 Rainwater harvesting and techniques, 3.3 Water and waste water management, 3.4 Solid waste management.	6 hrs
	4.0	**Energy Management** 4.1 Use of renewable energy 4.2 Solar water heating system 4.3 Other energy saving options 4.4 High performance glass	6 hrs
	5.0	**Eco-friendly Materials** 5.1 Various types of eco-friendly materials, 5.2 Use of recycled materials-: flyash bricks, recycled ceramic tiles, recycled glass tiles, porcelain tiles, wood, steel, aluminium and renewable materials, agrifibre	7 hrs
	6.0	**Indoor Air Quality** 6.1 Natural air ventilation systems, 6.2 Different types of low VOC materials, 6.3 Day lighting.	6 hrs
	7.0	**Rating Systems for Green Building**	7hrs

		7.1 Different types of rating systems and their special features	
	8.0	**Class Test(three nos)**	4 hrs

7. **Distribution of marks :- At least 6 marks shall be asked from each chapter**

9.0 Table of Specification for Theory (GREEN BUILDING)

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Introduction to green building	6	12	2	3	1	-
2	Design features for green building	6	12	2	2	2	-
3	Water and waste water management	6	12	2	1	3	-
4	Energy management	6	12	2	1	3	-
5	Eco-friendly materials	7	16	2	2	3	-
6	Indoor air quality	6	12	2	1	3	-
7	Rating systems for green building	7	16	2	2	2	-
8	Internal assessment	4	8	1	1	2	
		∑b=44 hrs+ 4hrs internal assessment	100				-

Probable Marks distributions are given below (minimum 6 marks from each chapter)

10. Details Table of Specification for Theory

Sl no	Topic	OBJECTIVE TYPE				SHORT/ DESCRIPTIVE ANSWER TYPE				
		K	C	A	***T***	K	C	A	HA	***T***
1	Introduction to green building	1	1		***2***	2	1	1		***4***
2	Design features for green building	2	1		***3***	1	1	2		***4***
3	Water and waste water management	2	1	1	***4***	2	1	2		***5***
4	Energy management	1	1	1	***3***	2	1	2		***5***
5	Eco-friendly materials	2	1	2	***5***	2	3	5		***10***
6	Indoor air quality	1	1	2	***4***	2	3	5		***10***
7	Rating systems for green building	1	1	2	***4***	2	2	3		***7***
8	Internal assessment									
9										
10										
					25					***45***

K = knowledge; C= comprehension; A= Application ; HA= Higher than application

11 . Suggested Implementation Strategies:- Teacher will use Black board, OHP, Smart board, video etc for effective teaching learning process

N.B:- Optional question may be of same topic in the form of either or type.

1. The question pattern will be as per the instruction of SCTE or as per existing rules.
2. The objective type questions may be in the form of multiple choice, fill up the blanks, true or false or very short answer type

Reference Books

1. Pradeep Kumar and Amit Kumar Tyagi; Managing Energy Efficiently in Hotels and Commercial Buildings, TERI Publications.
2. M K Halpeth, T Senthil Kumar and G Harikumar; Light Right – A Practising Engineer's Manual on Energy Efficient Lighting, TERI Publications

3. R K Pachauri and ShyamalaAbeyratne; From Sunlight to Electricity – Solar Photovoltaic Applications, TERI Publications.
4. National Rating system-GRIHA, TERI Publications.

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7:Course Title:-ARCHITECTURAL PRACTICES & INTERIOR DESIGN (Elective)

Course Code :- CV-508 Contact hrs :-45 hrs

1. Semester :- 5th (Civil)
2. Rationale of the Subject/ Courses :-

On completion of the course, the student will be able to:

a	Select a proper site with suitable orientation
b	Increase the aesthetic view of a building
c	Design a building
d	Select a suitable and proper material for the building
e	Use all places effectively.

ARCHITECTURAL PRACTICES & INTERIOR DESIGN (CV-508) 5th SEM

(CO)COURSE OUTCOME

Diploma in civil Engineering Students will be able to:

- **CO-1**: To select a proper site with suitable orientation.
- **CO-2**: To increase the aesthetic view of a building.
- **CO-3**: To design a building.
- **CO-4**: To select a suitable and proper material for the building.
- **CO-5**: To use all places effectively.

