DIRECTORATE OF TECHNICAL EDUCATION, KAHILIPARA, GUWAHATI-19

DIPLOMA PROGRAMME IN

CIVIL ENGINEERING

NEW SYLLABUS

DEPARTMENT OF CIVIL ENGINEERING
UNDER
DIRCTORATE OF TECHNICAL EDUCATION, ASSAM

PROGRAMME OUTCOME (PO)

After the completion of the three-year diploma programme, the diploma holders will have:

- The ability to apply knowledge of mathematics, science and engineering fundamentals to the solution of complex engineering problems.
- The ability to communicate technical concepts effectively in both verbal and written form.
- The ability to design and conduct experiments, as well as to analyse and interpret data.
- The ability to identify, formulate, and solve engineering problems.
- The ability to use computer application for engineering works.
- The ability to use drawings as a language of engineers along with the ability to create models of engineering prototypes.
- The ability to apply software engineering principles in product development using engineering technology.
- The ability to communicate effectively.
- The ability to work as an individual, and as a member or leader in diverse teams in multidisciplinary settings.
- An understanding of professional and ethical responsibilities.

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PROGRAMME SPECIFIC OUTCOME (PSO)

After the completion of the three-year diploma programme in Civil Engineering, the diploma holders will:

- Gain the ability to identify, analyse, formulate, and solve different challenging civil engineering problems.
- Be able to apply principles of mechanics and basic sciences to analyse civil engineering structures.
- Develop abilities in the application of the necessary mathematical tools, scientific basics, and fundamental knowledge of civil engineering.
- Be able to survey, map, measure and analyse data for sustainable infrastructure planning.
- Be able to characterize and evaluate materials for adoptability in civil engineering projects.
- Be able to analyse and design concrete and steel structures, earthen embankments, irrigation structures, water supply, waste treatment systems and transport systems.
- Be able to apply best management practices for construction and maintenance of infrastructure facilities.
- Develop professional skills that prepare them for immediate employment or higher studies in civil engineering disciplines.

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THIRD SEMESTER
CIVIL ENGINEERING BRANCH

COURSE STRUCTURE OF CIVIL ENGINEERING (3RD 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)						
Co-301	Computer Application & Programming	3	-	3	70	10	20	30	33	25	25	17	150	4
Hu-302	Engineering Economics & Accountancy	3	-		70	10	20	30	33				100	3
El/Et-304	Fundamentals of Electrical & Electronic Engineering	3	-	3	70	10	20	30	33	25	25	17	150	4
CV-301	Water Resource Engineering	4	-		70	10	20	30	33				100	4
CV-302	Building Construction & Materials	3	-	3	70	10	20	30	33	25	25	17	150	4
CV-303	Civil Engineering Drawing			6						100	50	50	150	4
CV-310	Professional Practice-I	1		2						25	25	17	50	2
Total		17		17										
		34			Grand Total =								850	25

1: Course Title – Computer Application & Programming (All Branches)

1: Course Code – Co-301

2: Semester- 3rd

3: Aim of the Course :

- To give basic concepts related to organisation of a computer
- To give fundamental terminologies in networking
- To develop simple programs in C.

4: Course Outcome:

On completion of the course students will be able to:

- Explain the basics of a computer hardware and software
- Solve problems related to number systems
- Define basics of Operating System
- Familiarize with networking components
- Write simple C programs

5: Prerequisites for the Course: Have basic idea about a computer and its functions.

6: Teaching Scheme (in hours):

Teaching Scheme			
L	T	P	Total hours per week
3	0	3	6

7: Examination Scheme :

	Theory (T)	Sessional (TS)	Practical (P)	Practical Sessional (PS)
Full Marks	70	30	25	25
Pass Marks	33		17	

8: Detailed Course Content:

Unit	Topic/Sub-Topics	Intended Learning Outcome	Hours
1	**Computer Architecture:** Brief history, Charles Babbage Machine, Von Neuman Architecture, block diagram, memory & it's different types, I/O devices, Role of O.S., computer languages, translator software, editor. Data, different types of data, information and its characteristics	1. Define a computer and identify its parts. 2. Define computer memory & describe its different types. 3. Define computer languages & translators. 4. Describe the characteristics of information.	8
2	**Number System and codes:** Different number system- decimal, binary, octal, hexadecimal number system, their conversion, 1's and 2's Complement, subtraction using complements. Different codes- ASCII, BCD, Ex-3, Gray. Conversion from Gray to binary and vice-versa, BCD addition.	5. Define decimal, binary, octal & hexadecimal number systems. 6. Convert between different number systems. 7. Define 1's & 2's complements. 8. Subtract using 1's & 2's complements. 9. Describe some different codes.	8
3	**Introduction to Operating System:** Definition, single user and multi-user OS, different function performs by OS, various popular OS like DOS, Windows, UNIX/LINUX. DOS and UNIX commands.	10. Define operating system. 11. Operate different commands of DOS, Windows & UNIX/ LINUX.	5
4	**Computer Network and the Internet:** Definition, necessity of network, different types of network-LAN, MAN, WAN, network	12. Define network. 13. Describe different types of	6

	topology, transmission media, different network devices like NIC, hub, bridge, switch, gateway. Introduction to the internet, Internet services, browser, search engine.	network. 14. Define network topology. 15. Describe different network devices. 16. Define internet & describe different internet services. 17. Explain use of different browsers & search engines.	
5	**Introduction to C programming:** Fundamentals of programming-Algorithm & Flowchart, source code and object code, Basic structure of C programs, Executing a C program, Constants, Variables, and data types. Operators and expression, Input Output function like printf, scanf, getchar, putchar, gets, puts, Decision making and branching using IF..Else, Switch, looping using for, while, and do-while, array.	18. Write algorithm and flow charts for simple programs. 19. Define basic terminology of C language. 20. Write small program using C language. 21. Write diversified solutions using C language. 22. Differentiate between IF..Else and Switch statement.	**15**
	Internal Assessment		**3**

Intellectual Skills :

- Logical reasoning
- Relating programming concepts in problem solving

Motor Skills :

- Learn to use and handle a computer and its peripherals.

List of Lab Exercises :

I. **Basic commands for computer system maintenance.**

II. **Preparation of Documents**

Introduction to Word processing, Opening a document, preparing documents, inserting diagrams and tables, Editing document- (a) Character, word and line editing, (b) Margin Setting, Paragraph alignment, (c) Block Operations, (d) Spell Checker, (e) Saving a document, (f) Mailmerge.

III. **Information Presentation through Spread Sheet**

Application of Spread Sheet, Structure of spreadsheets, Preparing table for simple data and numeric operations, Using formulae and functions in excel operations, Creation of graphs, Pie charts, bar charts.

IV. **Preparation of presentation**

Creation of electronic slides on any topic, Practice of animation effect, presentation of slides.

V. **Programming in C**

Editing a C program, defining variables and assigning values to variables
Arithmetic and relational operators, arithmetic expressions and their evaluation
Practice on input/output function like getchar, putchar, gets, puts, scanf, printf etc.
Programming exercise on simple if statement, If..else statement, switch statement
Programming exercise on looping with do-while, while, for loop and array.

9: Distribution of Marks:

Unit	Topic	Type of Question			Total Marks
		Objective	Short	Descriptive	
1	Computer Architecture	6	5	5	16
2	Number System and codes	4	2	8	14
3	Introduction to Operating System	4	2	4	10
4	Computer Network and the Internet	5	3	6	14
5	Introduction to C programming	6	3	7	16
		25	15	30	70

10: Table of specification :

Unit	Topics (a)	Time allotted in hours (b)	Percentage Weightage (c)	K	C	A	HA
1	Computer Architecture	8	19	✓			
2	Number Systems & Codes	8	19	✓		✓	
3	Introduction to Operating Systems	5	12	✓			
4	Computer Network & the Internet	6	15	✓		✓	
5	Introduction to C Programming	15	35	✓		✓	
Total		Σ b=42	100				

K = Knowledge C = Comprehension A =Application

HA = Higher Than Application (Analysis, Synthesis, Evaluation) $c = \frac{b}{\Sigma b} * 100$

Detailed Table Of Specifications

Unit	Topics	Objective				Short					Descriptive				
		K	C	A	T	K	C	A	HA	T	K	C	A	HA	T
1	Computer Architecture	7			7	5				5	4				4
2	Number Systems & Codes	4			4	2				2	4		4		8
3	Introduction to Operating Systems	4			4	2				2	4				4
4	Computer Network & the Internet	5			5	3				3	3		4		7
5	Introduction to C Programming	5			5	3				3	3		4		7
Total		25			25	15				15	18		12		30

K = Knowledge C = Comprehension A = Application

HA = Higher Than Application T = Total

12: Suggested Implementation Strategies:

1: As the subject is taught to the students of all branches, basic knowledge required to

understand the computer hardware and software needs to be emphasised.

2: Too much of hardware details could be avoided.

3: Programming section theory could be taught side by side in the lab.

13: Suggested Learning Resources :

1. Fundamentals of Computer, Rajaraman, PHI
2. It Tools and Applications, DOEACC "O" Level, Firewall Media
3. Let us C by Y. Kanetkar, BPB
4. Programming in ANSI C / E. Balagurusamy / Tata McGraw-Hill

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2: Course Title :ENGINEERING ECONOMICS AND ACCOUNTANCY

1. Course Code: **Hu – 302**
2. Semester: **III**
3. Aim of the Course:

1. To introduce the students to some important economic and accounting terms.
2. To acquaint the students with some economic laws and with the functions of money, bank etc.
3. To make the students capable of recording business transaction under double entry system.
4. To introduce the students about financial statements.

5. Course Outcomes:

On completion of the course on EEA, students will be able to

- CO_1 = Define some important economic and accounting terms.
- CO_2 = explain some basic economic laws.
- CO_3 = Describe overall economic environment.
- CO_4 = explain double entry system of book keeping.
- CO_5 = record business transactions under double entry system of book keeping
- CO_6 = define financial statements.

6. Teaching Scheme (in hours)

Lecture	Tutorial	Practical	Total
42hrs	**3 hrs**	**--**	**45hrs**

7. **Examination Scheme:**

Theory				Practical				Total Marks
Examination Full Marks	Sessional Full Marks	Total Marks	Pass Marks	Examination		Sessional		
70	30	100	33	--	--	--	--	100

8. Detailed Course Content:

Chapter No.	Chapter Title	Content	Intended Learning Outcomes	Duration (in hours)
Part – A : Engineering Economics				**21hrs**
1.0	**Introduction to Economics :**	i) Definition of Economics, its utility and scope of study ii) Definition of Engineering Economics ii) Meaning and concepts of Utility, Consumption, Value, Price, Goods and National Income, inflation iii) Wants – Definition and characteristics iv) Wealth& Welfare– Definition, meaning and types	i) explain core economic terms concepts and theories	5
2.0	**Demand and Supply :**	i) Meaning and types of Demand ii) The Law of Demand, its limitations iii) Preparation of Demand Schedule iv) Meaning of Supply ii) The Law of Supply, its limitations iii) Preparation of Supply Schedule	Define the Laws of Demand and Supply	4
3.0	**Production :**	i) Meaning and factors of production ii)Factors determining efficiency of labour iii) Savings, investment and capital formation iv)Meaning of production function	i) Define factors of production ii) Explain formation of capital	5
4.0	**Money:**	i) Meaning of money ii) Types of money iii) Functions of money	i) Understand meaning and functions of money	2
5.0	**Banking Organisation :**	i) Central Bank – its functions ii) Commercial banks – its functions	i) Distinguish the functions of	3

			different banks	
6.0	Pricing	i) Objectives of pricing policy ii) price determinants iii) Price discrimination	i) explain pricing policy	2
Part – B : Accountancy				**21hrs**
7.0 (A)	**Introduction to Book-Keeping and Accounting:**	i) Definition & objectives of Book-keeping ii) Need and advantages of Book-keeping iii) Definition of Accounting iv) Difference between Book-keeping and Accounting v) Double Entry System – main features vi) Advantages and disadvantages of Double Entry System	i) Define Double Entry System of Book Keeping ii) State its objectives, features merits and demerits	3
(B)	**Introduction to Computerised Accounting System:**	i) Components of Computerised Accounting Software ii) Need for Computerised Accounting iii) Difference between Manual Accounting and Computerised Accounting	i) Identify components of computerized accounting software	2
8.0	**Transaction:**	i) Definition ii) Meaning of Account iii) Classification of Accounts: - Traditional Approach - Modern Approach iv) Meaning of Debit and Credit v) Rules of Debit and Credit	i) State the meaning and rules of Debit and Credit	2
9.0	**Journal and Ledger**	i) Meaning Journal ii) Recording of Transactions in Journal iii) Meaning of Ledger	i) Record business transactions under double	4

		iv) Objectives and utility of Ledger v) Posting and balancing of Ledger vi) Distinction between Journal and Ledger vii) Names of different Books of Accounts	entry system in books of accounts	
10.0	**Cash Book:**	i) Meaning and importance of Cash Book ii) Characteristics and advantages of Cash Book iii) Discount – Trade Discount and Cash Discount iv) Different types of Cash Book: - Single Column Cash Book - Double Column Cash Book - Triple Column Cash Book v) Bank Reconciliation Statement – Basic idea	i) Differentiate different types of Cash Book ii) Record transactions in Cash Book	4
11.0	**Trial Balance & Errors in Accounting:**	i) Meaning and objects of Trial Balance ii) Main features and advantages of Trial Balance iii) Preparation of Trial Balance iv) Types of errors in Accounting	i) Explain meaning and features of Trial balance	3
12.0	**Components of Final Accounts:**	i) Meaning and objectives of Trading Account ii) Contents of Trading Account iii) Meaning and objectives of Profit and Loss Account iv) Contents of Profit and Loss Account v) Meaning of depreciation, revenue expenditure and capital expenditure	i) Identify different components of Financial Statements	3

		vi) Contents of Balance Sheet		
	Class Test			3 hrs
	Total			**45 hrs**

(9) TABLE OF SPECIFICATIONS for Engineering Economics & Accountancy

Sl. No	**Topic** (a)	**Time allotted in hours (b)**	**Percentage Weightage (c)**	Knowledge	Compre-hension	**Application**	**HA**
1	Introduction to Economics	5	12	5	3	0	0
2	Demand & Supply	4	9	2	4	0	0
3	Production	5	12	6	2	0	0
4	Money	2	5	4	0	0	0
5	Banking Organisation	3	7	3	2	0	0
6	Pricing	2	5	2	2	0	0
7	(A) Introduction to Book-Keeping	3	7	5	0	0	0
	(B) Introduction to Computerised Accounting System	2	5	3	0	0	0
8	Transaction	2	5	2	1	0	0
9	Journal & Ledger	4	9.5	2	2	3	0
10	Cash Book	4	9.5	0	5	2	0
11	Trial Balance & Errors in Accy	3	7	5	0	0	0
12	Components of Final Accounts	3	7	2	3	0	0
Total		**42hrs**	**100**	**41**	**24**	**5**	**0**

K = Knowledge C = Comprehension A = Application
HA = Higher than Application (Analysis, Synthesis, Evaluation) $\mathbf{C}=\frac{b}{\sum b}\times 100$

9. Distribution of Marks:

DETAILED TABLE OF SPECIFICATIONS FOR EEA

Sl. No	Topic	OBJECTIVE TYPE				SHORT ANSWER TYPE					ESSAY TYPE					Grand
		K	C	A	T	K	C	A	HA	T	K	C	A	HA	T	Total
1	Introduc	3	1	0	4	2	2	0	0	4	0	0	0	0	0	8
2	Demand &Suppl	0	0	0	0	0	0	0	0	0	2	4	0	0	6	6
3	Production	1	0	0	1	2	0	0	0	2	3	2	0	0	5	8
4	Money	2	0	0	2	2	0	0	0	2	0	0	0	0	0	4
5	Banking Organis	1	0	0	1	0	0	0	0	0	2	2	0	0	4	5
6	Pricing	2	2	0	4	0	0	0	0	0	0	0	0	0	0	4
7	Introdu to B K	2	0	0	2	3	0	0	0	3	0	0	0	0	0	5
	Introduc to Comput	3	0	0	3	0	0	0	0	0	0	0	0	0	0	3
8	Transact	2	0	0	2	0	1	0	0	1	0	0	0	0	0	3
9	Journal & Ledge	1	0	0	1	0	0	0	0	0	1	2	3	0	6	7
10	Cash Book	0	2	0	2	0	0	0	0	0	0	3	2	0	5	7
11	Trial Balance	3	0	0	3	2	0	0	0	2	0	0	0	0	0	5
12	Componts F/Ac	0	0	0	0	0	0	0	0	0	2	3	0	0	5	5
	Total	20	5	0	25	11	3	0	0	14	10	16	5	0	31	70

K = Knowledge C = Comprehension A = Application
HA = Higher Than ApplicationT = Total

10. **Suggested implementation Strategies**: Modified syllabus may be implemented with effect from July, 2018 (Starting with the present batch (2018) of 2nd Semester students)
11. **Suggested learning Resource**:

a. Book list

Sl. No.	Title of Book	Name of Author(s)	Publisher
1	Introductory Micro Economics	Sandeep Garg	DhanpatRai Publication Pvt. Ltd. New Delhi
2	Introductory Macro Economics	Sandeep Garg	DhanpatRai Publication Pvt. Ltd.New Delhi
3	Theory and Practice of Accountancy	B. B. Dam R. A. Sarda R. Barman B. Kalita	Capital Publishing Company, Guwahati – 5
4	Book-Keeping & Accountancy	Juneja, Chawla &Saksena	Kalyani Publisher, New Delhi - 110002
5	Tally. ERP 9 For Beginners	Tally Solutions Pvt. Ltd.	Sahaj Enterprises, Bangalore
6			
7			
8			

b. List of Journals

c. Manuals

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3:Course Title: - FUNDAMENTALS OF ELECTRICAL & ELECTRONICS ENGINEERING

1. Course Code :- El/Et-304
2. Semester :- 3rd (Civil)
3. COURSE OUT COME (CO)

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

- Definecurrent, voltage, insulator, conductor etc.
- Solve numerical problems using Kirchhoff's law.
- Operate motor and generator.
- Explain briefly the alternating current and transformer
- Explain the use of semiconductor and transistor.
- Guide house wiring
- Explain the fundamental concept of digital electronics correlated to microprocessor with its applications.

CO s and ILOs

CO s	*ILO s*
CO -1. define current, voltage, insulator, conductor etc	1. Define conductor, insulator, and semiconductor with examples. 2. Define current, voltage, resistance, capacitance 3. Describe the Ohm's law 4. Solve problems related to Ohm's law
CO-2 Solve numerical problems using Kirchhoff's law	1. Explain DC network. 2. Define and explain the Kirchhoff's current and voltage law 3. Solve of critical problems by using Kirchhoff's current and voltage law 4. Use of Wheatstone bridge 5. Determine of unknown resistance by Wheastone bridge
CO-3 operate motor and generator	1. Define DC generator and motor 2. Explain the construction of DC generator and motor 3. Explain the working principle of DC generator and motor 4. Compare the DC motor and generator

	5. Enumerate different types of DC motor and generator 6. Explain use of DC generator and motor
CO -4 Explain briefly the alternating current and transformer	1. Define amplitude, time period, frequency, equation of alternating voltage and current, RMS, average value, instantaneous value, peak factor. 2. Explain RLC circuit 3. Explain inductance of AC circuit 4. Solve numerical problems 5. Explain construction of transformer 6. State operating principle of transformer 7. State type and uses of transformer 8. State step up and step down transformer
CO5- Explain the use of semiconductor and transistor	1. Define semiconductor, energy band, intrinsic and extrinsic semiconductor 2. Doping of semiconductor 3. Explain P-type, N-type semiconductor, 4. Define PN junction diode, forward and reverse biased diode, 5. Explain diode characteristics, application of PN junction diode like Half-wave, Full-Wave rectifier. 6. Explain Transistor: Physical construction of bipolarPNP and NPN transistor. 7. biasing circuit configuration 8. Explain different mode of transistor (CE, CB, CC). 9. State the application of transistor as an amplifier. 10. State elementary ideas of display - LED, LCD, Seven segment display.
CO-6 Guide house wiring	1. Define house wiring 2. Explain different methods of house wiring 3. State the safety and precautionary measure to be taken for electrical shock.

CO-7 Microprocessor	1. Explain the various symbolic representation of logic gates, combinational logic, basic operation of flip-flops, counters and registers. 2. State the fundamental concept of microprocessor and its application in instrumentation, 8085 microprocessor and its operation.