INTENTED LEARNING OUTCOMES (ILO)

Sl.No.	CO/ CHAPTER	Indented Learning (ILO)
1.	CO-1:Architectural design	1. Principles of architecture. 2. Define site selection, climatic conditions, sun control, orientation of building and site. 3. Building by laws and its application.

2.	CO-2:Building aesthetics	1. Explain the feeling for aesthetics and unity, composition, unity, mass composition, order, expression, proportion, scale, accentuation & rhythm, contrast, balance, pattern. 2. State character of building.
3.	CO-3:Design of project	1. A case of study of residential building. 2. A case of study of public and commercial building. 3. Aspect of working drawing- Plan, elevation section.
4.	CO-4:Landscaping	1. State soft and hard landscaping. 2. Define basic principles of landscaping. 3. Explain assessment of land. 4. Design procedure. 5. A case of study of landscape for public and commercial campus.
5.	CO-5:Elements and principles of design	1. Define the elements such as form, texture, light, colour, effect of light on colour and texture, space organization of space in design, space pattern. 2. Explain the importance of colour as art element and various colour scheme.
6.	CO-6: Anthropometrics data	1. Define the relation of human measurement to furniture . 2. Define movement and to circulation patterns.
7.	CO-7:Interior materials	1. Explain the different interior materials, paneling, partitions, finishing materials, furniture. 2. Define false ceiling, flooring, paints.
8.	CO-8:Interior of residential building	1. Define the use of space, circulation and standard size of furniture. 2. Explain the plans and elevation of interior with furniture for living space, dining space, kitchen,

		bed room, guest room etc.
9.	CO-9:Interior of small commercial building	1. Define the planning of interior for small commercial units such as offices, consulting chambers, shops etc. 2. Define the furniture details such as executive table , architectures table etc. used in commercial units.

4. Teaching Scheme (in hours/week) Total contact hours : 60 hrs.

Lecture	Tutorial	Practical	Total
3			3

5. Examination Scheme :

6. Theory			Pass marks (ESE+SS)	Practical		Pass marks (PT+PA)	Total marks (Th+ Pr)	Credit
ESE	Sessional (SS)			PT	PA			
	TA	HA						
70	10	20	33/100				100	3

7. Detailed Course Content

Chapter No	Chapter Title	Content	Duration (in hours)
1	**Architectural Design:**	1.1 Review of principles of Architecture. 1.2 Site selection, climatic conditions, sun control, orientation of building & site. 1.3 Building by laws & its applications.	2
2	**Building Aesthetics:**	2.1 Feeling for aesthetics and utility, composition, unity, mass composition, order, expression, proportion, scale, accentuation & rhythm, contrast, balance, pattern.	5

		2.2 Character of Building.	
3	**Design of Projects**	3.1 A case study of residential building. 3.2 A case study of public / commercial building. 3.3 Aspect of working drawing – plan, elevation section	5
4	**Landscaping**:	4.1 Soft and Hard landscaping. 4.2 Basic Principle of landscaping. 4.3 Assessment of land. 4.4 Design procedure. 4.5 A case study of land scape for public/ commercial building campus.	5
5	**Elements and principles of design**.	5.1 Elements such as form, texture, light, colour, effect of light on colour and texture, space organization of space in design, space pattern. 5.2 Importance of colour as art element. Various colour scheme.	5
6	**Anthropometrics Data:**	6.1 Relation of human measurement to furniture and movement and to circulation patterns	2
7	**Interior Materials:**	7.1 Different interior materials, paneling, partitions, finishing materials, furniture. 7.2 False ceiling, flooring, paints.	4
8	**Interior of Residential building:**	8.1 Use of space, circulation, standard size of furniture. 8.2 Plans and elevation of interior with furniture for living space, dining space, kitchen, bed room, guest room etc.	5
9	**Interior of small**	9.1 Planning of interior for small commercial	5

	commercial building:	units such as offices, consulting chambers, shops etc. 9.2 Furniture details such as executive table, architectures table etc. used in commercial units.	
10	Revision, Class test and Seminar	Thorough discussion on all topics after finishing the courses. At least two class test and a seminar should be taken for internal assessment	07

8. Distribution of Marks/ Table of specifications

Chapter No	Chapter Title	Type of Question			Total Marks
		Objective Type (Compulsory)	Short Questions	Descriptive Questions	
N.B:- At least 5 marks shall be asked from each chapter.					