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	25	25	17/50	150	4

6. Detailed Course Content

Chapter No	Chapter Title	Content	Duration (in hours)
1	**Introduction**	Basics of Electricity: Revision of insulators and conductors and their examples ,Definition and units of voltage, current, resistance, inductance, capacitance, different voltage sources, Ohm's law, series & parallel combination of resistance .	4
2	DC network	DC network: Kirchhoff's Law, solving network problem to find current and voltage, Wheatstone bridge and Its problem.	5

3	Generator & motor	Faradays laws of electromagnetic induction, Flemings right hand and left hand rule D.C. generator and motor: Construction, operating principle, types, uses.	4
4	AC fundamental	A. C. Fundamentals: Basic terms-cycle, amplitude, time period, frequency, equation of alternating voltage and current, RMS, average value, instantaneous value, peak factor, form factor, simple problem	5
5	AC circuit	R-L-C series circuit: AC through resistance, capacitance, inductance and their combinations, expression for impedance, reactance, current, power factor, simple problem.	4
6	Transformer	Transformer Construction, operating principle, types and uses.	4
7	Semiconductor	Semiconductor: Definition of semiconductor, energy band diagram, intrinsic and extrinsic semiconductor, doping, P-type, N-type semiconductor, PN junction diode, forward and reverse biased diode, diode characteristics, application of PN junction diode like Half-wave, Full-Wave rectifier.	5
8	Transistor	Transistor: Physical construction of bipolar PNP and NPN transistor, biasing circuit configuration (CE, CB, CC). Application of transistor as an amplifier. Elementary ideas of display - LED, LCD, Seven segment display.	5
9	House wiring	9.1 Introduction to house wiring 9.2 Methods of house wiring 9.3 Safety and precautions measures against electrical hazard.	2

10	Microprocessor	1. Symbolic representation of logic gates, combinational logic, basic operation of flip-flops, counters and registers. 2. Fundamental concept of microprocessor and its application in instrumentation, 8085 microprocessor and its operation.	5
8	Class test	Two class test	2

7. Distribution of Marks/ Table of specifications

TABLE OF SPECIFICATIONS FOR THEORY

Sr. No	**Topic** (a)	**Time allotted in hours (b)**	**Percentage Weightage (c)**	**K**	**C**	**A**	**HA**
1	Introduction	4	9	3	0	0	
2	DC net work	5	11	3	0	4	
3	Generator & motor	4	9	3	0	5	
4	AC fundamental	5	11	4	3	4	
5	AC circuit	4	9	3	1	4	
6	Transformer	4	9	3	3	1	
7	Semiconductor	5	11	3	1	3	
8	Transistor	5	11	3	2	1	
9	House wiring	**2**	4	2	0	4	
10	**Microprocessor**	5	11	4	0	3	
11	Class test	2	4				
	Total	Σ b=45	100	31	10	29	

K = Knowledge C = Comprehension A = Application
HA = Higher Than Application (Analysis,Synthesis, Evaluation)

$c = \frac{b}{\Sigma b} \times 100$

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***
2	DC net work	1		1	***2***	2		3		***5***
3	Generator & motor	1		2	***3***	2		3		***5***
4	AC fundamental	2	1	1	***4***	2	2	3		***7***
5	AC circuit	1	1	1	***3***	2		3		***5***
6	Transformer	1		1	***2***	2	3			***5***
7	Semiconductor	1	1	1	***3***	2		2		***4***
8	Transistor	1	1	1	***3***	2	1			***3***
9	House wiring	1		1	***2***	1		3		***4***
10	Microprocessor	1		1	***2***	3		2		***5***
	Total				***25***					***45***

K = Knowledge C = Comprehension A = Application
HA = Higher Than ApplicationT = Total

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.

3. Optional question (if any) may be from the same topic in the form of either or type like below

QNo. Explain the properties of conductor

Or

Explain the properties of insulator

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

12. Ref Books:

I. A text book of Electrical Technology Vol – I, B. L. Theraja& A. K. Theraja, S. Chand.

II. Principle of Electronics, V. K. Mehta, S. Chand.

III. Electronic Principle, A.P. Malvino, Tata McGraw-Hill

IV. Electronic Devices & Circuits, Millman&Halkias, Tata McGraw-Hill

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3.Course Title :- FUNDAMENTAL OF ELECTRICAL & ELECTRONIC ENGINEERING (PRACTICAL)

1.Course Code :- El/Et-304

2.Semester :- 3rd (Civil)

INTELLECTUAL SKILLS

a. Identify the properties of generator, ammeter, voltmeter, transformer
b. Interpret the working principle of equipment
c. Interpret the test results
d. Follow the IS procedure of testing

MOTOR SKILLS

a. Measure the quantities accurately
b. Identify the instruments properly
c. Handle the equipment carefully.

LIST OF PRACTICAL

(Students are to perform minimum six experiments)

1. Verification of KCL and KVL
2. Study of DC shunt generator.
3. Milli ammeter as a Voltmeter.
4. Milli voltmeter as an ammeter.
5. Study of RLC series circuit.
6. Study of single phase transformer.
7. Determination of semi-conductor diode characteristic.
8. Study of transistor configuration (CE,CB.CC) (Project base)
9. Study of transistor as an amplifier. (Project base)
10. Hands on activity on house wiring (Mini project work on simple house wiring involving one light point, one fan point, one power socket, one MCB on a wooden or ply board

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4: Course Title :- BUILDING MATERIALS & CONSTRUCTION

1. Course Code :- Cv-302
2. Semester :- 3rd (Civil)
3. Course Objectives (CO s)

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

- Explain the properties and requirements of all building materials.
- Supervise and implement painting works
- Layout properly the foundation of the building.
- Identify various components of buildings and their functions.
- Mark layout of building on ground.
- Explain the procedure for execution of various constructions activities.
- Check the various construction activities.
- Prepare checklist of operations for supervision of various construction activities.
- Identify & suggest rectification the various defects in civil engineering works.

Pre-Requisite:-

- Student should be able to read the building plans.
- Student should be able to think over the construction problems and their remedies.
- Student should know the basic properties of material being used in the construction of the building.

INTENDED LEARNING OUTCOME (ILO):

CHAPTER TITLE/ CO s	ILO s
Introduction	• Explain different types of building materials used in construction.
Stone and bricks	• Define Various classification of stones and bricks. • Explain Requirements of good building stone and bricks • Explain Different uses of stones and bricks • State Different field test and laboratory test on stones and bricks • Explain Manufacturing process of bricks.
Sand and mortars	• State Various functions of sand in mortar and concrete. • Define Characteristics of good sand for mortar and concrete. • Identify Zoning of sand, fineness modulus of sand and bulking of sand. • Explain Properties of mortar and proportions of cement-sand-mortar

Timber & Miscellaneous materials	• Different uses and characteristics of timber. • Different types of defects in timber. • Uses and brief introduction of various miscellaneous materials like- Steel, glass, aluminum, PVC, resins etc.
Painting and Varnishing	• Characteristics of good paint. • Various methods of painting. • Uses of varnishing
Foundation	• Definitions and purpose of foundation. • Different types of foundation. • Importance of foundation of a building.
Masonry	• Definitions and principles to be observed in brick masonry. • Different types of bonding in brick masonry and their uses. • Definitions of Stone masonry and types of stone masonry. • Comparison between brick masonry and stone masonry.
Doors & windows	• Various classification of doors and their uses at specific location. • Various classification of windows and their functions. • Definition and types of scaffolding.
Damp proofing and floors	• Sources of dampness and its effects. • Methods used for prevention of damping. • Different types of ground floor and various factors affecting selection of suitable type of floor.
Plastering and pointing	• Different types of plaster and pointing • Necessity of plaster and pointing • Defects of plaster.

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	25	25	17/50	150	4

6. **Course content**

Chapter no	Chapter Title	Content	Contact hrs.
1	Introduction	1.1 Different types of materials used in construction 1.2 Description of engineering materials	1
2	Stone& Bricks	2.1 Classification of rock (Physical & chemical); Requirements of good building stone; Dressing of stone; Testing of stone-Water absorption and Impact test on stone; Uses of stone 2.2 Composition of good brick earth, Classification of bricks; Properties of first class brick; Different field and laboratory test on brick; Conventional bricks; Standard bricks; Special bricks- fire clay brick, refractory brick, hollow blocks, fly ash bricks	7
3	Sand & Mortar	3.1 Functions of sand in mortar and concrete, Characteristics of good sand for mortar and concrete work; Grading of fine aggregates; Zoning of sand; fineness modulus of sand , bulking of sand, Effect of bulking of sand in volumetric proportion of mortar and concrete 3.2 Cement–sand –mortar; usual proportions and specific uses; Lime mortar; Composite mortar; Special mortar; properties of mortar	6

4	Timber & Miscellaneous materials	4.1 Use of timber, characteristics of good timber, defects in timber, plywood, particle board, veneer, sun mica, artificial timber, rubber wood 4.2 Use and brief introduction of (Steel, Glass, Aluminum, PVC, CPVC, PPF, Waterproofing and Termite proofing materials, Bonding agents, Epoxy resins, Polishing materials etc) related to civil engineering construction. 4.3 Object and use of false ceiling, materials for false ceiling, methods of providing false ceiling.	7
5	Painting & Varnishing	5.1 Object and characteristics of good paint, composition of oil bound paint bas filler, solvent & pigment,Method of painting 5.2 Object and uses of Varnishing, 5.3 Objects and method of white washing	6
6	Foundation	6.1 Site clearance, preparing job layout, layout of structure by center line and face line method 6.2Excavation for foundation, timbering and strutting. 6.3 Definitions and purpose of foundation, Essential requirements of foundations ;Type of foundation-deep foundations and shallow foundations and their classifications.	6
7	Masonry	7.1 Definition, technical terms used in brick masonry, General principles to be observed in brick masonry, mortar, tools used in brick masonry Bonding, different types of bonding, their uses at specific locations 7.2 Stone masonry, technical terms used in stone masonry, mortar, tools used in stone masonry; Types of stone masonry-rubble masonry and ashlars masonry, their description with classification 7.3 Comparison between stone masonry and brick Masonry Hollow concrete block Masonry, composite masonry, Cavity wall- purpose and construction	6
8	Doors & Windows	8.1 Functions, locations, sizes of doors ; Classification of doors (description with sketches) and their uses at specific locations 8.2 Functions, locations, Sizes of windows; Classification of windows (description with sketches) and their uses at specific locations. 8.3 Definition and types of scaffolding, object of scaffolding	6

9	Damp proofing and floors	9.1 Definition of dampness, sources of dampness, effects of dampness 9.2 Methods used for prevention of dampness 9.3 Materials used for damp proofing 9.4 Damp proof course used for basement and at plinth, damp proofing of roofs 9.5 Ground floor-definition, different types of ground floors (name),description of concrete flooring, marble flooring 9.6 Factors affecting the selection of suitable type of floor	5
10	Plastering & pointing	a. Plastering – necessity of plastering, single coat plaster double coat plaster, special plasters , stucco plaster, Plaster board and wall claddings. Precaution to be taken while, Plastering. Defects in plaster. 10.2 Pointing – Necessity, types and procedure of pointing.	4
11	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

7. Distribution of Marks/ Table of Specifications

Chapter No	Chapter Title	Type of Question		Total Marks
		Objective Type (Compulsory)	Short Questions/	
1	Introduction	1	----	1
2	Stone & Bricks	4	6	10
3	Sand & Mortar	2	6	8
4	Timber & Miscellaneous materials	3	6	9
5	Painting & Varnishing	3	5	8
6	Foundation	3	4	7
7	Masonry	3	5	8

8	Doors & Windows	2	5	7
9	Damp proofing and floors	2	5	7
10	Plastering & pointing	2	3	5
Total		25	45	70

9.0 Table of Specification for Theory(Building Materials and construction)

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Introduction to Building materials	1	2	1	1	-	-
2	Stones and Bricks	7	13	1	2	5	-
3	Sand and Mortars	6	11	1	3	5	-
4	Timber and Miscellaneous Materials	7	13	1	2	5	-
5	Painting and varnishing	6	11	1	2	5	-
6	Foundations	6	11	-	2	5	-
7	Masonry	6	11	2	1	6	-
8	Doors and Windows	6	11	2	1	5	
9	Damp Proofing and Floors	5	9	1	-	5	-
10	Plastering and pointing	4	8		1	4	
		∑b=54 hrs+ 6hrs internal assessment	100	10	15	45	-

10 .0 Details Table of Specification for Theory

Sl no	Topic	OBJECTIVE TYPE/ SHORT ANSWER TYPE									ESSAY TYPE				
		K	C	A	***T***	K	C	A	HA	***T***	K	C	A	HA	***T***
1	Introduction to Building materials	1			***1***		1			***1***					
2	Stones and Bricks	1			***1***	1		1		***2***		5			***5***
3	Sand and Mortars		1		***1***	1	1	-		***2***			6		***6***
4	Timber and Miscellaneous Materials	1			***1***	1	-		-	***1***	-	3	3	0	***6***
5	Painting and varnishing	-	1		***1***	-	1	1		***2***	0	3	2		***5***
6	Foundations	1		-	***1***	-	1			***1***	2	3			***5***
7	Masonry	1			***1***		1	1		***2***	3	3			***6***
8	Doors and Windows	1			***1***	1	1	-		***2***			5		***5***
9	Damp Proofing and Floors	-	1		***1***		1			***1***			4		***4***
10	Plastering and pointing		1		***1***			1		***1***			3		***3***
					10					***15***					***45***

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

3. Optional question (if any) may be from the same topic in the form of either or type like below

Q:- Explain the necessity of plastering

Or

Explain the object of pointing

11.0 Suggested Implementation Strategies:- Teacher will use Black board, OHP, LCD Projector, Smart board, Video etc for effective teaching learning process.

12.0 **Text Books:-**

Name of books	**Name of author**	**Edition Name of the Publisher**
Construction Materials	D.N. Ghose	Tata McGraw-Hill
Building materials	Amarjit Agrawal	New India Publication
Building materials	S. K. Duggal	New Age International

Engineering materials	Sharma	PHI Publication
Building Construction	S. P. Arora and Bindra	DhanpatRai Publication
Building Construction	S. C. Rangawala	Charotar Publication
Building Construction	Sushil Kumar	Standard Publication
Building Materials & Construction	Saurabh Kr Soni	S K Kataria& Sons

Handbooks:

Sr. No.	Title	Author	Publisher
01	PWD Handbooks for -Materials - Masonry -Building -Plastering and Pointing - Foundation	AICTE	AICTE
02	Practical Civil Engineering Handbook	Khanna	Khanna Publication

BIS/ International Codes of Practice:

Sl.. No.	Title
01	National Building Code
02	962-1973 Code of Architectural and Building Drawing

XXXXXXXXXXXXXXXXXXXXX

4: Course Title :- BUILDING MATERIALS & CONSTRUCTION (PRACTICAL)

Total Contact Hr = 45 hrs.

Skills to be developed

INTELLECTUAL SKILLS

1. Identify the properties of building materials
2. Interpret the quality of materials
3. Interpret the test results
4. Follow the IS procedure of testing

MOTOR SKILLS

1. Measure the quantities accurately
2. Identify the instruments properly
3. Handle the equipment carefully.

LIST OF PRACTICAL

A. BRICK TEST
   1. Determination of water absorption
   2. Determination of compressive strength
   3. Determination of efflorescence
   4. Determination of dimension

B. STONE TEST
   1. Determination of water absorption
   2. Determination of impact value
   3. Determination of specific gravity
   4. Sieve analysis of coarse aggregate (Stone)

C. SAND TEST
   1. Determination of bulking of sand
   2. Determination of specific gravity
   3. Determination of surface moisture
   4. Determination of fineness modulus and zone by sieve analysis.

D. Visit of brick field nearby.

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.

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

5:Course Title :- WATER RESOURCE ENGINEERING

1. Course Code :- Cv-301
2. Semester :- 3rd (Civil)
3. Course Outcome (CO)

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

- Define irrigation and its necessity
- Define delta, duty, base period and establish relation between them.
- Explain hydrological cycle and its importance
- Apply integrated approach to watershed
- Apply techniques of soil and water conservation in watershed management
- Use peoples participation in local watershed management and development
- Explain various head works in irrigation
- Guide in construction of dams

INTENTED LEARNING OUTCOME(ILO)

Sl.No.	Course outcomes/ CHAPTER	Intended Learning
1.	CO-1:Introduction Sources of water, Definition of irrigation, Necessity of irrigation, Advantages of irrigation, Types of irrigation, Brief description of each type of irrigation.	1. Explain the sources of water 2. Define irrigation. 3. Define Necessities of irrigation 4. State the advantages of irrigation 5. State the types of irrigation 6. Explain each type of irrigation.
2.	CO-2:Water requirements of crops Delta, Duty, Base period, Relationships of delta, duty and base period, numerical problem.	1. Explains the terms ‘Delta’, ‘Duty’ and ‘Base period’. 2. Derive a relationship between delta, duty and base period. 3. Solve the numerical problems.

3.	CO-3:Definition of common terms Kor depth, Kor period, Crop ratio, outlet factor, Capacity factor, Cumec Day, GCA,CCA, Intensity of irrigation, Root-Zone-depth, Crop rotation.	1. Define the following- Kor depth, Kor period, Crop ratio, outlet factor, Capacity factor, Cumec Day, GCA,CCA, Intensity of irrigation, Root-Zone-depth, Crop rotation.
4.	CO-4: Hydrological cycles Importance of hydrological cycle, Measurement of precipitation by rain-gauges, Automatic and non - automatic gauges , types of precipitation, Computation of average rainfall over a basin , Factors affecting the run-off, characteristics of catchment surface,	1. Importance of hydrological cycle, 2. Measurement of precipitation by rain-gauges, 3. What are types of rain-gauge. 4. Explain the Automatic and non -automatic gauges 5. Types of precipitation, 6. Computation of average. 7. Define the term Runoff 8. What are Factors affecting the run-off 9. What are the characteristics of catchment surface. 10. Relationship between Rainfall and runoff.
5.	CO-5: Watershed management Introduction and definition of watershed management ,objectives of watershed management, concept of integrated watershed management, causes and prevention of soil erosion	1. Briefly describe the watershed management. 2. What are the objectives of watershed management? 3. What are concept of integrated watershed management? 4. Briefly explain the causes of soil erosion. 5. State the prevention of soil erosion.
6.	CO-6: Head works Component parts of a diversion head work and their	1. What are the Component parts of a diversion head work. 2. Briefly discuss the function of parts of a diversion head work.

	function. Selection site of a head work	3. Selection site of a head work
7.	CO-7: Weir section Weir section showing its different components, Function of Barrage	1. Define weir . 2. Weir section showing its different components. 3. Function of Barrage.
8.	CO-8: Gravity dam Forces acting on a gravity dam , selection of site of a gravity dam, classification of dams, sketch of a gravity dam showing its various components, causes of failure of gravity dam,Earthdam,causes of failure of earth dam and protection work against failure	1. Briefly discuss about the forces acting on a gravity dam. 2. Selection of site of a gravity dam. 3. Classification of dams 4. Sketch of a gravity dam showing its various components. 5. Causes of failure of gravity dam. 6. Define Earth dam. 7. Causes of failure of earth dam. 8. Protection work against failure.
9.	CO-9:Canals Classification of canal,briefly description of contour canal,Ridge canal and watershed canal,purpose of canal lining,types of lining	1. State the classification of canal. 2. Briefly description of contour canal. 3. State the Ridge canal. 4. State the watershed canal. 5. What are the purposes of canal lining. 6. State the types of lining.
10.	CO-10:Cross drainage works Definition, purposes of different cross drainage works with sketches	1. Definition 2. Purposes of different cross drainage works with sketches.
11.	CO-11: Water logging Definition of water logging, ILL effects of water logging,reclamation of waterlogged areas	1. Definition of water logging. 2. ILL effects of water logging. 3. Reclamation of waterlogged areas.