9. Table of Specification for Theory (ARCHITECTURAL PRACTICES & INTERIOR DESIGN,CV-508)

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Architectural design	2	4				-
2	Building aesthetics	5	11				-
3	Design of projects	5	11				-
4	landscaping	5	11				-
5	Elements and principles of design	5	11				-

6	Anthropometrics data	2	4				-
7	Interior materials	4	10				-
8	Interior of residential building	5	11				
9	Interior of small commercial building	5	11				
10	Internal assessment	7	16				
		∑b=38 hrs+ 7hrs internal assessment	100				-

10. Suggested Implementation Strategies:- Teacher will use Black board, OHP, Smart board, video etc for effective teaching learning process. The short question should carry 2 or 3 marks per question and descriptive question may carry minimum 5 marks and maximum 10 marks per question. Objective type question will carry 1 mark per question and it shall be of very short type or multiple choice or fill up the gap type.
11. Suggested Learning Resource :
    a. Book list

Name of Author	Name of Book	Edition	Name of publisher
M. G. Shah, C.M. Kale / S.Y. Patiki	Building construction		Tata McGraw hill
Joseph De Chiara, JulinsPanch, martin Zelnik	Time saver standard for interior design & space planning		McGraw hill

Albert O. Halse	The use of colours in interiors		McGraw hill
BousmahaBaiche &Nicholes Walliman	Nwtert – Architects		**Black Well Science**

b. Manuals National building codes.

Journals 1. Inside out side
2. A + D Journal on architecture.
3. Indian Architects and builders.

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8:Course Title :- CONSTRUCTION TECHNIQUE & EQUIPMENT (ELECTIVE)

1. Course Code :- CV-508
2. Semester :- 5 th (Civil)
3. COURSE OBJECTIVES (CO)

On completion of the course, the student will be able to:

Manage and control construction work and valuation of materials
Explain various new method of construction
Control and guide the construction procedure
Use effectively all construction materials
Supervise all construction equipment and machineries.

CO	ILO
CO-1 Manage and control construction work and valuation of materials	Explain the necessity of Scope Human Resources Planning – Selection & Recruitment – Training & Development – Performance Appraisal – Industrial Safety. Explain and perform Time management- Resource management-, Network Techniques & Bar chart- Simple problem. Define the valuation and its necessity Explain scrap value, salvage value, depreciation Estimate the valuation of materials Explain the method of valuation.
CO-2 Explain various new method of construction	1. State the use of Steel Formwork, H frames, Steel plates, Steel props, Telescopic props, Girders or trestles. Tubular formwork. Slip formwork- meaning, use of slip formwork. Process of concreting with slip forms. 2. Use of lifts, belt conveyors, Pumped concrete, Equipment and machinery required for construction of Multistoried Buildings. Precautions and safety measures.

	3. Explain the various methods of pre-cast and pre-fabrication 4. Explain the Necessity of soil reinforcing, Use of wire mesh and geo-synthetics. Strengthening of embankments, slope stabilization in cutting and embankments by soil reinforcing techniques 5. Explain and use of all modern Hoisting Equipment, Conveying Equipment , Excavation Equipment Compacting Equipment Concrete Mixer, Stone Crushers.
CO-3 Control and guide the construction procedure	1. Select proper equipment for respective work 2. Act as a team leader 3. Follow economical and efficient procedure 4. Ensure proper maintenance and use of equipment 5. Follow proper time management.Pile driving equipment, Pile hammers, selection of hammers.
CO-4 Use effectively all construction materials	**1. Explain all construction materials** **2. State the use of** Steel, Carbon, Glass fibers. Use of fibers as construction materials. Properties of fibers. **3. State and use of** PVC, RPVC, HDPE, FRP, GRP etc. Colored plastic sheets. Use of plastic as construction Material **4. Explain the** Properties and uses of artificial timber. Types of artificial timber available in market, strength of artificial timber. **5.** Explain and use of of acoustics materials, wall claddings, plaster boards, Micro-silica, artificial sand, bonding agents, adhesives etc.
CO-5 Supervise all construction equipment and machineries.	1. State the function and operating procedure of all construction equipment and machineries 2. Guide the operator of all construction equipment and machineries.