4. Teaching Scheme (in hours/week)

Lecture	Tutorial	Practical	Total
4			4

5. Examination Scheme :

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

6. Detail course content

Chapter No	Chapter Title	Content	Duration (in hours)
1	Introduction	➢ Sources of Water ➢ Definition of irrigation ➢ Necessity of irrigation ➢ Advantages of irrigation ➢ Types of irrigation ➢ Brief description of each type of irrigation	3
2	Water requirements of crops	➢ Delta ➢ Duty ➢ Base period ➢ Relationships of delta, duty and base period, numerical problems	5
3	Definition of common terms	➢ Kor depth ➢ Kor period ➢ Crop ratio ➢ Outlet factor	3

		➢ Capacity factor ➢ Cumec day ➢ GCA, ➢ CCA ➢ Intensity of irrigation ➢ Root-zone-depth ➢ Crop rotation	
4	Hydrological cycles	➢ Importance of hydrological cycle ➢ Measurement of precipitation by rain-gauges ➢ Automatic and non automatic gauges ➢ Types of precipitation ➢ Computation of average rainfall over a basin ➢ Runoff, factors affecting runoff ➢ Characteristics of catchment area ➢ Rainfall and runoff relationship	8
5	Watershed management	➢ Introduction and definition of watershed management ➢ Objectives of watershed management ➢ Concept of integrated watershed management ➢ Causes and prevention of soil erosion	8
6	Head works	➢ Component parts of a diversion head work and their function ➢ Selection site of a head work	5
7	Weir section	➢ Weir section showing its different components ➢ Function of barrage	2
8	Gravity dam	➢ Forces acting on a gravity dam ➢ Selection of site of a gravity dam ➢ Classification of dams ➢ Sketch of a gravity dam showing its various components ➢ Causes of failure of gravity dam ➢ Earth dam	10

		➢ Causes of failure of earth dam and protection work against failure	
9	Canals	➢ Classification of canal ➢ Brief description of contour canal, ridge canal and watershed canal ➢ Purpose of canal lining ➢ Types of lining	3
10	Cross drainage works	➢ Definition ➢ Purposes of different cross drainage works with sketches	3
11	Water logging	➢ Definition of water logging ➢ Ill effects of water logging ➢ Reclamation of waterlogged areas	3
12	Class test/Revision/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

8. Distribution of Marks/ Table of Specifications

Chapter No	Chapter Title	Type of Question		Total Marks
		Objective Type (Compulsory)	Short Questions/ Descriptive questions	
1	Introduction	1	2	3
2	Water requirements of crops	2	5	7
3	Definition of common terms	2	3	5
4	Hydrological cycles	4	6	10
5	Watershed management	4	6	10

6	Head works and weir section	2	6	8
7	Gravity dam	4	8	12
8	Canals and cross drainage works	3	6	9
9	Water logging	3	3	6
		25	45	70

TABLE OF SPECIFICATIONS FOR THEORY

Sr. No	Topic (a)	Time allotted in hours (b)	Percentage Weightage (c)	K	C	A	HA
	Introduction	3	5				
	Water requirements of crops	5	8				
	Definition of common terms	3	5				
	Hydrological cycles	8	13				
	Watershed management	8	13				
	Head works	5	8				
	Weir section	2	4				
	Gravity dam	10	17				
	Canals	**3**	5				
	Cross drainage works	**3**	5				
	Water logging	**3**	5				
	Class test/Revision/Seminar	**7**	13				
	Total	Σ b=60	100				

K = Knowledge C = Comprehension A = Application
HA = Higher Than Application (Analysis, Synthesis, Evaluation)

$$c = \frac{b}{\Sigma b} \times 100$$

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***
2	Water requirements of crops	1		1	***2***	2		3		***5***
3	Definition of common terms	1		1	***2***		3			***3***
4	Hydrological cycles	1	1	2	***4***	2		4		***6***
5	Watershed management	1	2	1	***4***	2		4		***6***
6	Head works and weir section	1		1	***2***	2	4			***6***
7	Gravity dam	1	1	2	***4***	2	2	4		***8***
8	Canals and cross drainage works	1	1	1	***3***		3	3		***6***
9	Water logging	1	1	1	***3***			3		***3***
	Total				***25***					***45***

K = Knowledge C = Comprehension A = Application
HA = Higher Than Application T = Total

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

3. Optional question (if any) may be from the same topic in the form of either or type like below

Q:- Define Duty Or Define Delta

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

12. Text books:

Name of author	Titles of the book	NAME OF PUBLISHER
S.K. Garg	Irrigation and hydraulic structure	Khanna publisher
B.C. Punmia	Irrigation engineering	Laxmi publication
S R Sahasrabudhe	Irrigation Engineering	S K Kataria& Sons
S R Sahasrabudhe	Water Resource Engineering	S K Kataria& Sons

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6: Course Title :- CIVIL ENGINEERING DRAWING

1. Course Code :- Cv-303
2. Semester :- 3rd (Civil)
3. Course Objectives (CO s)

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

- Read, interpret and draw the building drawings.
- Prepare and submission drawings for the building.
- Prepare working drawings for the building.
- Plan various types of buildings considering the functional requirements.
- Apply the building rules, regulations and byelaws.

CO/ CHAPTER	Intended Learning Outcome (ILO)
CO-1 Read, interpret and draw the building drawings.	1. State the plan, elevation and section of a drawing 2. Explain the importance of drawing in Civil Engg 3. Symbol used in Civil Engg drawing 4. Importance of plan, elevation and section of drawing 5. Execution in field as per drawing
CO-2 Prepare submission drawings for the building.	**Preparation and submission of drawing of** 1. Partly paneled and partly glazed door 2. Fully paneled Door 3. battened and ledge door 4. Flush door 5. fully glazed window 6. fully paneled window 7. Steel framed glazed window. 8. King post, Queen post, steel truss, stair case
CO-3 Prepare working drawings for the building.	Preparation and submission of 1. Single and two storied residential building (Framed structure type) showing

	a. Plan b. Elevation c. Section d. Foundation plan e. Construction notes f. Site plan g. Area statement 2.Working drawing of above drawing sheet preferably one plan, section through stair case to scale 1:50 3. Pitched roofed residential building (Framed structure type) showing Plans , Elevation, Sections, Foundation Plan ,construction notes, Schedule of openings, Site Plan ,Area statement etc.
CO-4 Plan various types of buildings considering the functional requirements& CO-5 Apply the building rules, regulations and byelaws.	1. Importance and Principles of planning of Residential and Public building. 2. Hygienic condition of building 3. Standard size of various rooms 4.Building planning as per local building bye laws and its implementation 5. Explain the set back

4. Teaching Scheme (in hours/week)

Lecture	Tutorial	Practical	Total
		6	6

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						
			-----	100	50	50/150	150	4

6. Course Contents :

Unit	Topic	Contact hour Th + Pr
1	**Getting started**: 1.1 importance of drawing (plan, elevation and section) 1.2 Symbols used in Civil Engineering Drawing	5
2	**Submission of Drawing :Doors and Window** 2.1 Partly paneled and partly glazed door 2.2 Fully paneled Door 2.3 battened and ledge door 2.4 Flush door 2.5 fully glazed window 2.6 fully paneled window 2.7 Steel framed glazed window.	10
3	**Submission of Drawing :Roof Truss** 3.1 King post, Queen post 3.2 Steel roof Truss	10
4	**Planning of Building** 4.1 Principles of planning of Residential and Public building. 4.2 Building planning as per local building bye laws and its implementation	10
5	**Stair Case** 5.1 Draw the plan and section of dog legged and straight stair case (teacher should only discuss other types of stair case as required for site specific condition)	5
6	**Submission of Building Drawing** 6.1 Draw a single and two storied residential building (Framed structure type) showing Plans , Elevation, Sections, Foundation Plan ,construction notes, Schedule of openings, Site Plan ,Area statement etc. Working drawing of above drawing sheet preferably one plan, section through	30

	stair case to scale 1:50 6.2 Draw a pitched roofed residential building (Framed structure type) showing Plans , Elevation, Sections, Foundation Plan ,construction notes, Schedule of openings, Site Plan ,Area statement etc. Working drawing of above drawing sheet preferably one plan, section to scale 1:50.	
7	8.1 Two point perspective view of a small object like pedestal, step block, small single storied building with flat roof etc.	10
8	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	10

7. MARKS DISTRIBUTION: - ***Question setter will try to set question from every chapter. Marks will be allotted logically as per weightage of the chapter.***

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

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

3. Optional question (if any) may be from the same topic in the form of either or type.

9.0 Table of Specification for Practical (Civil Engineering Drawing)

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Introduction to Building Drawing(Getting Started)	5	3	1	2	-	-
2	Doors and Windows	10	12	1	1	15	-
3	Roof Truss	10	12	1	1	15	-
4	Planning of	10	12	1	2	5	-

	Buildings						
5	Stair case	5	6	1	2	10	-
6	Building Drawing	30	33	-	-	30	-
7	Perspective View drawing.	10	12	2	5	-	5
		∑b=90 hrs	100	7	13	75	5

11.0 Reference books

Text Books:-

Titles of the Book	Name of Authors	Edition	Name of the Publisher
Text Book of Building Drawing	Shah, Kale, Patki	--	
Elements of Building Drawing	D. M. Mahajan	--	
Planning and Design of Building.	Y. S. Sane	--	
Civil Engineering Drawing	Malik & Mayo		New Asian Publishers, New Delhi

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7: Course Title :- PROFESSIONAL PRACTICE-I

1. Course Code :- Cv-310
2. Semester :- 3rd (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 Objective (CO s)

After completion of the course the Student will be able to:

a) Acquire information from different sources.
b) Prepare notes for given topic.
c) Present given topic in a seminar.
d) Interact with peers to share thoughts.
e) 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. Prepare a report on the source.
2.	CO-2: Prepare notes for given topic.	1. Identification of an important topic 2. Group discussion 3. Note preparation on that 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)

Lecture	Tutorial	Practical	Total
1		2	2

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	-----	25	25	17/50	50	2

6. Course Content

UNIT	TOPIC/ACTIVITIES	CONTACT HRS
1	Industrial visit : Structured industrial visit shall be arranged and report of the same should be submitted by individual student (Any two of the following) 1.1 Nearby Brick manufacturing plant 1.2 Nearby Cement factory 1.3 Nearby irrigation project 1.4 Nearby stone query 1.5 Any other relevant industry/ factory as decided by teachers	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 Recent development of building materials 2.2 Firefighting/ Safety precautions/ First aid 2.3 Computer Networking and Security 2.4 Career opportunities. 2.5 Any other topic as decided by concerned teacher	6
3	Group discussion: The students should discuss in a group of six to eight students and write a brief report on the same as a part of term work. Two topics for group discussions may be selected by the faculty members. Some of the suggested topics are - 3.1 Current topic related to Civil Engg 3.2 The role of student in the progress of the nation 3.3 Use of internet/ mobile 3.4 Any other relevant topic selected by teaches.	6
4	Student Activities : The students in a group of 3 to 4 will perform any one of the following activities and same will be presented in seminar	8

	4.1 Market survey of building materials 4.2 Study of availability of local construction materials 4.3 Study of locally available timbers 4.4 Any other relevant field selected by teachers	

Remarks

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

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FOURTH SEMESTER
CIVIL ENGINEERING BRANCH

COURSE STRUCTURE OF CIVIL ENGINEERING 4TH 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-401	Surveying	3		3	70	10	20	30	33	25	25	17	150	4
CV-402	Structural Mechanics	3			70	10	20	30	33				100	3
CV-403	Hydraulics	3		3	70	10	20	30	33	25	25	17	150	4
CV-404	Estimating-I	3			70	10	20	30	33				100	3
CV-405	Computer Aided Drafting & Drawing			6						100	50	50	150	4
CV-406	Concrete Technology	3		3	70	10	20	30	33	25	25	17	150	5
CV-410	Professional Practice-II	1		2						25	25	17	50	2
Total		16		17										
		33			Grand Total =								850	25

Variations :- New subject Concrete Technology has been added in place of Water Resource Engg. Civil Engineering Drawing-II has been renamed as Computer Aided Drafting & drawing as because some topics related to the Computer Aided Design has been proposed in new syllabus. Content of almost all subjects have been modified.

Important:-*Evaluation Process for the subject* Computer Aided Drafting & Drawing (Cv-405) *:- Students will be evaluated through continuous process by entrusting some practical work related to CAD. For evaluation of theory Knowledge seminar may be conducted. Evaluation shall be done at Institute level. No question paper will be set by SCTE.*

1: Course Title: - SURVEYING

1. Course Code :- CV-401
2. Semester :- 4 th (Civil)
3. Course Outcome (CO)

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

- Use the surveying instrument.
- Take linear and angular measurement.
- Measure the area of land.
- Prepare lay out and maps and Set out alignment for roads, railways, canal, tunnels, pipelines, etc.
- Use the surveying instrument like theodolite and plane table.

CO/ CHAPTER	Intended Learning Objectives (ILO)
CO-1 Use the surveying instrument.	1. Define surveying 2. Explain the objective and classification of survey 3. State the principles of surveying 4. Measuring distances by various methods 5. Familiar with different surveying instruments 6. Solving numerical problems
CO-2 Take linear and angular measurement	1. Direct measurement- Pacing, Passometer, Pedometer, Odometer, Speedometer, Perambulator, Chain and Tape 2. State types of chain and testing of chain. 3. Errors due to incorrect chain. 4. Indirect measurement- basic idea of tachometry, electronic distance measurement (EDM). 5. Ranging- direct and indirect ranging. Chaining on sloping ground. 6. Use of compass in surveying 7. Measurement of bearings of a line by compass 8. Traversing by compass 9. Detection and correction of local attraction
CO-3 Measure the area of land.	1. State the area of land 2. Measure the area of land after traversing by

	chain and compass
CO-4 Prepare lay out and maps and Set out alignment for roads, railways, canal, tunnels, pipelines, etc.	1. Preparation of lay out and maps of any project or location 2. Alignment for roads 3. Alignment for canal 4. Alignment for tunnel and pipelines
CO-5 Set up and perform plane table survey	1. Explain of plane table and its accessories 2. Set up the plane table in the field 3. State the Methods of plane table survey 4. Perform Two point and three point problem 5. Explain the Advantages and disadvantages of plane table survey

Pre-requisite:-

- Student should be perfect in drawing and sketching.

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)		33/100	PT	PA	17/50	150	4
	TA	HA						
70	10	20		25	25			

6. Detailed Course Content

Chapter No	Chapter Title	Content	Duration (in hours)
1	**Introduction and overview**	➢ Definition and objectives of survey. ➢ Primary division of survey. ➢ Principle of surveying ➢ Classification of surveying ➢ Work of a surveyor	2

2	**Measurement of distances**	➢ Direct measurement- Pacing, Passometer, Pedometer, Odometer, Speedometer, Perambulator, Chain and Tape ➢ Different types of chain and testing of chain. ➢ Instrument for chaining ➢ Errors due to incorrect chain. ➢ Indirect measurement- basic idea of tachometry, electronic distance measurement (EDM). ➢ Ranging- direct and indirect ranging. Chaining on sloping ground. ➢ Numerical problems related to above problems.	5
3	**Chain survey**	➢ Basic concept, survey stations, survey lines. ➢ Offsets and number of offsets for locating details ➢ Instruments for setting right angles ➢ Obstacles in chaining, numerical problems ➢ Field book and making entries into a field book and plotting ➢ Computation of area.	6
4	**Compass survey**	➢ Basic concept, compass and their types and their comparisons. ➢ Open and closed traverse. ➢ Meridians and bearings, designation of bearings, fore and back bearings, numerical problems. ➢ Local attraction and numerical problems related to it. ➢ Methods of traversing with chain and compass, plotting ➢ Closing error and balancing of traverse. ➢ Magnetic declination, agonic and isogonic lines and variations of magnetic declination, dip of the needle, numerical problems.	8
5	**Levelling**	➢ Definition and terminology ➢ Leveling instruments, modern leveling instruments- a) Automatic level	10

		b) Digital level c) Leveling staff ➢ Temporary adjustment of levels ➢ Basic leveling operation and terminology ➢ Reduced levels and booking of entries in a level page book. ➢ Different methods to determine the reduce level of stations. ➢ Different methods of leveling- a) Fly leveling b) Profile leveling c) Cross sectioning d) Reciprocal leveling ➢ Curvature and refraction error in leveling, dip of horizon, numerical problems	
6	Plane table survey	➢ Principle of plane table and features of its accessories ➢ Setting up the plane table in the field ➢ Methods of plane table survey ➢ Two point and three point problem ➢ Advantages and disadvantages of plane table survey	
7	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

8. Distribution of Marks / Table of specifications

Chapter No	Chapter Title	Type of Question		Total Marks
		Objective Type (Compulsory)	Shot/Descriptive Questions	
1	**Introduction and overview**	2		2
2	**Measurement of distances**	4	5	9
3	**Chain survey**	5	6	11
4	**Compass survey**	5	7	12
5	**Levelling**	5	15	20
6	Plane table	4	12	16
Total		25	45	70

9. TIME ALLOTMENT TABLE

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Introduction and overview	2	5				-
2	Measurement of distance	5	12				-
3	Chain survey	6	14				-
4	Compass Survey	8	18				-
5	Levelling	10	23				-
6	Plane table	6	14				-
7	Internal assessment	6	14				-
		∑b=37 hrs+ 6hrs internal assessment	100				-

10. MARKS DISTRIBUTION TABLE

Sl no	Topic	OBJECTIVE TYPE				SHORT/ DESCRIPTIVE ANSWER TYPE				
		K	C	A	***T***	K	C	A	HA	***T***
1	Introduction and overview	1	1		***2***					
2	Measurement of distance	2	2		***4***	2		3		***5***
3	Chain survey	2	2	1	***5***	2		4		***6***
4	Compass Survey	2	1	2	***5***	2	2	3	-	***7***
5	Levelling	1	1	3	***5***	3	5	7		***15***
6	Plane table	1		3	***4***	3	3	6		***12***
7	Internal assessment									
					25					***45***

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

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

12. 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 and Levelling	N.N.BASAK	Tata McGraw-Hill
Text book of surveying	S.K.Husain, M.S. Nagaraj	S. Chand and company

Surveying and levelling vol. I and II	S. K. Duggal	TATA MC GRAW-HILL

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

Q no:- Explain briefly the two point problem

Or

Explain briefly the three point problem

xxxxxxxxxxxxxxxxxxxxxxxx

Name of course: SURVEYING PRACTICAL

Course code: Cv-401(P)
Duration: 45 hrs.
Teaching scheme
Practical: 3 hrs/week
Practical: 0 hrs/week

Semester: 4th
Maximum Marks: 50
Examination scheme:
Internal assessment: 25 Marks
Practical /viva: 25 Marks

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SKILLS TO BE DEVELOPED**:**

- *INTELLECTUAL SKILLS*:

  1) Identify the different instruments for linear measurement and levelling
  2) Record and observing necessary observation with the survey instruments
  3) Classify and discriminating various types of survey instruments.
  4) Identify the errors of the survey instruments.

  MOTOR SKILLS:

  1. Measure distances, bearings and finding reduced levels with survey instruments.
  2. Prepare drawing using survey data.
  3. Prepare traverse of a given terrain/topography.
  4. Prepare a level book and calculate the RL of points.

- **Instructions:**

  1) Group size for survey practical work should be maximum 6 students.
  2) Each student from a group should handle the instrument independently 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.

Pre-requisite:-

Student should be perfect in drawing and sketching

Detail course content

Unit	Topic	Hour
1.	Measurement of distance with chain and tape on ground with direct or indirect ranging. Measurement with EDM.	03
2.	Construction & use of optical square & open cross for setting out perpendicular & running survey line for locating details.	03
3	Preparation of chain survey map of a small area available within the campus/vicinity of the institute	06
4	Study of prismatic compass, setting the compass and measuring bearing of lines. Determining angle between two lines.	06

5	Prismatic compass traversing including plotting the traverse and showing graphical adjustment. Use of dumpy level, temporary adjustment of level, taking staff readings, recording records in a level page book	12
6	Longitudinal section including plotting of profile leveling.	06
7	Use of auto level & taking observation.	03
8	Direct and indirect contouring in two separate sheets including sectional views.	06

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

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2: Course Title :- STRUCTURAL MECHANICS

1. Course Code :- CV-402
2. Semester :- 4 th (Civil)
3. Course Objectives (CO)

After completion of the course the students will be able to:-

CO1:- Recognize the concept of one and two dimensional simple and compound stress and strain.
CO2:- Identify the stress developed in beams due to forces applied.
CO3:- Analyze the slope and deflection of beams.
CO4:- Calculate bending moments and shear force and draw SFD and BMD.
CO5:- Analyze the columns and struts.
CO6:- Analyze the truss.
CO7:- Analyze the stability of dam and retaining walls.

Course Outcomes (COs)	Intended Learning Outcomes(ILOs)
CO-1 Recognize the concept of one and two dimensional simple and compound stress and strain.	1. Define stress, strain, Poison's ratio 2. State Hook's law 3. Elastic constants and their relationship 4. Composite sections 5. Effects of temperature on stresses 6. Numerical problems related to the above topics
CO-2 Identify the stress developed in beams due to forces applied.	1. Theory of simple bending 2. Calculating Section modulus for various sections 3. Flitched beam for symmetrical section 4. Formula of Bending stresses in beams- I section and T section 5. Numerical problems related to the above topics
CO-3 Analyze the slope and deflection of beams.	1. Finding Slope and deflection of simply supported beam and cantilever beam 2. Numerical problems related to the above topics
CO-4 Calculate bending moments and shear force and draw SFD and BMD.	1. Different Types of beams and loads(udl and point loads) 2. Definitions of shear force and bending moment and their sign conventions, point of contra flexure and location of maximum bending moment 3. Drawing SFD and BMD for udl and point load for a. Simply supported beam b. Cantilever beam c. Overhanging beam 4. Numerical problems related to the above topics

CO-5 Analyze the columns and struts.	1. Define Long columns and short columns, slenderness ratio, effective length for different end condition 2. Define Buckling load or crippling load 3. Deduce Euler's formula for crippling load and assumptions for Euler's formula 4. Deduce Rankine's formula for long columns 5. Numerical problems related to the above topics
CO-6 Analyze the truss.	1. Different types of truss 2. Analysis of perfect frame by method of joint 3. Numerical problems related to the above topics
CO-7 Analyze the stability of dam and retaining walls.	1. Different forces acting on dam and retaining wall 2. Calculation of stress at the base of dams and retaining walls 3. Analyzing the stability of dam 4. Numerical problems related to the above topics

Pre-requisite:-

Student should be perfect in engineering mechanics

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)	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	**Simple stresses and strains**	➢ Definition of stress, strains. Poison's ratio ➢ Hook's law ➢ Elastic constants and their relationship(no deduction is required)	4

		➢ Composite sections ➢ Temperature stresses ➢ Numerical problems related to the above topics	
2	**Shear force and bending moments**	➢ Types of beams and loads(u.d.l. and point loads) ➢ Definitions of shear force and bending moment and their sign conventions, point of contra flexure and location of maximum bending moment ➢ SFD and BMD for udl and point load for a. Simply supported beam b. Cantilever beam c. Overhanging beam ➢ Numerical problems related to the above topics	8
3	**Stresses in beams**	➢ Theory of simple bending ➢ Section modulus for various sections ➢ Flitched beam for symmetrical section ➢ Bending stresses in beams- I section and T section(no deduction) ➢ Numerical problems related to the above topics	5
4	**Slopes and deflection of beams**	➢ Slopes and deflections of simply supported beam and cantilever beam (no deduction) ➢ Numerical problems related to the above topics	4
5	**Column and struts**	➢ Long columns and short columns, slenderness ratio, effective length for different end condition ➢ Buckling load or crippling load ➢ Euler's formula for crippling load and assumptions for Euler's formula	6

		➢ Rankine;s formula for long columns ➢ Numerical problems related to the above topics	
6	**Analysis of truss**	➢ Types of truss ➢ Analysis of perfect frame by method of joint ➢ Numerical problems related to the above topics	6
7	**Dams and retaining walls**	➢ Forces acting on dam and retaining wall (having vertical face towards soil fill with no surcharge load) ➢ Calculation of stress at the base of dams and retaining walls ➢ Stability analysis of dams ➢ Numerical problems (Simple) related to the above topics	6
8	**Class test**	➢ 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/ Descriptive Questions	
1	**Simple stresses and strains**	3	5	8
2	**Shear force and bending moments**	5	8	13
3	**Stresses in beams**	3	7	10
4	**Slopes and deflection of beams**	4	6	10
5	**Column and struts**	3	6	9

6	**Analysis of truss**	3	7	10
7	**Dams and retaining walls**	4	6	10
Total		25	45	70

9.0 TIME ALLOTMENT TABLE

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Simple stresses and strains	4	10				-
2	Shear force and bending moments	8	17				-
3	Stresses in beams	5	11				-
4	Slopes and deflection of beams	4	10				-
5	Column and struts	6	13				-
6	Analysis of truss	6	13				-
7	Dams and retaining walls	6	13				-
8	Internal assessment	6	13				
		∑b= 45	100				-

10.0 MARKS DISTRIBUTION TABLE

Sl no	Topic	OBJECTIVE TYPE				SHORT/ DESCRIPTIVE ANSWER TYPE				
		K	C	A	***T***	K	C	A	HA	***T***
1	Simple stresses and strains	1	-	-	***1***	1	2	2		***5***
2	Shear force and bending moments	1	1	2	***4***	2	3	3		***8***
3	Stresses in beams	1	-	2	***3***	2	2	3		***7***
4	Slopes and deflection of beams	1	1	2	***4***	-	3	3		***6***
5	Column and struts	1	2	1	***4***	2	-	4		***6***
6	Analysis of truss	1	2	2	***5***	2	2	3		***7***
7	Dams and retaining walls	1	2	1	***4***	-	2	4		***6***
8	Internal assessment									
					25					***45***

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

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

12 **Text books:**

Titles of the book	Name of author	NAME OF PUBLISHER
Strength of materials	S. Ramamuratham& R. Narayan	Dhanpatrai& Sons
Structural Mechanics	A K Upadhyay	S K Kataria& Sons
Structural Mechanics	R S Khurmi	S. Chand & Company Delhi
Strength of materials	M. Chakraborty	S K Kataria& Sons
Mechanics of Structures volume –I & II	S. B. Junnarkar	Charotar Publishing House, Anand
Strength of Materials	F. L. Singer	Harpe Collins Publishers India ,Delhi

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 from the same topic in the form of either or type like below

Q no:- Define stress and strain
Or
Define poisons ratio.

XXXXXXXXXXXXXXXXXXXXX

3: Course Title :- HYDRAULICS

1. Course Code :- CV-403
2. Semester :- 4 th (Civil)
3. Course Objectives (CO)

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

- To define the properties of various fluids .
- To name different types of pressures and various pressure measuring devices.
- To calculate hydrostatic forces and pressure on plane surfaces immersed in water.
- To explain types of forces, energy and application of Bernoulli's theorem.
- To describe different types of Orifices and Mouthpieces and to derive discharge formulae and their practical applications.
- To state the different losses of head of flowing liquids in pipes and their equations.
- To describe different types of Notches and Weirs, and deriving the discharge formulas and their Practical applications.
- To describe different types of Channels and their discharge formulas and to determine the condition for maximum discharge
- To explain the construction details, specifications and efficiencies of Reciprocating Pumps and Centrifugal Pumps.

Course Outcome (CO)	Intended Learning outcome (ILO)
CO-1 To define the properties of various fluids	**ILOs** **1.** Define Mass, force, weight ,volume, specific gravity, specific weight, density, relative density, compressibility, viscosity, cohesion, adhesion, capillarity and surface tension, SI Units for area, volume, velocity, acceleration, density, discharge, force, pressure and power.
CO-2 To name different types of pressures and various pressure measuring devices	1 . List out of different pressure measuring instrument 2. State the relation between atmospheric pressure, gauge pressure and vacuum pressure
CO-3 To calculate hydrostatic forces and pressure on plane surfaces immersed in water	1. State the intensity of pressure 2. Conversion from intensity of pressure to pressure head 3 . Measurement of pressure by pressure measuring instrument 4 . Measuring of pressure in horizontal, vertical and inclined plane.
CO-4 To explain types of forces, energy and application of Bernoulli's theorem.	1 . Define laminar flow, turbulent flow, steady flow, unsteady flow, uniform and non uniform flow. 2 . Define continuity of equation and Bernoulli's theorem

	3. State potential, kinetic and pressure energy of liquid 4. Use of venturimeter and pitot tube
CO-5 To describe different types of Orifices and Mouthpieces and to derive discharge formulae and their practical applications	1 . State different types of orifice, vena contracta, hydraulic coefficient. 2 . State the different discharge formula 3. Solving of numerical problems
CO-6 To state the different losses of head of flowing liquids in pipes and their equations	1 . State the different losses in pipe flow 2. Measurement of minor and major losses in pipe flow 3. State Darcy's and Chezy's equation 4. Solving of numerical problems.
CO-7 To describe different types of Notches and Weirs, and deriving the discharge formulas and their Practical applications.	1. Define various types of notches and weirs. 2. Derivation of equation of discharge formula by various notches and weirs 3. Solving of numerical problems.
CO-8 To describe different types of Channels and their discharge formulas and to determine the condition for maximum discharge	1. Definition ansd Classification of Rectangular and Trapezoidal channels 2. Discharge by Chezy's formula, Bazin's formula and Manning's formula. 3. Importance of Hydraulic mean depth 4. Condition for maximum discharge 5. Solving of numerical problems

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

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	25	25	17/50	150	4

6. Detailed Course Content

Chapter No	Chapter Title	Content	Duration (in hours)
1	**Introduction**	Hydraulics – Definition - Properties of fluids - Mass, force, weight ,volume, specific gravity, specific weight,	4

		density, relative density, compressibility, viscosity, cohesion, adhesion, capillarity and surface tension, SI Units for area, volume, velocity, acceleration, density, discharge, force, pressure and power.	
2	Measurement of Pressure	Pressure of liquid – Intensity of pressure - Pressure head of liquid, Conversion from intensity of pressure to pressure head and vice-versa, Formula and Simple problems. Types of pressures – Atmospheric pressure, Gauge pressure, Vacuum pressure and Absolute pressure . Measurement of pressure - Simple mercury Barometer, Pressure measuring devices, Piezometer tube , Simple U-tube manometer , Differential manometer – Micrometer. Simple numerical problems. Pressure on plane surfaces - Horizontal, vertical and inclined surfaces-Total pressure-Centre of pressure - Depth of centre of pressure – Resultant pressure Numerical Problems	6
3	Flow of fluids	Types of flow – Laminar and turbulent flow - Steady and unsteady flow –Uniform and Non-uniform flow - Equation for continuity of flow (law of conservation of mass) – Energy possessed by a fluid body – Potential energy and Potential Head – Pressure energy and Pressure Head - Kinetic Energy and Kinetic Head - Total Energy and Total Head –Bernoulli's theorem – (Proof not necessary) . Practical applications of Bernoulli's theorem – Venturi meter – Orifice meter (Derivation not necessary) - Simple numerical problems. **FLOW THROUGH ORIFICES AND MOUTHPIECES** Definitions- Types of orifices - Vena contracta and its significance –Hydraulic coefficients Cd, Cv and Cc and their relationship. Simple problems. Large orifice – Definition and Discharge formula – Simple problems – Practical applications of orifices – Types of mouthpieces - External and internal mouthpieces - Discharge formula - Simple problems. **FLOW THROUGH PIPES** Losses of head in pipes – Major losses - Minor losses - Sudden enlargement, sudden contraction, obstruction in pipes (no proof is necessary) -Simple problems – Energy / Head losses of flowing fluid due to friction Darcy's equation - Chezy's equation (No derivation) – Numerical Problems - Transmission of power through pipes – Efficiency - Pipes in parallel connected to reservoir - Discharge formula - Simple problems. **FLOW THROUGH NOTCHES** Definitions- Types of notches – Rectangular, Triangular and Trapezoidal notches – Derivation of equations for discharges - Simple problems - Comparison of V-Notch and Rectangular Notch.	16

		FLOW THROUGH WEIRS Definitions - Classification of weirs - Discharge over a rectangular weir and trapezoidal weir – Derivation – Simple problems – End contractions of a weir – Franci's and Bazin's formula – Simple problems - Cippoletti weir –Problems - Narrow crested weir – Sharp crested weir with free over fall - Broad crested weir - Drowned or Submerged weirs - Suppressed weir -Stepped weir – Problems - Definition of terms - Crest of sill, Nappe or Vein,	
4	Flow through Open channel	Definition - Classification - Rectangular and Trapezoidal channels –Discharge – Chezy's formula, Bazin's formula and Manning's formula. Hydraulic mean depth – Problems Conditions of rectangular/trapezoidal sections - Specific energy, critical depth –Conditions of maximum discharge and maximum velocity - Numerical Problems Methods of measurements of velocities – Channel losses - Lining of canals – Advantages of lining of canals - Types of lining- Cement concrete lining with sketches	6
5	Pumps	8.1 Pumps – Definition and types. Centrifugal pump – component parts and their functions, principle of working, priming. Reciprocating pump – component parts and working.Submersible and Jet pump. Selection and choice of pump.Computation of power required for pumps.Turbines – Definition and types.	5
6	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.	8

7. Distribution of Marks/ Table of Specifications

Chapter No	Chapter Title	Type of Question		Total Marks
		Objective Type (Compulsory)	Short/ Descriptive Questions	
1	Introduction	3	-	3
2	Measurement of Pressure	6	6	12
3	Flow of fluids	7	24	31
4	Flow through open channel	5	10	15
5	Pumps	4	5	9
Total		25	45	70

9.0 TIME ALLOTMENT TABLE

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Introduction	4	9				-
2	Measurement of Pressure	6	13				-
3	Flow of fluids	16	36				-
4	Flow through Open channel	6	13				-
5	Pumps	5	11				-
6	Internal assessment	8	18				-
		∑b= 45	100				-

10.0MARKS DISTRIBUTION TABLE

Sl no	Topic	OBJECTIVE TYPE				SHORT/ DESCRIPTIVE ANSWER TYPE				
		K	C	A	***T***	K	C	A	HA	***T***
1	Introduction	1	1	2	***4***	-	-	-		***-***
2	Measurement of Pressure	1	2	3	***6***	2	1	3		***6***
3	Flow of fluids	2	2	2	***6***	6	6	12		***24***
4	Flow through Open channel	1	2	2	***5***	2	3	5		***10***
5	Pumps	1	1	2	***4***	-	2	3		***5***
6	Internal assessment									
					25					***45***

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

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

12.0 Suggested Learning Resource :-

12.1 Book list

1. Dr. JagadishLal - Hydraulics, Fluid Mechanics and Hydraulic Machines-Metropolitan Book
13.0 Company- New Delhi
2. P.N. Modi& S.M. Sethi - Fluid Mechanics - Standard Publishers – New Delhi
3. S. Ramamirtham-Hydraulics,Fluid Mechanics and Hydraulics Machines- DhanpatRai&
13.1 Sons, New Delhi
4. K.L.Kumar - Fluid Mechanics – EurasaPublshing House – New Delhi
5. R.K. Bansal - Fluid Mechanics - Lakshmi Publications
6. Prof. S. Nagarathinam - Fluid Mechanics - Khanna Publishers – New Delhi
7. K.R. Arora - Hydraulics, Fluid Mechanics and Hydraulics Machines –Standard Publishers &
14.0 Distributors, New Delhi

8. B C S Rao, "Fluid Mechanics and Machinery" Tata-McGraw-Hill Pvt. Ltd., New Delhi
9. Different related Journals/ manuals shall be referred.

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

Q no:- Differentiate between uniform flow and non uniform flow

Or

Differentiate between laminar flow and turbulent flow.

Xxxxxxxxxxxxxxxxxxxxxxxxxxxx

Course Title :- HYDRAULICS (PRACTICAL)

Contact hrs:- 45 Practical to be performed: 08 (Any eight)

SKILLS TO BE DEVELOPED

INTELLECTUAL SKILLS:

a. Identify the different instruments/ equipment
b. Interpret test results
c. Calculate quantities of parameters
d. Draw graphs

MOTOR SKILLS:

a. Operate different equipment properly.
b. Measure different parameters accurately
c. Adjust levels by operating and controlling valves

1. Measurements of pressure and pressure head by Piezometer, U-tube manometer
2. Measurement of pressure difference by U-tube differential manometer.
3. Verification of Bernoulli's theorem
4. Reynolds experiment to study types of flow.
5. Determination of Darcy's friction factor for given pipe.
6. Determination of Minor losses pipes (any two)
7. Demonstration of Hydraulic jump
8. Determination of coefficient of discharge for given rectangular or triangular notch.
9. Determination of coefficient of discharge for a given Venturimeter.
10. Demonstration and use of Pitot tube and current meter.
11. Determination of hydraulic coefficients for sharp edge orifice.
12. Study of a model of centrifugal and reciprocating pump.

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

Xxxxxxxxxxxxxxxxxxxxx

4: Course Title :- ESTIMATING-I

1. Course Code :- CV-404
2. Semester :-4th (Civil)
3. Objective of the Subject/ Courses :-
   On completion of the course, the student will be able to

- Calculate the approximate cost of civil structure
- Take measurement of civil engineering work
- Know about various types of estimates.
- Calculate different items of work of a building.
- Calculate approximate cost different item of services.

INTENDED LEARNING OUTCOME (ILO)

SUBJECT NAME: ESTIMATING-I
SUBJECT CODE: CV-404

CHAPTER TITLE	After the completion of the chapter, the students will learn
Introduction	➢ Definition of Estimating and purpose of estimating. ➢ Units of measurement of different items of works. ➢ Rate of payments of different items of works.
Types of estimates	➢ Primary division of estimates ➢ Different types of rough estimates ➢ Different types of detailed estimate ➢ Bill of quantities
Method of building estimate	➢ Center line and long wall and short wall method with example
Different items of work	➢ Calculation of quantity of materials of different items of works viz. cement concrete work, timber work for frame, shutter and trusses, plastering, painting and flooring
Sanitary and plumbing	➢ Unit of measurement and method of estimating sanitary fittings and plumbing works in residential buildings. ➢ Estimate of septic tank.
Estimate of RCC items of works	➢ Estimation of beams, columns and slab showing bar bending schedule ➢ Bar bending schedule for reinforcement calculation in standard Performa. ➢ Calculation of quantity of shuttering for different items of RCC work.

Pre-requisite:-

Student should have basic knowledge about area, volume of objects.

4. Teaching Scheme (in hours/week) Total contact hours : 45 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. Detail course content

Chapter No	Chapter Title	Content	Duration (in hours)
1	**Introduction**	➢ Definition of Estimating and purpose of estimating. ➢ Units of measurement of different items of works. ➢ Rate of payments of different items of works.	3
2	**Types of estimates**	➢ Primary division of estimates a. Detailed estimate b. Rough estimate ➢ Different types of rough estimates d. Plinth area estimates e. Carpet area estimate f. Cube rate estimate ➢ Different types of detailed estimate a. Detailed estimate b. Revised estimate c. Supplementary estimate d. Annual repair estimate ➢ Bill of quantities	6
3	**Method of building estimate**	➢ Center line and long wall and short wall method with example (considering isolated footing or combined footing)	8

4	**Different items of work**	➢ Calculation of quantity of materials of different items of works viz. a. Cement concrete work b. Timber work for frame, shutter and trusses c. Plastering d. Painting e. flooring	10
5	**Sanitary and plumbing**	➢ Unit of measurement and method of estimating sanitary fittings and plumbing works in residential buildings. ➢ Estimate of septic tank.	4
6	**Estimate of RCC items of works**	➢ Beams ➢ Columns ➢ Slab showing bar bending schedule ➢ Bar bending schedule for reinforcement calculation in standard Performa. ➢ Calculation of quantity of shuttering for different items of RCC work.	8
7	**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

7. **Distribution of marks/ Table of specifications**

Chapter No	Chapter Title	Type of Question		Total Marks
		Objective Type (Compulsory)	Short/ Descriptive Questions	
1	**Introduction**	3		3
2	**Types of estimates**	5	7	12
3	**Method of building estimate**	5	12	17
4	**Different items of work**	4	10	14
5	**Sanitary and plumbing**	3	6	9

6	**Estimate of RCC items of works**	5	10	15
Total		25	45	70

9.0 TIME ALLOTMENT TABLE

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Introduction	3	7				-
2	Types of estimates	6	13				-
3	Method of building estimate	8	18				-
4	Different items of work	10	22				-
5	Sanitary and plumbing	4	9				-
6	Estimate of RCC items of works	8	18				-
7	Internal assessment	6	13				-
		∑b= 45	100				-

10.0 MARKS DISTRIBUTION TABLE

Sl no	Topic	OBJECTIVE TYPE				SHORT/ DESCRIPTIVE ANSWER TYPE				
		K	C	A	***T***	K	C	A	HA	***T***
1	Introduction	1	2	1	***4***	-	-	-		***-***
2	Types of estimates	1	2	2	***5***	2	2	3		***7***
3	Method of building estimate	2	1	2	***5***	2	2	8		***12***
4	Different items of work	2	2	1	***5***	3	3	4		***10***
5	Sanitary and plumbing	1	-	-	***1***	1	2	3		***6***
6	Estimate of RCC items of works	-	2	3	***5***	2	3	5		***10***
7	Internal assessment									
					25					***45***

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

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

12. Text books:

Titles of the book	Name of author	NAME OF PUBLISHER
Estimating and costing in civil engineering	B.N. Dutta	UBS publication
Civil Engineering contracts and estimates	B.S. Patil	Universities press
Estimating and costing	G.S. Birdie	DhanpatRai and Sons
Civil Estimating & Costing	A.K. Upadhyay	SK kataria& Sons
Estimating & costing	S.C. Rangwala	Charotar Publication Anand

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

Q no:- What do you mean by detailed estimate ?