4. Teaching Scheme (in hours/week) Total contact hours : 60 hrs.

Lecture	Tutorial	Practical	Total
3			3

5. Examination Scheme :-

Theory			Pass marks (ESE+SS)	Practical		Pass marks (PT+PA)	Total marks (Th+ Pr)	Credit
ESE	Sessional (SS)			PT	PA			
	TA	HA						
70	10	20	33/100				100	3

6. Detailed Course Content

Chapter No	Chapter Title	Content	Duration (in hours)
1	Human Resource Management & Construction Planning	Scope & Functions – Human Resources Planning – Selection & Recruitment – Training & Development – Performance Appraisal – Industrial Safety. Scheduling- Time management- Resource management-, Network Techniques & Bar chart- Simple problem.	6
2	Valuation	Definition of different terms – (i) valuation, (ii) value and cost, (iii) scrap value and salvage value, (iv) assessed value (v) speculative value, (vi) sinking fund, (vii) depreciation and obsolescence. Qualifications and functions of a valuer and governing factors affecting the value of a property. Methods of valuation – rental and depreciation	4

3	Advanced Construction Materials	**3.1 FIBERS AND PLASTICS**. Types of fibers – Steel, Carbon, Glass fibers. Use of fibers as construction materials. Properties of fibers. Types of Plastics – PVC, RPVC, HDPE, FRP, GRP etc. Colored plastic sheets. Use of plastic as construction Material. **3.2 Artificial Timber** Properties and uses of artificial timber. Types of artificial timber available in market, strength of artificial timber. **3.3 Miscellaneous materials** Properties and uses of acoustics materials, wall claddings, plaster boards, Micro-silica, artificial sand, bonding agents, adhesives etc.	8
4	Advanced Construction Method	**4.1 Formwork** Steel Formwork, H frames, Steel plates, Steel props, Telescopic props, Girders or trestles. Tubular formwork. Slip formwork- meaning, use of slip formwork. Process of concreting with slip forms. **4.2 Construction of Multistoried Buildings** Use of lifts, belt conveyors, Pumped concrete, Equipments and machinery required for construction of Multistoried Buildings. Precautions and safety measures. **4.3 Prefabricated Construction** Meaning of prefabrication and precast. Methods of prefabrication- plant prefabrication and site prefabrication. Linear members, rigid frames, roofing and flooring members, R.C. Doors and windows, wall panels, Jointing of structural	12

		members. **4.4 Soil Reinforcing techniques** Necessity of soil reinforcing, Use of wire mesh and geo-synthetics. Strengthening of embankments, slope stabilization in cutting and embankments by soil reinforcing techniques	
5	Hoisting & Conveying Equipment	**5.1 Hoisting Equipment** Principle and working of Tower cranes, Crawler cranes, Truck mounted cranes, gantry cranes, Mast cranes, Derricks. **5.2 Conveying Equipment** Working of belt conveyors. Types of belts and conveying mechanism. Capacity and use of dumpers, tractors and trucks	5
6	Earth moving machinery	**6.1 Excavation Equipment** Use, Working and output of bulldozers, scrapers, graders, and power shovels, JCB, draglines. **6.2 Compacting Equipment** Use of rollers, Roller types- Plain rollers , Sheep footed rollers, Vibratory rollers, pneumatic rollers. Rammers- use and working	5