Or

What do you mean by revised estimate?

XXXXXXXXXXXXXX

5: Course Title :- COMPUTER AIDED DRAFTING & DRAWING

1. Course Code :- CV-405
2. Semester :- 4 th (Civil)
3. Course Objective (CO)

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

a. Apply various commands related to CAD
b. Develop drawing strategies
c. Use the software properly
d. Draw and print various drawing using SOFTWARE/ CAD perfectly.

CO	ILO
CO-1 Apply various commands related to CAD	1 . Explain various commands related to CAD 2 . Explain command window, drop down menu, toolbars 3 . Apply line command, co-ordinates, relative co-ordinates 4 .Explain polar co-ordinates, offset, fillet 5 . Set up Drawing unit, drawing size and scale, the grid, drawing limit, drawing with grid and shape, saving a drawing
CO-2 Develop drawing strategies	1. Develop drawing strategies 2. Use layers to organize drawing 3. Use Blocks and W blocking 4. Generate, plan, elevation and section of a drawing 5. Work with hatches and fills 6. Apply proper dimensioning in drawing 7. Get familiar with proper shape.
CO-3 Use the software properly	1 . Explain various software related to Auto CAD 2 . Handle the software properly 3 . Use the software in generating drawing
CO-4 Draw and print various drawing using AUTO CAD perfectly	1. Explain various paper size 2 . Use the Printer 3 . Print / plot configuration dialog box, device and default information, pen parameter, paper size, and orientation, scale rotation and origin, additional parameters, printing a drawing , determining line weight for a drawing setting up the other parameters for the print, previewing a print, printing a drawing with paper space, printing drawing with multiple viewports, printing site plan

4. Teaching Scheme (in hours/week)

Lecture	Tutorial	Practical	Total
		6	6

5. Examination Scheme :-

Theory			Pass marks (ESE+SS)	Practical		Pass marks (PT+PA)	Total marks (Pr)	Credit
ESE	Sessional (SS)			PT	PA			
	TA	HA						
				100	50	50	150	4

7. Content for theory:

Unit	Topic	Contact hour
1	**Getting started**: Starting up Drafting software , introduction to the graphics window, command window, drop down menus, toolbars (flying out, calling up and arranging etc of toolbars)	2
2	**Basic command to get started** Point and line command, coordinates, relative coordinates, Cartesian and Polar coordinates, drawing a box (as an example rectangle) by coordinates; offset, fillet, extend, divide and trim commands (use to generate walls and opening as exercise).	4
3	**Setting up a drawing** Drawing unit, drawing size and scale, the grid, drawing limit, drawing with grid and shape, saving a drawing	3
4	**Developing drawing strategies** Note: the preliminary exercise should be based on rectangular building because at the initial stage too complex drawing may distract and confuse the students Laying out the walls, exterior walls and interior walls, creating wall opening, creating doors, swing of doors, copying objects, mirroring objects, finishing the swinging doors, drawing a sliding glass door, paneled door (by using fillet command) drawing steps and threshold The balcony (balcony should be circular/elliptical to learn the control over circle and elliptical command) Laying out Kitchen: counter, stove and refrigerator sink ,Constructing bathroom and W.C. (setting and running object shapes): drawing shower unit, bathing block and W.C.	8
5	**Using layers to organize drawing** Layers as an organizing tool, setting up layers, layers and line-type properties dialog box. Assigning objects to layers. Freezing and turning off layers, drawing the header (portion above opening beneath the ceiling), Drawing the roof, Colour, Line types and layers. Assigning a colour or line-type to an object, Making a colour and a line-type current. Assigning an individual line-type scale factor.	6
6	**Using Blocks and W blocking** Making a block for a door, Inserting the door block, Finding the block	5

	in a drawing, Using grips to detect a block, Using the list command to detect a block. Using the properties button to detect a block, Creating the window block., inserting the window block, rotating a block during insertion, using guidelines when inserting a block, using point filters to insert a block, using blips to help in inserting block, finishing the windows revising a block, W blocking, inserting a DWG file into a DWG file	
7	**Generating elevation** Drawing the front elevation, setting up lines for height, trimming lines in elevation, drawing the roof in elevation, putting in the door, step and windows, finishing touches, generating the other elevations, making rear elevation making the left and right elevation, drawing scale consideration, interior elevations/sections	6
8	**Working with hatches and fills** Ornamenting the front elevation by hatching looking at hatch pattern special effects modifying hatch pattern providing hatch to floor (for ornamentation)	3
9	**Controlling drawing texts** Setting up text styles, text and drawing scales, defining text styles, using single line text, placing title of views in the drawing, placing room label in the floor plan, using text in a grid, creating a title block and border, using multiline text	3
10	**Dimensioning in drawing** Dimension styles, making a new dimension style, placing dimension on the drawing, horizontal dimension, vertical dimension, other dimension, radial, leader line, angular and aligned dimension modifying dimension text, dimension overrides, dimensioning short distances	3
11	**External references** Drawing site plan, using bearings (surveyor's unit), laying out property lines, setting up external reference dialog box, controlling the appearance of an External reference (External reference),Modifying an External reference drawing, application for External reference, additional features of external references, the External reference path, binding External reference, other features of External reference	1
12	**Getting families with proper shape** Setting up proper space, drawing a border in paper space, designing a title block for paper space, creating floating view path, zooming view part to 1/Xp, working with multiple viewport in paper space, setting u multiple viewports, aligning viewports, finishing drawing setting up viewports to different scale adding text to paper space turning off viewports, tile mode variable and tiled viewpoint	3
13	**Printing an auto CAD drawing** The print / plot configuration dialog box, device and default information, pen parameter, paper size, and orientation, scale	1

	rotation and origin, additional parameters, printing a drawing , determining line weight for a drawing setting up the other parameters for the print, previewing a print, printing a drawing with paper space, printing drawing with multiple viewports, printing site plan.	
Total		45

Practical:

Unit	Topic	Contact hour
1	Draw a wooden door (2/3 rd glazed and 1/3 paneled using sash-bar) with standard dimension	3
2	Draw a wooden window (raised panel with fanlight) with standard dimension	3
3	Building drawing Single storied building shall comprise of two rooms, bath, WC, kitchen, front verandah with a provision of staircase and mumty for utilization of roof space. Development of line plan – ground floor plan and roof plan with provision for drainage layout. Elevation (front elevation) Two Sectional elevation (section must pass through stair-case, bath WC, kitchen and front verandah) Site plan (to be developed from a Mouza map for conception of location plan) Foundation details (trench plan, section of main wall and a partition wall/ isolated footing with tie beam if provided)	20
4	Septic tank Details of Septic tank along with the connection to latrine and soak pit.	8
5	Culvert Plan, Elevation and Section of Box type culvert and Hume pipe culvert.	7
6	Section of road and railway track	4

8.0 Distribution of marks: No specific marks have been allotted chapter wise. Teachers will evaluate the students through continuous evaluation process.

9.0 TIME ALLOTMENT TABLE

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Getting started	2	5				-
2	Basic command to get started	4	8				-
3	Setting up a drawing	3	6				-
4	Developing drawing strategies	8	17				-
5	Using layers to	6	12				-

	organize drawing						
6	Using Blocks and W blocking	5	10				-
7	Generating elevation	6	12				-
8	Working with hatches and fills	3	6				
9	Controlling drawing texts	3	6				
10	Dimensioning in drawing	3	6				
11	External references	1	3				
12	Getting families with proper shape	3	6				
13	Printing an auto CAD drawing	1	3				
		∑b= 48	100				-

10.0 MARKS DISTRIBUTION TABLE

Sl no	Topic	OBJECTIVE TYPE				SHORT/ DESCRIPTIVE ANSWER TYPE				
		K	C	A	***T***	K	C	A	HA	***T***
1	Getting started									
2	Basic command to get started									
3	Setting up a drawing									
4	Developing drawing strategies									
5	Using layers to organize drawing									
6	Using Blocks and W blocking									
7	Generating elevation									
8	Working with hatches and fills									
9	Controlling drawing texts									
10	Dimensioning in drawing									
11	External references									
12	Getting families with proper shape									
13	Printing an auto CAD drawing									
14	Internal assessment									

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

11.0 Suggested Implementation Strategies:- Teacher will use Black board, OHP, Smart board, video etc for effective teaching learning process . ***All students may be advised to purchase laptop of their own at the beginning of the course.***

12.0 Text Books:-

Name of Books	Name of the author	Edition	Name of the Publisher
Autodesk official training guide	Scott Onstott		Wiley-India
Autodesk officialtraining guide	George Omura		Wiley-India
Engineering Drawing Plus	Venugopal K		New Age International
Auto CAD Building Drawing			
Reference Manual of AutoCAD	AutoDesk		

Evaluation Process:- Students will be evaluated through continuous process by entrusting some practical work related to CAD. For evaluation of theory Knowledge seminar may be conducted. Evaluation shall be done at Institute level. No question paper will be set by SCTE.

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6: Course Title :- CONCRETE TECHNOLOGY

1. Course Code :- Cv-406
2. Semester :- 4th (Civil)
3. COURSE OUTCOME (CO)

The Students will be able to

- Determine the properties of concrete ingredients i.e. cement. sand. coarse aggregate by conducting different tests.
- Use different types of cement as per their properties for different fields applications.
- Design economic mix proportion for different exposure conditions and intended purposes.
- Supervise various concreting operations.
- Carry out field and laboratory tests on concrete in plastic and hardened stage.
- Use different types of admixtures to improve the properties of concrete for different field applications.
- Describe different types of concrete.
- Infer the test results as per relevant I.S. provisions.

COURSE OUTCOME (CO)

SUBJECT NAME: CONCRETE TECHNOLOGY
SUBJECT CODE: CV-406

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

- Determine the properties of concrete ingredients i.e. cement, sand, coarse aggregates by conducting different tests.
- Use different types of cement as per their properties for different field applications.
- Determine the quality of water to be used in concrete.
- Use different grades of concrete on the basis of strength as per relevant I.S. provisions.
- Design economic mix proportion for different exposure conditions and intended purposes.
- Conduct quality control of concrete.
- Supervise various concreting operations.
- Carry out field and laboratory tests on concrete in plastic and hardened state.
- Use different types of admixtures to improve the properties of concrete for different field applications.
- Take precautions for extreme weather concreting
- Describe special types of concrete.
  Infer the test results as per relevant I.S. provisions

INTENDED LEARNING OUTCOME (ILO)

SUBJECT NAME: CONCRETE TECHNOLOGY
SUBJECT CODE: CV-406

CHAPTER TITLE	After the completion of the chapter, the students will learn
Introduction	➢ Definition of cement concrete ➢ Composition of cement concrete ➢ Advantages and disadvantages of concrete Difference between regular concrete and advance concrete
Cement	➢ Composition of cement ➢ Physical properties of Ordinary Portland Cement(OPC) ➢ Definition and process of hydration of cement, ➢ Fineness, initial and final setting times, compressive strength and soundness of cement ➢ Different grades of OPC and their specification as per BIS ➢ Field & Laboratory tests of cement ➢ Storing of cement at site and effect of storage of cement on properties of concrete ➢ Various types of cement ➢ Difference between OPC and PPC ➢ Quality of water to be used in concrete
Properties of concrete	➢ Different grades of concrete (ordinary concrete, standard concrete & high strength concrete as per provisions of IS 456- 2000) ➢ Minimum grade of concrete for different exposure conditions ➢ Minimum grade of concrete for R.C.C. ➢ Durability of concrete ➢ Definition of water-cement ratio and its significance ➢ Selection of w/c ratio for different grades of concrete prepared from different grades of OPC as per graphs specified in IS 10262 -1982 ➢ Maximum w/c ratio for different grades of concrete for different exposure conditions. ➢ Properties of fresh concrete ➢ Definition of workability and factors affecting workability of concrete ➢ Determination of workability of concrete by slump cone test ➢ Range values of workability requirement for different types of concrete works ➢ Concept of cohesiveness, segregation, harshness and bleeding ➢ Properties of hardened concrete

	➢ Definition of compressive strength, impermeability elastic properties of concrete, modulus of elasticity of concrete ➢ Creep and factors affecting creep ➢ Shrinkage and factors affecting shrinkage
Concrete mix design	➢ Objectives of mix design ➢ Mix design procedure by I.S. method as per I.S. 10262-2009 ➢ Testing of concrete and its significance ➢ Determination of compressive strength of ➢ concrete cubes at different ages ➢ Non- destructive testing of concrete and its importance and methods of NDT
Quality control of concrete	➢ Batching and types of batching ➢ Different types of mixers and vibrators ➢ Formwork and different types of formworks for different works such as beams, slabs, columns, well foundation ➢ Process of transportation, placing, compaction & finishing of concrete ➢ Definition, necessity and methods of curing of concrete
Extreme weather concreting & chemical Admixture in concrete	➢ Effects of cold and hot weather on concrete and precautions to be taken while concreting in cold and hot weather condition ➢ Properties and applications of different types of admixtures in concrete
Properties of special concrete	➢ Properties, advantages and limitations of special types of concrete

4. Teaching Scheme (in hours/week) Total Contact Hr= L 45 hrs. T 15 hrs. P 45 hrs.

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	25	25	17/50	150	5

6. Detailed Course Content

Chapter No	Chapter Title	Content	Duration (in hours)
1	Introduction	Cement Concrete, Composition of cement Concrete, Advantages and disadvantages of concrete, Regular concrete, Advance Concrete	02
2	Cement	2.1 Cement :- Composition of cement, Physical properties of Ordinary Portland Cement(OPC), Hydration of cement, Fineness, ,initial& final setting times ,compressive strength &soundness, different Grades of OPC& their specification as per BIS ,Field & Laboratory tests of cement, storing of cement at site, effect of storage of cement on properties of concrete. Various type of cement .Differentiate between OPC &PPC 2.2 Water :- Quality of water to be used in concrete.	05
3	Properties of concrete	3.1 Different grades of concrete (ordinary concrete, standard concrete & high strength concrete as per provisions of IS 456- 2000), minimum grade of concrete for different exposure conditions, minimum grade of concrete for R.C.C., durability of concrete 3.2 Water cement ratio, Definition of w/c ratio, significance of w/c ratio, selection of w/c ratio for different grades of concrete prepared from different grades of OPC as per graphs specified in IS 10262 - 1982, maximum w/c ratio for different grades of concrete for different exposure conditions. 3.3 Properties of fresh concrete Definition of workability, factors affecting workability of concrete. Determination of workability of concrete by slump cone test . Range values of workability requirement for different types of concrete works, cohesiveness, segregation, harshness, bleeding. 3.4 Properties of hardened concrete Definition of compressive strength, impermeability elastic properties of concrete, modulus of elasticity of concrete. Creep, factors affecting creep, shrinkage, factors affecting shrinkage	8
4	Concrete mix design	4.1 Objectives of mix design, list of different method of mix design, study of mix design procedure by I.S. method as per I.S. 10262-2009, determination of design mix proportion by mass for M 20 grade of concrete using I.S. Method for given data (such as grading zone of sand, proportion of 20 mm & 10 mm	8

		metals, Specific gravities of cement, sand & aggregate , water absorption of sand & aggregate, compacting factor and exposure condition). 4.2 Testing of concrete Significance of testing, determination of compressive strength of concrete cubes at different ages (Say 7 days and 28 days) interpretation & co-relation of test results 4.3 Introduction to different Non- destructive testing of concrete, Importance of NDT, methods of NDT - rebound hammer test & Determination of rebound index & compressive strength of concrete by rebound hammer test as per I.S. 13311,determination of quality of concrete by ultrasonic pulse velocity test	
5	Quality control of concrete	5.1 Batching, Volume & weight batching, volume batching for nominal mixes & weight batching for design mix concrete Different Types of Mixers & Vibrators , types of mixers (tilting & non-tilting type) Different types of vibrators - needle vibrator, surface vibrator, table vibrator, principle & application of each type of vibrator 5.2 Formwork : formwork for concreting, different types of formworks for different works such as beams, slabs, columns, well foundation, materials used for formwork, requirement of good formwork, stripping time for the removal of formwork as per I.S. 456- 2000 provisions for different structural members. 5.3 Transportation, placing, compaction & finishing of concrete ,Modes of transportation of concrete , precautions to be taken during transportation and placing of concrete in formwork compaction of concrete, methods of compaction, care to be taken during compaction, purpose of finishing, types of finishing & requirement of good finish. 5.4 Curing of concrete : definition of curing, necessity of curing, different methods of curing and their application (spraying water, membrane curing, steam curing, curing by infra red radiations, curing by wet gunny bags, ponding methods).	10
6	Extreme weather concreting & chemical	6.1 Extreme weather concreting Effect of cold weather on concrete, effect of hot weather on concrete, precautions to be taken while concreting in hot & cold weather	03

	Admixture in concrete	condition. 6.2 Chemical admixture in concrete Properties & application for different types of admixture such as accelerating admixtures, retarding admixtures, water reducing admixture, air entraining admixture & super plasticizers.	
7	Properties of special concrete	Properties, Advantages & Limitation of the following types of Special concrete i) Ready mix Concrete ii) Reinforced Concrete iii) Pre stressed Concrete iv) Fiber Reinforced Concrete v) Precast Concrete vi) High performance Concrete	03
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	06

7. Distribution of Marks/ Table of specifications

Chapter No	Chapter Title	Type of Question		Total Marks
		Objective Type (Compulsory)	Short/Descriptive Questions	
1	Introduction	1		1
2	Cement	4	5	9
3	Properties of concrete	5	10	15
4	Concrete mix design	5	10	15
5	Quality control of concrete	5	12	17
6	Extreme weather concreting & chemical Admixture in concrete	2	5	7
7	Properties of special concrete	3	3	6
		25	45	70

9.0 TIME ALLOTMENT TABLE

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Introduction	2	5				-
2	Cement	5	11				-
3	Properties of concrete	8	17				-
4	Concrete mix design	8	17				-
5	Quality control of concrete	10	23				-
6	Extreme weather concreting & chemical Admixture in concrete	3	7				-
7	Properties of special concrete	3	7				-
8	Internal assessment	6	13				
		∑b= 45	100				-

10.0 MARKS DISTRIBUTION TABLE

Sl no	Topic	OBJECTIVE TYPE				SHORT/ DESCRIPTIVE ANSWER TYPE				
		K	C	A	***T***	K	C	A	HA	***T***
1	Introduction	1	-	-	***1***	-	-	-		***-***
2	Cement	1	2	1	***4***	1	2	2		***5***
3	Properties of concrete	1	2	2	***5***	2	3	5		***10***
4	Concrete mix design	2	1	2	***5***	1	2	7		***10***
5	Quality control of concrete	1	1	2	***5***	3	3	6		***12***
6	Extreme weather concreting & chemical Admixture in concrete	1	-	-	***1***	-	2	3		***5***
7	Properties of special concrete	1	2	1	***4***	-	3	-		***3***
8	Internal assessment									
					25					***45***

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

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

12.0 Suggested Learning Resource :-

Book list

Title of Book	Writer	Publisher
Concrete Technology	MS Shetty	S. Chand Publication
Concrete Technology	ML Gambhir	Tata McGraw . Hill Publishing Co. Ltd. New Delhi
Concrete Technology	A. M. Neyille& J JBrooks	List of Journals Pearson Education (Singapore) Pyt. Ltd. New Delhi
A Text book of Concrete Technology-	P D Kulkarni	M. H. Ghosh and Phullpublication

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

Q no:- Explain briefly the properties of fine aggregates

Or

Explain briefly the properties of coarse aggregates.

Xxxxxxxxxxxxxxxxxxxxxxxxxx

Course Title :- CONCRETE TECHNOLOGY (PRACTICAL)

Contact hrs :-45

Practical:
Skill to be developed:

INTELLECTUAL SKILLS:
1. Identify the qualities of materials.
2. Analyze the given data
3. Select proper method for analysis
4. Interpret the results

MOTOR SKILLS :
1. Measure the quantities accurately
2. Handle instruments properly
3. Mix the ingredients properly.

LIST OF PRACTICALS TO BE DONE

1) Determination of fineness of cement preferably by Blaine's air permeability apparatus or by sieving.
2) Determination of standard consistency of Cement
3) Determination of initial & final setting times of Cement.
4) Determination of compressive strength Cement
5) Determination of soundness of Cement.
6) Determination of specific gravity of cement

7) Determination of aggregate abrasion value.
8) Determination of aggregate crushing value.
9) Determination of tensile strength of rod.
10) Determination of compressive strength of cube

Note: video cassettes or cd's of above 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.

&&&&&&&&&&&&&&&&&&&&&&&&

7: Course Title :- PROFESSIONAL PRACTICE-II

1. Course Code :- Cv-410
2. Semester :- 4th (Civil)
3. Objective 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:

f) Acquire information from different sources.
g) Prepare notes for given topic.
h) Present given topic in a seminar.
i) Interact with peers to share thoughts.
j) 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 Paver Block manufacturing plant b. Nearby water treatment plant c. Nearby stone crusher plant d. Nearby pre stressed concrete plant
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)

Lecture	Tutorial	Practical	Total
1		2	2

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						
---	---	---	-----	25	25	17/50	50	2

6. Course content

UNIT	TOPIC/ACTIVITIES	CONTACT HRS
1	Industrial visit : Structured industrial visit shall be arranged and report of the same should be submitted by individual student (Any two of the following) 1.6 Nearby Paver Block manufacturing plant 1.7 Nearby water treatment plant 1.8 Nearby stone crusher plant 1.9 Nearby pre stressed concrete plant 1.10 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 Computer aided drafting and design 2.2 Mix design of high strength concrete/ Ready mix concrete	6

	2.3 Building bye laws 2.4 Social responsibilities of Civil Engineer. 2.5. Any other topic as decided by teachers	
3	Individual Assignment: Student will be given some individual assignment and asked to submit them. **Any two** from the list suggested a) Measure of floor area of all building of the campus b) Preparation of index map of the campus c) High order thinking (HOT) Assignment on Bending moment, Shear force, deflection of beam d) Assignment on flow through pipes, orifices, notches e) Writing of materials specification of all sanitary and plumbing materials f) Estimation of a septic tank g) List out the rate of different main items from PWD (building) schedule. h) Pin point some suitable locations for plantation of trees in your campus i) Any other assignment given by teacher.	6
4	Student Activities : The students in a group of 3 to 4 will perform any one of the following activities and same will be presented in seminar 4.5 List out the different varieties of cement available in the local market with specification and price 4.6 Prepare the concrete block (M-30) and test for compressive strength 4.7 Collect some varieties of bricks and test for different physical properties. 4.8 Using compass ,survey your institute campus 4.9 Any other relevant field selected by teachers	8

xxxxxxx END xxxxxx

Remarks

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

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.

XXXXXXXXXXXXXXXXXXXXXXXXXXXX

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.

XXXXXXXXXXXXXXXX

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

XXXXXXXXXXXXXXXXXXXXX

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.

Xxxxxxxxxxxxxxxxxxxxx

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

XXXXXXXXXXXXXXXXXXXX

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.

SIXTH SEMESTER
CIVIL ENGINEERING BRANCH

COURSE STRUCTURE OF CIVIL ENGINEERING

6TH SEMESTER

Subject Code	Subject	Study Scheme (contact hour/week)			Evaluation Scheme									Total Mark (Th+Pr)	Credit
					Theory					Practical					
		L	T	P	ESE	Sessional (SS) TA	HA	Total(TA+HA)	Pass (ESE+SS)	PT	PA	Pass mark (PT+PA)			
Hu-601	Industrial management & Entrepreneurship	3			70	10	20	30	33					100	3
CV-601	Design of Steel Structure	4	1		70	10	20	30	33					100	4
CV-602	Estimating-II	3			70	10	20	30	33					100	3
CV-603	Environmental Engineering &Pollution Control	3	1	3	70	10	20	30	33	25	25	17		150	4
Cv-611	Project & Seminar			6						100	50	50		150	3
Cv-612	General Viva		2							50		17		50	2
CV-610	Professional Practice-IV	1		2						25	25	17		50	2
OPTIONAL (ANY ONE)															
CV-604	Building Repair & Maintenance	3		3	70	10	20	30	33	25	25	17		150	4
CV-605	Railway Bridge & Tunnel Engineering	3		3	70	10	20	30	33	25	25	17		150	4
Total		18	3	14											
		35			Grand Total =									850	25

1: Course Title : Industrial Management and Entrepreneurship

4. Course Code: **Hu – 601**
5. Semester: **VI**
6. **Aim of the Course:**
    1. To acquaint the students with managerial activities
    2. To provide introductory knowledge of Cost Accounting
    3. To introduce students with industrial legislation
    4. To explain the scope for self-employment
    5. To compare and contrast different forms of business organization
    6. To identify the opportunities to start a small scale industry
7. **Course Outcomes**:

On completion of the course on IME, students will be able to

- CO_1 = explain managerial activities.
- CO_2 = describe leadership qualities and decision making process.
- CO_3 = state the elements of costs.
- CO_4 = explain important industrial laws.
- CO_5 = define different forms of business organisations
- CO_6 = identify entrepreneurial abilities for self employment through small scale industries.

8. **Teaching Scheme (in hours)**

Lecture	Tutorial	Practical	Total
42hrs	3 hrs	--	45 hrs

9. **Examination Scheme:**

Theory				Practical				Total Marks
Examination Full Marks	Sessional Full Marks	Total Marks	Pass Marks	Examination		Sessional		
70	30	100	33	--	--	--	--	100

10. **Detailed Course Content**:

Chapter No.	Chapter Title	Content	Intended Learning Outcomes	Duration (in hours)
				42 hrs
1.0	**Introduction to Management :**	i) Meaning and Concept ii) Functions of Management iii) Principles of Management	i) Explain functions and principles of management	3
2.0	**Leadership Decision Making & Communication :**	i) Definition of Leader ii) Functions of a leader iii) Decision making – Definition iv) Decision making process v) Communication – definition, importance & types	i) Develop leadership qualities ii) Demonstrate decision making abilities	4
3.0	**Introduction to Cost :**	i) Definition and classification of Cost	i) State elements of costs ii) Explain	3

		ii) Elements of Cost iii) Break Even Analysis	Break Even Analysis	
4.0	**Human Resource Management:**	i) Meaning of manpower planning ii) Recruitment and Selection procedure iii) Payment of wages – factors determining the wage iv) Methods of payment of wages – Time rate and Piece rate v) Labour Turnover – definition, its causes, impact and remedy	i) State selection procedure of employees ii) Distinguish Time rate and Piece rate system of wage payments iii) Explain causes and impact of labour turnover	5
5.0	**Industrial Legislation :**	i) Need of Industrial legislation ii) Indian Factories Act – 1948 – Definition of Factory, main provisions regarding health, Safety and Welfare of Workers iii) Industrial Dispute Act – 1947 – Definition of	i) Identify the needs and importance of industrial laws	5

		Industrial dispute, Machineries for settlement of Industrial dispute in India		
6.0	**Production Management :**	i) Meaning of Production ii) Production Management – definition, objectives, functions and scope iii) Inventory Management, Basic idea	i) State the objectives and functions of Production management	3
7.0	**Marketing Management:**	i) Meaning and functions of marketing ii) e- Commerce iii) Channels of distribution iv) Wholesale and retail trade	i) state the functions of wholesalers and retailers	2
8.0	**Entrepreneur andEntrepreneurship:**	i) Definition of Entrepreneur and Entrepreneurship ii) Qualities required by an entrepreneur iii) Functions of an entrepreneur iv) Entrepreneurial motivation	i) State the qualities and functions of an entrepreneur	3
9.0	**Forms of Business Organisation:**	i) Sole Trader – meaning, main features, merits and demerits ii) Partnership –	i) Differentiate different forms of Business organization	5

		definition, features, merits and demerits iii) Joint Stock Company – Definition, types, features, merits and demerits	ii) compare and contrast features, merits and demerits of different business organizations .	
10.0	**Micro and Small Enterprises:**	i) Definition of Micro & Small enterprises ii) Meaning and characteristics of Micro and Small enterprise iii) Scope of SSI with reference to self-employment iv) Procedure to start SSI – idea generation, SWOT analysis v) Selection of site for factories	i) Define micro and small enterprises ii) Explain the procedure to start a small enterprise	4
11.0	**Support to Entrepreneurs**	a) Institutional support: i) Introduction ii) Sources of information and required application forms to set up SSIs iii) Institutional support of various National & State level organizations – DICC, NSIC, IIE, MSME - DI, Industrial Estates	i) identify the supporting agencies to entrepreneurs ii) Explain the role of financial support organisations	5

		b) Financial support: i) Role of Commercial banks, RRB, IDBI, ICICI, SIDBI, NEDFi, and State Financial Corporations ii) Special incentives and subsidies for Entrepreneurship Development in the North East		
	Class Test			3 hrs
	Total			**45 hrs**

(9) TABLE OF SPECIFICATIONS for Industrial Management & Entrepreneurship

Sl. No	**Topic** (a)	**Time allotted in hours (b)**	**Percentage Weightage (c)**	Knowledge	Compre-hension	**Application**	**HA**
1	Introduction to Management	3	7	2	3	0	0
2	Leadership & Decision Making	4	9.5	3	4	0	0
3	Introduction to Cost	3	7	3	2	0	0
4	Human Resource Management	5	12	6	2	0	0
5	Industrial Legislation	5	12	4	4	0	0
6	Production Management	3	7	3	2	0	0
7	Marketing Management	2	5	4	0	0	0
8	Entrepreneur & Entrepreneurship	3	7	3	2	0	0
9	Forms of Business	5	12	3	5	0	0

	Organisation						
10	Micro & Small Enterprises	4	9.5	4	3	0	0
11	Support to Entrepreneurs	5	12	4	4	0	0
Total		**42**	**100**	**39**	**31**	**0**	**70**

K = Knowledge C = Comprehension A = Application HA = Higher Than Application (Analysis, Synthesis, Evaluation)

$C = \frac{b}{\sum b} \times 100$

10. Distribution of Marks:

DETAILED TABLE OF SPECIFICATIONS FOR IME

Sl. No	Topic	OBJECTIVE TYPE				SHORT ANSWER TYPE					ESSAY TYPE					Grand
		K	C	A	T	K	C	A	HA	T	K	C	A	HA	T	Total
1	Management	1	0	0	1	1	0	0	0	1	0	3	0	0	3	5
2	Leader &Decisi	1	0	0	1	2	1	0	0	3	0	3	0	0	3	7
3	Cost	1	1	0	2	2	1	0	0	3	0	0	0	0	0	5
4	HRM	2	1	0	3	1	1	0	0	2	3	0	0	0	3	8
5	Laws	3	0	0	3	0	0	0	0	0	1	4	0	0	5	8
6	Product Manage	2	1	0	3	1	1	0	0	2	0	0	0	0	0	5
7	Market	2	0	0	2	2	0	0	0	2	0	0	0	0	0	4
8	Entrepreneurship	1	1	0	2	2	1	0	0	3	0	0	0	0	0	5
9	Forms of BO	2	1	0	3	0	0	0	0	0	1	4	0	0	5	8
10	MSME	2	0	0	2	0	0	0	0	0	2	3	0	0	5	7
11	Support to Entp.	3	0	0	3	1	0	0	0	1	0	4	0	0	4	8
	Total	**20**	**5**	**0**	**25**	**12**	**5**	**0**	**0**	**17**	**7**	**21**	**0**	**0**	**28**	**70**

K = Knowledge C = Comprehension A = Application
HA = Higher Than ApplicationT = Total
Higher than Application (Analysis, Synthesis, Evaluation)

11. Suggested implementation Strategies: Modified syllabus may be implemented with effect from January, 2020 (Starting with the present batch (2018) of 2nd Semester students)

12.Suggested learning Resource:

a. **Book list** :

Sl. No.	Title of Book	Name of Author(s)	Publisher
1	Industrial Management	S.C. Jain H.S. Bawa	DhanpatRai& Co. (P) Ltd. New Delhi-110006
2	Business Organisation and Entrepreneurship Development	S.S. Sarkar R.K. Sharma Sashi K. Gupta	Kalyani Publishers, New Delhi-110002
3	Entrepreneurial Development	S. S. Khanka	S. Chand & Co. Ltd. New Delhi-110055
4	Business Methods	R.K. Sharma Shashi K Gupta	Kalyani Publishers, New Delhi
5	Entrepreneurship Development and Management	Dr. R.K. Singhal	S.K. Kataria& Sons, New Delhi-110002
6	Business Administration & Management	Dr.S.C.Saksena	SahityaBhawan, Agra
7			
8			

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b. List of Journals
c. Manuals
d. Others

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2:Course Title :- ESTIMATING –II

1. **Course Code :- CV-602**
2. **Semester :- 6th (Civil)**
3. **Objective of the Subject/ Courses :-**

Objective:- Studentwill be able to

- Calculate the approximate cost of civil structure
- Prepare check list of items of construction
- Prepare estimate of civil engineering works.
- Prepare rate analysis of items of construction.
- Specifications of various items of construction works.
- Calculate earth works involved in roads and canals.

Course outcomes :-

After completion of this course, the students will be able to –

CO 1	-	prepare estimates of Civil Engineering works.
CO 2	-	analyze the rates of different items of construction.
CO 3	-	demonstrate the concept of specification required in the course.
CO 4	-	calculate the approximate cost of Civil Engineering structures.
CO 5	-	explain the method of executing Departmental Works
CO 6	-	prepare Measurement Book as PWD hand book.

COs and ILOs of Estimating II

COs	ILOs
1. PREPARE ESTIMATES OF CIVIL ENGINEERING WORKS	**1.** Calculate the quantity of earth work by a. Mid sectional area method b. Mid depth method c. Prismoidal formula method

COs	ILOs
	2. define lead and lift **3.** show the tabular forms of each method of calculation of earth work **4.** describe the units of measurement of various items of

	road work. **5.** explain the methods of estimating earth work for road embankment and canal. **6.** find out different items of Hard Crust for bituminous road. **7.** compare the most accurate method of estimating earth work of road/ canal.
2. ANALYSE THE RATES OF DIFFERENT ITEMS OF CONSTRUCTION	**1.** explain the meaning of the term 'rate analysis' **2.** state the main features of rate analysis. **3.** enumerate the factors effecting rate analysis. **4.** Analyze the rate of a. Brick work b. PPC work c. RCC work d. Doors and Windows. e. Plastering f. Cement concrete floor g. White washing h. Centering and plastering i. DPC j. Earth work for foundation **5.** Prepare checklist for different types of construction work.
3. DEMONSTRATE THE CONCEPT OF SPECIFICATION REQUIRED IN THE COURSE	**1.** classify specification **2.** distinguish between General specification and Detailed specification. **3.** state general specifications of an RCC building.

	4. write the detailed specification of a. Earth work in excavation. b. First class brickwork c. Wood Work in doors and windows

	d. GI sheet and AC sheet roofing e. C.C. Floor f. Tile flooring g. RCC works h. Centering and shuttering i. White washing j. Plastering
4. CALCULATE THE APPROXIMATE COST OF CIVIL ENGINEERING STRUCRTURES	1. estimate the approximate cost of a given Civil Engineering structure using the latest PWD schedule of rates
5. EXPLAIN THE METHOD OF EXECUTING DEPARTMENTAL WORKS	1. define the term 'contract' 2. Classify contract. 3. describe in brief Administrative approval, technical sanction contingencies, budget, tender, earnest money, security deposit, running bill and final bill. 4. describe E tendering
6. PREPARE MEASUREMENT BOOK AS PWD HAND BOOK	1. explain the use of Measurement Book 2. make entries in the Measurement Book 3. state the general rules for units of measurement for different items of work as PWD hand book. 4. state in brief about master roll.

Pre-requisite:-

- Student should have basic knowledge about calculation of area, volume of objects.

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+ Pr.)	Credit
ESE	Sessional (SS)			PT	PA			
	TA	HA						3
70	10	20	33/100				100	

6. Detail course content

Chapter No	Chapter Title	Content	Duration (in hours)
1	**Earthwork**	➢ Method of calculation of quantity of earthwork by a. Mid sectional area method b. Mid depth method c. Prismoidal formula method ➢ Lead and lift ➢ Tabular forms of each method of calculation of earth work.	8
2	**Roadwork**	➢ Unit of measurement of various items of road work ➢ Method of estimating various items of road work	3
3	**Rate analysis**	➢ Analysis of rates- its meaning and main features. ➢ Factors effecting rate analysis ➢ Analysis of rate of a. Brick work b. PCC work c. RCC work d. Doors and windows e. Plastering f. Cement concrete floor g. Whitewashing h. Centering and plastering i. DPC j. Earth work for foundation	9
4	**Specification**	➢ Specification and its type a. General specification b. Detailed specification ➢ General specification of an RCC building	9

		➢ Detailed specification of a. Earth work in excavation b. First class brick work c. Wood work in doors and windows d. CGI sheet and AC sheet roofing e. Cement concrete floor f. Tile flooring g. RCC works h. Centering and shuttering i. White washing j. plastering	
5	**Departmental works**	➢ Contracts, various types of contract, item rate contract, lump sum contract, labor contract, contract agreement. ➢ Administrative approval, technical sanction, contingencies, budget, tender, earnest money, security deposit, running bill and final bill. ➢ E tendering ➢ Measurement book (MB) use, entries made in MB, general rules for units of measurement for different items of work as PWD hand book. ➢ Master roll	10
6	**Revision and Class test**	➢ 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/ Descriptive Questions	
1	**Earthwork**	5	7	12
2	**Roadwork**	2	5	07
3	**Rate analysis**	5	10	15
4	**Specification**	5	10	15
5	**Departmental works**	8	13	21
		25	45	70

9.Table of Specification for Estimating-II (CV-602)

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Earthwork	8	18	1	4	7	
2	Roadwork	3	7	1	1	5	
3	Rate analysis	9	20	1	5	9	
4	Specification	9	20	1	5	9	
5	Departmental works	10	22	4	7	10	
6	Internal assessment	6	13	-	-	-	-
		∑b=39 hrs.+ 6hrs internal assessment	100	8	22	40	

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	Earthwork	1	2	2	***5***		2	5		***7***
2	Roadwork	1	1		***2***			5		***5***
3	Rate analysis	1	2	2	***5***		3	7		***10***
4	Specification	1	2	2	***5***		3	7		***10***
5	Departmental works	2	3	3	***8***	2	4	7		***13***
	Total				***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.Text books:

Titles of the book	Name of author	NAME OF PUBLISHER
Estimating and costing in civil engineering	B.N. Dutta	UBS publication
Civil Engineering contracts and estimates	B.S. Patil	Universities press
Estimating and costing	G.S. Birdie	DhanpatRai and Sons
Civil Estimating & Costing	A K Upadhyay	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

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

3:Course Title :- ENVIRONMENTAL ENGINEERING & POLLUTION CONTROL

1. **Course Code :- CV-603**
2. **Semester :- 6th (Civil)**
3. **Objective of the Subject/ Courses :-**

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

* Estimate water demands for a certain locality
* Analyze the quality and standard of potable water
* Suggest the treatment required by knowing the quality of water
* Handle the sewerage system.
* Analyze the sewage
* Suggest the waste water treatment
* Suggest the treatment for industrial waste
* Know the solid waste management