7	Concreting Equipment	**7.1 Concrete Mixers** Types of concrete mixers. Weigh batching equipment, Equipment for transportation of concrete- trollies, lifts. Transit mixers, Concrete vibrator-Needle vibrators, Screed vibrators. Automatic concrete plants – layout, process and working. **7.2 Stone Crushers** Types of stone crushers, capacities and working. Equipment for production of artificial sand.	6
8	Equipment Management	**8.1Miscellaneous Equipment** Pile driving equipment, Pile hammers, selection of hammers. Working of hot mix bitumen plant, Bitumen paver. Grouting equipments, Floor polishing machine. **8.2 Equipment Management** Standard equipment, Special equipment, Selection of equipment, Owning and operating cost of construction equipment. Economic life of construction equipment. Preventive maintenance of equipment, Break down maintenance of Equipment.	8
8	Revision, Class test and Seminar	Thorough discussion on all topics after finishing the courses. At least two class test and a seminar should be taken for internal assessment.	6

7. Distribution of Marks/Table of Specifications

Chapter No	Chapter Title	Type of Question			Total Marks
		Objective Type (Compulsory)	Short Questions	Descriptive Questions	
N.B:- At least 6 marks question shall be asked from each chapter.					

9.0 Table of Specification for Theory (CONSTRUCTION TECHNIQUES AND EQUIPMENTS,CV-508)

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Human resource management & construction planning	6	10	2	2	2	-
2	Valuation	4	8	1	1	2	-
3	Advanced construction materials	8	13	2	2	4	-
4	Advanced construction method	12	20	3	4	5	-
5	Hoisting & conveying equipment	5	8	2	2	1	-
6	Earth moving machinery	5	8	2	1	2	-
7	Concreting equipment	6	10	2	2	2	-
8	Equipment management	8	13	2	3	2	

9	Internal assessment	6	10	2	2	2	
		∑b=54 hrs+ 6hrs internal assessment	100				-

Probable Marks distributions are given below (minimum 6 marks from each chapter)

10 .Details Table of Specification for Theory

Sl no	Topic	OBJECTIVE TYPE				SHORT/ DESCRIPTIVE ANSWER TYPE				
		K	C	A	***T***	K	C	A	HA	***T***
1	Human resource management & construction planning	1	2		***3***	1		2		***3***
2	Valuation	1		1	***2***	1	1	2		***4***
3	Advanced construction materials	1	1	1	***3***	2	3	5		***10***
4	Advanced construction method	2	1	2	***5***	2	1	4		***7***
5	Hoisting & conveying equipment	1	1	1	***3***	2	1	2		***5***
6	Earth moving machinery	1		2	***3***	2	3	4		***9***
7	Concreting equipment	1		2	***3***	1	1	1		***3***
8	Equipment management	1	1	1	***3***	2	1	1		***4***
9	Internal assessment									
10										
					25					***45***

K = knowledge; C= comprehension; A= Application ; HA= Higher than application

11 Suggested Implementation Strategies Teacher will use Black board, OHP, Smart board, video etc for effective teaching learning process. The short question should carry 2 or 3 marks per question and descriptive question may carry minimum 5 marks and maximum 10

marks per question. Objective type question will carry 1 mark per question and it shall be of very short type or multiple choice or fill up the gap type.

12 Suggested Learning Resource :-

a. Book list

Text Books:			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
R. Chudly	Construction Technology Vol. I to IV		ELBS- Longman Group
R.L. Peurifoy	Construction Planning equipment and methods		McGraw-Hill Co. Ltd.
S. Seetharaman	Construction Engineering and management		Umesh Publication, New Delhi
B. Sengupta and Guha	Construction management and Planning		Tata McGraw Hill
R. Satyanarayana and S. C. Saxena	Construction Planning and Equipment		Standard Publication New Delhi
Mantri Construction	A to Z of Building Construction		Mantri Publication
Govt. of Maharashtra	PWD Handbooks for – Materials - Foundation - Construction equipment		Govt. of Maharashtra

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Remarks

5. The proposed syllabus is the outcome of team work
6. The proposed syllabus has been prepared as per the instructions obtained from the higher authority time to time.