CO's and ILO's of ENVIRONMENTAL ENGINEERING & POLLUTION CONTROL

CHAPTER TITLE	After the completion of the chapter, the students will learn
Introduction	➢ Environmental Pollution and its types. ➢ Causes of Pollution. ➢ Effects of Pollution. ➢ Control of Pollution. ➢ Existing laws related to Environmental Pollution.
Water Supply	➢ Demands of water- Domestic, Industrial, Commercial & Institutional, Public use, Losses and wastes, Fire demand, Factors affecting rate of Demand, Variations of water demand. ➢ Forecasting of population, Methods of forecasting of population. ➢ Design period for water supply scheme. ➢ Sources of Water. ➢ Intake Structures- Definition and types. ➢ Ground water recharging – Necessity, importance and advantages. ➢ Need for analysis quality of water. ➢ Characteristics of water- Physical, Chemical and Biological. ➢ Testing of water for Total solids, hardness, chlorides, dissolved Oxygen, pH, Fluoride, Nitrogen and its compounds, Bacteriological tests. ➢ E coli index, MPN. ➢ Sampling of water. ➢ Water quality standards as per Indian Standard & World Standard (WHO). ➢ Aeration- Objects and methods of aeration. ➢ Plain sedimentation, Sedimentation with coagulation, principles of

	coagulation, types of coagulants, Jar Test, process of coagulation. ➢ Classification of filters- slow sand filter, rapid sand filter, pressure filter, construction and working of slow sand filter and rapid sand filter. ➢ Disinfection- Objects, methods of disinfection. ➢ Chlorination- Application of chlorine, forms of chlorination, types of chlorination practices, residual chlorine and its importance. ➢ Miscellaneous water Treatments (Water Softening, Defluorination techniques). ➢ Flow diagram of water treatment plants. ➢ Conveyance and Distribution of Water- Layouts of distribution of water- dead end system, grid iron system, circular system, radial system; their suitability, advantages and disadvantages.
Domestic Sewage	➢ Importance and necessity of sanitation, Necessity to treat domestic sewage. ➢ Recycling and Reuse of domestic waste. ➢ Definitions- Sewage, sullage, types of sewage. ➢ Definitions of the terms related to Building Sanitation- Building Sanitary fittings- Water closet – Indian and European type, Traps- types, qualities of good trap, Principles regarding design of building drainage, layout plan for building sanitary fittings (drainage plan). ➢ Systems of Sewerage-Types of Sewers, Systems of Sewerage, Self-cleansing velocity and non-scouring velocity, Laying, Testing and maintenance of sewers. ➢ Sewer Appurtenances-Manholes and Drop Manhole-component parts, ,location, spacing, construction details, Sewer Inlets , Street Inlets, Flushing Tanks – manual and automatic. ➢ Analysis of Sewage, Characteristics of sewage, B.O.D./ C.O.D. and significance ➢ Aerobic and anaerobic process. ➢ Treatment of Sewage, Objects of sewage treatment, General layout and flow diagram, Screening, Grit removal, Skimming. ➢ Sedimentation of sewage, Sludge digestion, Trickling filters, Activated sludge process. ➢ Disposal of sewage, Septic tank, Oxidation pond, Oxidation ditch.
Industrial Waste	➢ Characteristics of industrial waste water from sugar, dairy, distillery, textile, paper and pulp and oil industries and their suggestive treatments.
Environmental Pollution	➢ Sources of Air Pollution and Noise Pollution ➢ Effects and Control of Air Pollution and Noise Pollution ➢ Global warming ➢ Acid Rain ➢ Ozone hole
Solid Wastes from Society	➢ Solid Waste Management. ➢ Definitions- Refuse, Rubbish, Garbage, Ashes. ➢ Constituents of solid wastes. ➢ Sources of solid wastes, Collection of Solid Wastes. ➢ Methods of collection of solid wastes. ➢ Methods of treatment and disposal of solid waste. ➢ Types of hazardous wastes. ➢ Characteristics of hazardous wastes.

	➢ Treatment and disposal of hazardous waste.
Environmental Sanitation	➢ Environmental Sanitation and its necessity and importance. ➢ Types of Privies – Aqua privy and Bore Hole Latrine.

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

Lecture	Tutorial	Practical	Total
3	1	3	7

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						4
70	10	20	33/100	25	25	17/50	150	

6. Detailed Course Content

Chapter No	Chapter Title	Content	Duration (in hours)
1	**Introduction**	1.1 Introduction Environment, Ecosystem, Environmental Pollution and its types, Causes of Pollution, Effects of Pollution, Control of Pollution, Existing laws related to Environmental Pollution.	2
2	Water Supply	**PUBLIC WATER SUPPLY** 2.1 Quantity of Water Demands of water: Domestic, Industrial, Commercial & Institutional, Public use, Losses and wastes, Fire demand ; Factors affecting rate of Demand, Variations of water demands, Forecasting of population, Methods of forecasting of population, (Numerical Problem), Design period for water supply scheme. 2.2 Sources of Water Surface and Subsurface sources of water, Intake Structures- Definition and types, Ground water recharging – Necessity Importance and advantages. 2.3 Quality of Water	14

		Need for analysis of water, Characteristics of water- Physical, Chemical and Biological, Testing of water for Total solids, hardness, chlorides, dissolved Oxygen, pH, Fluoride, Nitrogen and its compounds, Bacteriological tests, E coli index, MPN, Sampling of water, Water quality standards as per Indian Standard & World Standard (WHO) 2.4 Purification of Water Aeration- objects and methods of aeration, Plain sedimentation, Sedimentation with coagulation, principles of coagulation, types of coagulants, Jar Test, process of coagulation, classification of filters : slow sand filter, rapid sand filter, pressure filter, construction and working of slow sand filter and rapid sand filter, Disinfection: Objects, methods of disinfection, Chlorination-Application of chlorine, forms of chlorination, types of chlorination practices, residual chlorine and its importance, Miscellaneous water Treatments (Water Softening, Defluorination techniques) , Flow diagram of water treatment plants. 2.5 Conveyance and Distribution of Water - Layouts of distribution of water- Dead end system, grid iron system, circular system, radial system; their suitability, advantages and disadvantages	
3	Domestic Sewage	3.1 Introduction Importance and necessity of sanitation, Necessity to treat domestic sewage, Recycling and Reuse of domestic waste Definitions- Sewage, sullage, types of sewage 3.2 Building Sanitation Definitions of the terms related to Building Sanitation- Building Sanitary fittings- Water closet – Indian and European type, Traps- types, qualities of good trap, Principles regarding design of building drainage, layout plan for building sanitary fittings (drainage plan) 3.3 Systems of Sewerage-Types of Sewers, Systems of Sewerage, Self-cleansing velocity and non-scouring velocity, Laying, Testing and maintenance of sewers. 3.4 Sewer Appurtenances Manholes and Drop Manhole-component parts,, location, spacing, construction details, Sewer Inlets , Street Inlets, Flushing Tanks – manual and automatic	10

		3.5 Analysis of Sewage Characteristics of sewage, B.O.D./ C.O.D. and significance., Aerobic and anaerobic process, 3.6 Treatment of Sewage Objects of sewage treatment, General layout and flow diagram, Screening, Grit removal, Skimming, Sedimentation of sewage, Sludge digestion, Trickling filters, Activated sludge process, Disposal of sewage, Septic tank, Oxidation pond, Oxidation ditch	
4	Industrial Waste	4.1 Industrial Waste Water Characteristics of Industrial waste water, from sugar, Dairy, Distillery, Textile, Paper and Pulp and Oil industry; and their suggestive treatments	3
5	Environmental Pollution	5.1 Air Pollution and Noise Pollution Sources, Effects and Control of Air Pollution, Effects and Control of Noise Pollution (only brief idea) Global warming, Acid Rain, Ozone hole	3
6	Solid Wastes from Society	**SOLID WASTES FROM THE SOCIETY** 6.1 Solid Waste Management Definitions – Refuse, Rubbish, Garbage, Ashes, Constituents of, solid wastes, Sources of solid wastes, Collection of Solid Wastes. Methods of collection of solid wastes Methods of treatment and disposal of solid waste. 6.3 Hazardous Wastes Introduction, Types of hazardous wastes. Characteristics of hazardous wastes. Treatment and disposal of hazardous waste	5
7	Environmental Sanitation	7.1 Environmental Sanitation Necessity and importance, Rural sanitation- Types of Privies – Aqua privy and Bore Hole Latrine.	3
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.	5

8. Distribution of Marks/ Table of specifications

Chapter No	Chapter Title	Type of Question		Total Marks
		Objective Type (Compulsory)	Short/Descriptive Questions	
1	Introduction	2		2
2	Water Supply	6	15	21
3	Domestic Sewage	5	10	15
4	Industrial Waste	4	6	10
5	Environmental Pollution	4	4	8
6 &7	Solid Waste from Society & Environmental Sanitation	4	10	14
Total		25	45	70

9. Table of Specification for Environmental Engineering &Pollution Control (CV-603)

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Introduction	2	4	1	1		
2	Water Supply	14	30	3	5	13	
3	Domestic Sewage	10	22	1	4	10	
4	Industrial Waste	3	7	4	6		
5	Environmental Pollution	3	7	2	6		
6	Solid Waste from Society	5	10	1	6		
7	Environmental Sanitation	3	7	1	6		
8	Internal assessment	6	13	-	-	-	-
		∑b=40 hrs.+ 6hrs internal assessment	100	13	34	23	

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	Water Supply	1	2	3	***6***	2	3	10		***15***
3	Domestic Sewage	1	1	3	***5***		3	7		***10***
4	Industrial Waste	2	2		***4***	2	4			***6***
5	Environmental Pollution	2	2		***4***		4			***4***
6	Solid Waste from Society	1	1		***2***		5			***5***
7	Environmental Sanitation	1	1		***2***		5			***5***
	Total				***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. Suggested Learning Resource :-

12.Book list

Text Books:			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
Santosh Garg	Environmental Engineering (Volume I & II)		Khanna Publishers
Kamla A. &Kanth Rao D. L.	Environmental Engineering		Tata McGraw Hill
Birdie G. S. Birdie J. S.	Water Supply and Sanitary Engineering		DhanpatRai& Sons
Deolalikar S.G.	Plumbing – Design and Practice		Tata McGraw Hill
Rao M.N. Rao H.V.N.	Air Pollution		Tata McGraw Hill
AK Upadhyay& D Lal	Water Supply & Waste Water 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

XXXXXXXXXXXXXXXXX

3:Course Title :- ENVIRONMENTAL ENGINEERING & POLLUTION CONTROL (PRACTICAL)

- **Contact hrs. :- 45 hrs.**
- **Course Code :- CV-603**
- **Semester :- 6th (Civil)**

Practical :

Skills to be developed:

INTELLECTUAL SKILLS:

1. Identify the method for testing of water.
2. Interpret the results

MOTOR SKILLS:

1. Observe chemical reactions
2. Handle instruments carefully.

List of Practical:

Water Supply Engineering:

1) To determine fluoride concentration in given water sample
2) To determine the turbidity of the given sample of water.
3) To determine residual chlorine in a given sample of water.
4) To determine suspended solids, dissolved solid, and total solids of water sample
5) To determine the dissolved oxygen in a sample of water
6) To determine the optimum dose of coagulant in the given sample by jar test.

Sanitary Engineering:

1) To determine the dissolved Oxygen in a sample of waste water.
2) To determine B.O.D. of given sample of waste water.
3) To determine C.O.D. of given sample of waste water.
4) To determine suspended solids, dissolved solids and total solids of waste water sample.
5) Design the Septic, Tank for the public building such as hostel or hospital. Draw Plan and section of the same along with the drainage arrangement in soak pit.
6) To determine various pollutant levels in the atmosphere using Digital Air Volume sampler.
    a) Energy generation plants from solid wastes.

XXXXXXXXXXXXXXXXXXXX

4 Course Title : DESIGN OF STEEL STRUCTURES (Duration of Exam = 4 hours)

1. **Course Code:** : **Cv-601**
2. **Semester** : **6th**
3. **Objective of the subject/ Course** : **Design of steel structures involves planning of structures, proportioning of members of structures for carrying load in an economical manner.**

COURSE OUTCOMES AND INTENDED LEARNING OUTCOMES

Subject: Design of Steel Structures
Code: CV-603

COURSE OBJECTIVES	**INTENDED LEARNING OUTCOMES** (***After attending the course the students will be able to***…….)	Associated Skill
To make the students understand about structural steel and relevant code of practice	State properties of structural steel .	remember
	Give examples of structural steel.	understand
	Use steel tables for section properties of structural steel.	Apply
	Identify and compute loads in structure as per relevant code of practice.	remember
To develop the concept of Limit State Design in steel design	Define each types of Limit States	remember
	List the points of difference s between LSD and WSM design	remember
	explain the FOS adopted for Material and Loads	understand
	Asses the characteristic strength and characteristic loads.	evaluate
	Describe the various methods of structural analysis	understand
To familiarize with rivets and analysis of riveted joint	State the types of rivets.	remember
	Describe the failure of Riveted joint.	understand
	Show the types of arrangement of rivets in joint.	apply
	Calculate strength and efficiency of riveted joints	apply
	Design riveted joints for given loads.	create
To develop concept of bolted joint.	State the types of bolts.	remember
	Describe the advantage and disadvantage of bolted joint.	understand
	Show the types of arrangement of bolts in joint.	apply
	Describe the failure of bolted joint	understand
	Calculate strength and efficiency of bolted joints	apply
	Design bolted joints for given loads	create
	Detail the bolted connection in sheets.	create
Ability to perform	Differentiate frame and seated connection.	understand

bolted frame and seated connection for steel structures.	Analyze and design of bolted frame connection for beam column and beam - beam connection.	create
	Analyze and design of bolted unstiffened seated connection for beam column connection.	create
To be able to perform analysis and design of welded connection design.	State advantage and disadvantage of welded joint.	remember
	Describe the types welds.	understand
	Apply design considerations for welded joint as per IS 800-2007	Analyze
	Analyze and design welded joint subjected to axial load	Analyze
	Apply fillet weld for beam-column connection.	Analyze
Ability to design and draw tension member	Identify steel sections for tension member	Understand
	State factors affecting design of tension member	Remember
	Describe the failure modes for tension member	Understand
	Analyze and design of tension member simple types	Analyze
	Detail tension member for bolted and welded connection.	Apply
Ability to analyze , design and draw compression member.	Classify compression member depending on slenderness ratio.	Analyze
	Describe the failure modes for compressive member	understand
	Explain the failure modes of compression member.	analyze
	Design compression member for axially loaded member.	Analyze, create
To be able to design simple steel beams.	Illustrate the types of steel beams.	understand
	Classify beam cross sections	Apply
	List factors affecting lateral stability of beam	remember
	Describe the failure modes of beams	Understand
	Determine bending strength of laterally supported beam.	Apply
To understand the use of column bases and their design technique.	Name the types of column bases.	Remember
	Apply codal provisions for minimum thickness and effective area of column base.	Apply
	Design and analyze slab base and gusseted base plate for axial loads only.	Analyze ,create
	Sketch column bases as per design data.	create

5. Teaching Scheme (In hours/week) Total Contact hr.= 60

Lecture	Tutorial	Practical	Total
4 hrs./week	1	--	5 hrs

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 of Course Content:**

Chapter No.	Chapter Title	Content	Duration (Hrs.)
1.	**Introduction to steel structure:**		2
		Advantage and disadvantage of steel structure as construction material, types of structural steel- mild steel, medium carbon steel, high carbon steel, low alloy steel and high alloy steel. Types of rolled steel sections with geometric shape, Grade of steel (IS:2060). Use of steel tables. Types of load and load combinations as per IS 875-1987. Familiarization with IS:800-2007	
2.	**Design considerations(IS:800-2007)**		3
		Philosophy of Limit state method of design, Characteristic loads, partial safety factors, characteristic strength, Design strength. Limit state of serviceability, forms of structural stability Deflection limit, vibration limit, Durability consideration, fire resistance, Various Methods of structural analysis (brief descriptions only)	
3.	**Riveted Connections**		8
		Rivets-their types, definition and terms used in riveting, riveted joints, failure of riveted joint, strength of riveted joint, rivet value, efficiency of riveted joint, design of riveted joint (simple problems)	
4.	**Bolted Connections**		8
	4.1	Bolts- their types, advantages and disadvantages of bolted connections, definition and terms used in bolt and bolting, failure of bolted connections, Efficiency. Type of joints. Lap and Butt Joint. Arrangement of bolts in connections, Simple problems using Limit State method.	
5.	**Simple beam connections**		4
	5.1	Framed connections-beam to beam connections, Beam column connections: Seated connections. Simple problems using Limit State method.(Bolted connection only)	
6.	**Welded connections**		5
		Welding- different types and properties of welds, advantage and Disadvantage of welded connection	

		, welding processes, weld specifications, Calculation of strength of welded joints using LSM, Design of fillet weld for symmetrical and unsymmetrical sections for axial load only	
7.	**Design of tension members**		7
		Definition of tension members, types, factors affecting Strength of tension members, lug angles, Design of tension member using bolted and welded connections.(simple problems only)	
8.	**Design of compression members**		7
		Definition, classification of compression members- long, short and intermediate, slender compression members, sections used for compression members, loads on compression members, possible failure modes, Effective length and effective cross sectional area, Modes of failure of axially loaded compression member. Limit of slenderness ratio. Design of compression members.(for axially loads only)	
9.	**Design of beams**		5
		Types of beams, lateral stability of beams, factors affecting lateral stability, effective length, buckling, bending, maximum deflection, design of beams.	
10.	**Design of column bases**		5
		Types of column bases ,slab bases and gusseted base plate, Code provision (IS:800-2007) minimum thickness and effective thickness and effective area of base plate, Design of Slab base plate using bolt for axial loads only. (No problems on Gusseted base design)	
11.	**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

8.Distribution of Marks/ Table of specifications

Chapter No.	Chapter Title	Type of question		Total Marks
		Objective type (Compulsory)	Short/Descriptive Questions	
1.	Introduction to steel structure	3	--	3
2.	Design considerations(IS:800-2007)	4	--	4
3,4 &6	Connections : Riveted , Bolted and	5	11	16

	welded			
5.	Simple beam connections	3	11	14
7& 8	Design of tension members and compression members	5	11	16
9 & 10	Design of beams and column bases	5	12	17
	Total	25	45	70

9.Table of Specification for Theory Design of Steel Structure (CV-601)

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Introduction to steel structure	2	4	3	2		-
2	Design considerations	3	5	1	4		-
3	Riveted connections	8	13	3	2		-
4	Bolted connections	8	13	1	2	3	-
5	Simple beam connections	4	7	1	3	4	-
6	Welded connections	5	8	1	2	5	-
7	Design of tension members	7	12	1	2	5	-
8	Design of Compression members	7	12	1			6
9	Design of beams	5	8	1	2		6
10	Design of column bases	5	8	1	2	6	
11	Internal assessment	6	10	-	-	-	-
		∑b=54 hrs.+ 6hrs internal assessment	100	14	21	23	12

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 steel structure	1			***1***	2	2			***4***
2	Design considerations	1	2		***3***		2			***2***
3	Riveted connections	1	2		***3***	2				***2***

4	Bolted connections	1	2		***3***			3		***3***
5	Simple beam connections	1	1		***2***		2	4		***6***
6	Welded connections	1	2		***3***			5		***5***
7	Design of tension members	1	2		***3***			5		***5***
8	Design of Compression members	1			***1***				6	***6***
9	Design of beams	1	2		***3***				6	***6***
10	Design of column bases	1	2		***3***			6		***6***
	Total				***25***					***45***

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

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.

12.Suggested Learning Resource: -

Teacher will use Black board, OHP, Smart board, video etc. for effective teaching learning process. Models of various rolled steel section should be shown for better understanding and concept.

RECOMMENDED BOOKS

1. Dr. N. Subramanian "Design of Steel Structures", Oxford University Press.
2. K. S. Sai Ram "Design of Steel Structures" Pearson-Porling Kindersley Pvt Ltd
3. M. R. Shiyekar "Limit State Design in Structural Steel", PHI Learning Pvt Ltd, 2011
4. S. Ramamrutham " Design of Steel structures" DhanpatRai publishing House.
5. Dr. Ramchandra&Gahlot- Design of Steel Structures
6. IS:800-2007, IS:875,
7. Steel Tables

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

Optional questions (if any) may be from the same topic as below

Q: Design a tension member

Or

Design a compression member

(***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)***

XXXXXXXXXXXXXXXXX

5:Course Title :- PROJECT & SEMINAR

1. **Contact hrs. :- Tutorial 45 hrs. + Practical 45 hrs.**
2. **Course Code :- CV-611**
3. **Semester :- 6th (Civil)**
4. **Objective of the Subject/ Courses :-**

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

- Collect the information for a given project.
- Apply principles, theorems and bye-laws in the project planning and design.
- Interpret and analyze the data.
- Develop professional abilities such as persuasion, confidence, and perseverance and Communication skill.
- Develop presentation skill.
- Enhance creative thinking.

PROJECT & SEMINAR (CV-611) 6th SEM

(CO)COURSE OUTCOME)

Diploma in civil Engineering Students will be able to:

- **CO-1**: To collect information for a given project.
- **CO-2**: To apply principles, theorems and bye-laws in the project planning and design.
- **CO-3**: To interpret and analyze the data.
- **CO-4**: To develop professional abilities such as persuasion, confidence, and perseverance and communication skill.
- **CO-5**: To develop presentation skill.
- **CO-6:** To enhance creative thinking.

INTENTED LEARNING OUTCOMES (ILO)

Sl.No.	Course outcomes/ Topics	Indented Learning
1.	Intellectual skills	1. To decide and collect data for projects. 2. To read and interpret the drawing, data. 3. To design the components. 4. To apply the principles rules regulations and byelaws.

2.	Motor skills	1. To plan different phases of a task. 2. To prepare drawings for projects. 3. To use of computer for drawing, networking. 4. To work in a group for a given task.
3.	Project work	1. To collect data related to the project work 2. To develop team spirit 3. To write a complete project work 4. To develop confidence and communication skill 5. To draw conclusion and report writting

Pre-Requisite :-

1. Students should have entire knowledge of civil engineering.

5. Teaching Scheme (in hours/week) Total contact hours : Tutorial 60 hrs +Practical 60 hrs

Lecture	Tutorial	Practical	Total
		6	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						
				100	50	50	150	3

7. Examination Scheme :-

Theory			Pass marks (ESE+SS)	Practical		Pass marks (PT+PA)	Total marks (Th+ Pr)	Credit
ESE	Sessional (SS)			PT	PA			
	TA	HA						
				100	50	50	150	3

Project:
Skills to be developed:

INTELLECTUAL SKILLS:
1) Decide and collect data for projects.
2) Read and interpret the drawing, data.
3) Design the components.
4) Apply the principles rules regulations and byelaws.

MOTOR SKILLS:
1) Plan for different phases of a task.
2) Prepare drawings for project.
3) Use of computer for drawing, networking.
4) Work in a group for a given task.

LIST OF PROJECTS*:*

Following is the list /areas of suggested civil engineering projects to be undertaken by a group of 4 to 6 students . A topic for project can be selected on appropriate civil engineering subject or recent development in civil engineering.
The project report shall be in the following format:

- Topic and objectives
- Collection of data, required survey work,
- Management and construction procedure
- Resources scheduling and networking
- Design details
- Required drawing set
- Utility to society if any
- Conclusion

LIST OF CIVIL ENGINEERNG PROJECTS:
1) K.T. Weir
2) Lift Irrigation scheme.
3) Micro irrigation –Drip/Sprinkler Irrigation.
4) Junction planning for city roads/planning for roads for congested area/parking Studies etc.
5) Water shed development of small catchments.
6) Rain water harvesting for domestic or public building.
7) Campus development.
8) Interior decoration.
9) Concrete mix design.
10) Bridge design.
11) NDT of any RCC building.
12) Solid waste management.
13) Hospital waste disposal.
14) Recycling of resources.
15) Manufacturing of Pre cast concrete products.
16) Prestressed concrete.
17) Non conventional sources of energy.
18) Concrete pipe manufacturing unit.

19) Advance construction techniques.
20) Transfer of technology to villages.
21) Planning and design for residential apartments/commercial complex.
22) Planning and design of water treatment plant for given data.
23) Planning and design of water supply scheme for given lay out.
24) Planning and design of sewage treatment plant for given data.
25) Planning and design of sanitary scheme for given lay out.
26) ***Any other similar project can be selected.***

The Project Group and the faculty guide should be constituted at the beginning of 5th semester and initial work may be started at the 5th semester itself though the final project report has to be submitted at the end of 6th semester. The Project work must be reviewed twice in the same semester. On the basis of performance of students teacher/ guide/team of teacher will evaluate.

XXXXXXXXXXXXXXXXXXXX

6:Course Title :- PROFESSIONAL PRACTICE-IV

1. **Course Code :- Cv-610**
2. **Semester :- 6th (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:

p) Acquire information from different sources.
q) Prepare notes for given topic.
r) Present given topic in a seminar.
s) Interact with peers to share thoughts.
t) Prepare a report on industrial visit, expert lecture.

INTENTED LEARNING OUTCOMES (ILO)

Sl.No.	Course outcomes/ topic/ activities	Indented Learning
1.	CO-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) 1. Nearby steel structure under construction. 2. Nearby railway bridge under construction. 3. Nearby tunnel under construction. 4. Nearby mega water treatment plant. 5. Nearby multi-storied flat under construction. 6. Any other nearby industry related civil engineering.
2.	CO-2:Guest lectures	Lectures by professional or industrial expert or Student seminars based on information search to be organized from any two the following areas: 1. Entrepreneurship. 2. Self-motivation and career counselling. 3. How to face interview. 4. Building repair and maintenance. 5. CPM and PERT. 6. Any other relevant topic related to civil engineering.

3.	CO-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- 1. Job opportunities in different organization. 2. Scope for further higher studies. 3. Maintenance of building 4. Environmental monitoring system. 5. Design of water treatment plant. 6. Design of irrigation project. 7. Construction of tunnel. 8. Any other topic suggested by teacher.
4.	CO-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. 1. Visit of an old RCC building to observe defects and to suggest remedial measures. 2. Visit of an nearby factory or industry to study the management system. 3. Visit of the nearby town or city to study the sewage disposal system. 4. Collection of water samples from different sources to study the quality of drinking water. 5. Visiting of a nearby railway station for preparing a report on the station. 6. Any other relevant field selected by teacher.

4. Teaching Scheme (in hours/week) **Total contact hours : 30 hrs.**

Lecture	Tutorial	Practical	Total
		2	2

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						
---	---	---	-----	25	25	17/50	50	

7.Detail course content

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) 1.17 Nearby Steel structure under construction 1.18 Nearby Railway bridge under construction 1.19 Nearby Tunnel under construction 1.20 Nearby Mega Water treatment plant 1.21 Nearby multi -storied flat under construction 1.22 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 Entrepreneurship 2.2 Self-motivation and career counselling 2.3 How to face interview 2.4 Building repair and maintenance 2.5 CPM and PERT 2.6 Any other relevant topic related to Civil Engineering	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 r) **Job opportunities in different organization** s) Scope for further higher studies t) Maintenance of building u) Environmental monitoring system v) Design of Water treatment plant w) Design of irrigation project x) Construction of tunnel y) Any other topic suggested by teacher	6
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 4.16 Visit of an old RCC building to observe defects and to suggest remedial measures 4.17 Visit of an nearby factory or industry to study the management system 4.18 Visit of the nearby town or city to study the sewage disposal system	8

	4.19 Collection of water samples from different sources to study the quality of drinking water. 4.20 Visiting of a nearby railway station for preparing a report on the station. 4.21 Any other relevant field selected by teachers	

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7: Course Title :- BUILDING REPAIR & MAINTENANCE (Optional)

1. **Course Code :- CV-604**
2. **Semester :- 6th (Civil)**
3. **COURSE OUTCOME (CO)**

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

* Diagnosis the defect of the building
*Identify the causes of defect
* Apply common technique of repair
*Repair RCC element
*Apply common strengthening procedure to the structure

COURSE OUTCOMES AND INTENDED LEARNING OUTCOMES

Course Outcome	Intended Learning Outcomes
CO1-Define the Importance of maintenance, Find out the factors influencing maintenance,	ILOs 1.Define the maintenance 2. State the objectives of maintenance. 3. State the importance of maintenance. 4. State the factors influencing maintenance. 5. State the Life of building.
CO2-State the process of deterioration. Classify the deterioration of buildings. Find out the factors of deterioration. Effect of deterioration on bricks, timber, concrete , paints, glass and plastics.	ILOS 1. State the process of deterioration. 2. Classify the deterioration. 3. List out the process of deterioration. 4. Factors of deterioration. 5.Effect of deterioration on bricks. Timber, concrete, paints , glass and plastics.
CO3-Apply steps for investigation. Objectives of investigation. Sources of information. Investigation kits for diagnosis. List out NDT instruments. Find out causes and symptoms o deterioration.	1. State the objectives of investigation. 2. State the steps for investigation. 3.State the purposes of investigation. 4. Find out the Sources of information. 5. Visual Examination. 6. Investigation kit for diagnosis. 7.Listout Non destructive tests instruments. 8. State the merits and demerits of NDT. 9. Uses of NDT. 10. Find the causes and symptoms of deterioration. 11. Causes of defects in foundation , DPC, wall , plaster , columns , Beams, Roofs , R.C.C , paints.

CO4 - Characteristics of repair materials. Find out the factors for selection of materials for repairs. Types of repair materials. Select the commercially available materials for repair.	ILOs 1. State characteristics of repair materials. 2. Find out the factors of materials for repairs. 3. Types of repair materials. 4. Select the commercially available materials for repair.
CO5 - Know the importance of surface preparation. Methods of surface preparation. State the common repair techniques. Common methods of cracks repair. Repair of existing water proofing of flat roof.	ILOs 1.State the importance of surface preparation. 2. State the methods of surface preparation. 3. State the common repair techniques. 4. State the common methods of crack repair. 5. Repairs of existing water proofing of flat roof. 6. State the steps and techniques used in water proofing flat roof by Mudphuska, Lime Terrace and Ferro cement.
CO6 - List out prevention of corrosion in reinforcement. Preparation of RCC for repair. Repair of corroded RCC elements. List out Concrete placement Techniques. Repair of surface defects.	ILOs 1. List out the prevention of corrosion in reinforcement. 2.Preparation of RCC for repair. 3. Repair of corroded RCC elements. 4. List out concrete placement Techniques. 5. repair of surface defects.
CO7 - Stabilization of foundations. Underpinning. Repair of raft slab foundations. Repair of DPC against rising dampness.	ILOs 1. Stabilization of foundations. 2. Underpinning. 3. Foundation support. 4. Repair of raft slab foundations- Edge settlement, interior slab heaving, upheaval. 5. Repair of DPC against rising dampness.
CO8 - State the Importance of finishing. List of repair of mortar joints. Efflorescence of removal.	ILOs 1. State the Importance of finishing. 2. List out repair of mortar joints. 3. Efflorescence of Removal. 4. List out Decorative coatings. 5. Repair of plastering. 6. Repair of paints. 7. Common defects in concrete floors.
CO9 - State the common problems in water supply and sanitary systems. Maintenance of pipes. Repair of Taps. Repairing of WC cisterns. Cleaning of clogged drains. Common defects in overhead and underground water tanks.	ILOs 1.State the common problems in water supply and sanitary systems. 2. Maintenance of pipes. 3. Repair of Taps. 4. Repairing of WC cisterns. 5. Cleaning of clogged drains. 6. Find the common defects in overhead and underground water tanks.

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

Lecture	Tutorial	Practical	Total
3	1		4

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	25	25	17/50	150	

6. Detailed Course Content

Chapter no	Chapter Title	Content	Duration (Hrs.)
1	Introduction	**6.1 Introduction of building** 6.2 Importance of maintenance 6.3 Definition of maintenance 1.4 Objectives of maintenance 1.5 Factors influencing maintenance 1.6 Life of buildings-physical, functional and economical life.	3
2	**Deterioration of buildings**	2.1 Process of deterioration 2.2 Classification of deterioration 2.3 Factors of deterioration 2.4 Effect of deterioration on-Bricks, Timber, concrete, Paints, Glass and plastics.	4
3	**Investigation and Diagnosis of defects in buildings**	3.1 Steps for investigation 3.2 Objectives of investigations 3.3 purposes of investigations 3.4 Sources of information 3.5 Visual Examinations 3.6 Investigation Kits for diagnosis 3.7 Non destructive tests- purposes and lists of NDT instruments, merits and demerits & their uses. 3.8 Causes and Symptoms of deterioration 3.9 Causes of Defects in foundations, DPC, Walls, plaster, columns, Beams, Roofs, RCC, paints.	9

4	**Materials for repair**	4.1 Characteristics of repair materials 4.2 Factors for Selection of materials for repairs 4.3 Types of repair materials with examples. 4.4 Commercially available repair materials (name only) for rebar primer, Curing compounds, Joint Sealants, protective coatings, Water proofing.	3
5	**Common Techniques of Building repairs**	5.1 Importance of Surface preparation 5.2 Methods of Surface preparation 5.3 Common repair techniques (brief description only) 5.4 Common methods of Crack repair (brief description only) 5.5 Repairs of existing water proofing of flat roof 5.6 Steps and techniques used in water proofing flat roof by Mud phuska, Lime Terrace and Ferro cement.	5
6	**Repair of RCC Elements**	6.1 Prevention of corrosion in reinforcement (list only) 6.2 Preparation of RCC for repair 6.3 Repair of Corroded RCC elements. 6.4 Concrete Placement Techniques(list only) 6.5 Repair of Surface defects.	5
7	**Repair and Maintenance of Foundations and DPC**	7.1 Stabilization of foundations 7.2 Underpinning 7.3 Foundation Support 7.4 Repair of raft slab foundations- Edge settlement, Interior slab heaving, Edge Upheaval. 7.5 Repair of DPC against rising dampness.	4
8	Repair **of finishes**	8.1 Importance of finishing 8.2 List of repair of mortar joints. 8.3 Efflorescence Removal 8.4 Decorative Coatings(list only) 8.5 Repair of Plastering 8.6 Repair of Paint 8.7 Common defects in concrete floors	4
9	**Repair of Water Supply and Sanitary System**	9.1 Common Problems in water supply and Sanitary system 9.2 maintenance of Pipes 9.3 Repairs of Taps 9.4 Repairing of WC Cisterns 9.5 Cleaning of clogged drains 9.6 Common defects in overhead and underground water tanks.	4

10	**Common Strengthening Techniques**	10.1 Importance of Strengthening 10.2 Basic Techniques.	2
11	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.	8

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 5 marks question shall be asked from each chapter.					

9.Table of Specification for BUILDING REPAIR & MAINTENANCE :

Sl. no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Introduction	3	6	1	4	-	-
2	Deterioration of buildings	4	8	1	4	-	-
3	Investigation and Diagnosis of defects in buildings	9	20	4	9	-	-
4	Materials for repair	3	6	1	4	-	-
5	Common Techniques of Building repairs	5	10	1	7	-	-
6	Repair of RCC Elements	5	10	1	7	-	-

7	Repair and Maintenance of Foundations and DPC	4	8	1	7	-	-
8	Repair of finishes	4	8	1	6	-	-
9	Repair of Water Supply and Sanitary System	4	8	1	6	-	-
10	Common Strengthening Techniques	2	4	1	3	-	-
11	Internal assessment	6	12	-	-	-	-
		∑b=49 hrs.+ 6hrs internal assessment	100	13	57		

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***		3	-	-	**-**
2	Deterioration of buildings	1	1		***2***		3	-	-	**-**
3	Investigation and Diagnosis of defects in buildings	2	2		***4***	2	7	-	-	**-**
4	Materials for repair	1	1		***2***		3	-	-	**-**
5	Common Techniques of Building repairs	1	2		***3***		5	-	-	**-**
6	Repair of RCC Elements	1	2		***3***		5	-	-	**-**
7	Repair and Maintenance of Foundations and DPC	1	2		***3***		5	-	-	**-**
8	Repair of finishes	1	1		***2***		5	-	-	**-**
9	Repair of Water Supply and Sanitary System	1	1		***2***		5	-	-	**-**
10	Common Strengthening Techniques	1	1		***2***		2	-	-	**-**
	Total				***25***					***45***

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

8. Suggested Implementation Strategies:- The short question should carry 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.
9. Suggested Learning Resource :-

9.1 Book list

REFERENCE BOOKS-

I) P.S. GAHLOT & SANJAY SHARMA-Building Repair and Maintenance Management.

ii) A.C. PANCHDARI-Maintenance of Buildings

iii) National building agency-Common Building defects.

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7:Course Title :- BUILDING REPAIR & MAINTENANCE (Optional) (PRACTICAL)

1. **Course Code :- CV-604**
2. **Semester :- 6th (Civil)**

Practical :

Skills to be developed:

INTELLECTUAL SKILLS:

1. Identify the method for testing of strength of a building
2. Identify the method for repairing and maintenance of the structure
3. Diagnosis the defect of the structure

MOTOR SKILLS:

1. Observe results carefully
2. Handle instruments carefully.

List of Practical:

1. **Determination of strength of concrete by rebound hammer**
2. **Determination of Concrete cover on reinforcement by cover meter**
3. **Use and handling of rebar locator**
4. **Determination of quality of Concrete by chemical reagent**
5. **Determination of strength of concrete by UPV method**
6. **Use and handling of any other NDT equipment.**

OR

Preparation of a mini project report related to

1. **Building repair and maintenance**
2. **Retrofitting of structures**
3. **Repair and maintenance of water supply and sanitary system**
4. **Diagnosis the defects of some nearby RCC building**
5. **Any other related topic suggested by concerned teachers**

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8: Course Title :- RAILWAY BRIDGE & TUNNEL ENGINEERING (Optional)

1. **Course Code :- CV-605**
2. **Semester :- 6th (Civil)**
3. **Objective of the Subject/ Courses :-**

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

a) Explain the various stages of work for Railway alignment.
b) Identify and use components of Rail.
c) Organize and supervise laying of rail track.
d) Select ideal site for Bridge and carry out their maintenance.
e) Use drilling Equipment.
f) Practice safety in drilling operation.

5.Course Outcomes of Railway Bridge and Tunnel Engineering (Theory).

Sr. No.	Course Outcomes	Intended Learning
1.	CO1- Define the Role of Railway Transportation in the development on nation. State the Modes of Transformation systems. State the importance of each mode and comparison of each mode. State the merits and demerits of each mode.	ILOs- 1.Define the Role of Railway Transportation in the development of nation. 2. State the modes of Transportation system. 3. State the importance of each mode of transportation. 4. Comparison of each mode. 5. State the merits and demerits of each mode. 6. State the necessity and importance of Cross drainage works in railways.
2.	CO2 – Classify Indian Railways. State the zones of Indian Railway. Factors governing rail alignment. Types of Gauges. Factors affecting selection of gauges. Rail Track cross sections. Rails function and types. Rail joints – requirements , types of joints. Sleepers – functions and requirement and types of sleepers. Railway Track Geometrics.	ILO2- 1. Classify the Indian Railways. 2. State the zones of Indian Railway. 3. Factors governing rail alignment. 4. State the types of Gauges. 5. List out Factors affecting selection of gauge. 6. Find the Rail Track cross –sections. 7. Describe the functions of Rails. 8. Describe the types of Rails. 9. Describe the Rail joints. 10. State the functions and requirement of Sleepers. 11. State the types of sleepers. 12. State the Ballast function and types with their properties. 13. State the Rail fixtures and fastenings. 14. Railway Track Geometrics. 15. Define the point and crossing. 16. Sketch of different components of points and crossing lines.

	Branching of Tracks. Station and yards. Track Maintenance.	17. Inspection of points and crossings. 18. Selection of site for Railway Stations. 19. Find the requirement of railway station. 20. State the types of Stations. 21. State the types of station yard. 22. Find the necessity of Track Maintenance. 23. Types of Tools required for Maintenance.
3.	CO3- Site Selection and Investigation of a Bridge . Collection of Design data. Classify bridges. Draw the plan and sectional elevation of bridge showing component parts of substructure and super structure. Define permanent and Temporary bridges. Inspection of Bridges. Maintenance of Bridges.	ILOs- 1.State the factors affecting selection of site of a bridge. 2. Find bridge alignment. 3. Collect design data. 4. Classify bridges according to function , material , span , size , alignment , position of HFL. 5. Draw the plan and sectional elevation of bridge showing component parts of substructure and super structure. 6. State the function and types of foundation of bridges. 7. State the function and types of abutment. 8. State the function and types of wing walls. 9. State the function and types of bearing for RCC and steel bridges. 10. Sketch of culverts , permanent bridges. 11. Temporary bridges. 12. Inspection of bridges. 13. Maintenance of bridges .
4.	CO4- Define Tunnels. Classify Tunnels. Tunnel cross sections for highway and railways. Investigation and surveying. Shaft construction and its purpose. Methods of Tunneling in soft rock-needle beam method. Methods of tunneling in hard rock-full – face heading method. Precautions in construction of tunnels. Drilling equipment. Types of explosives used in tunneling. Tunnel lining and ventilation.	ILOs- 1. Define Tunnels. 2. Find necessity of Tunnels. 3. State the advantages and disadvantages of tunnels. 4. Classify tunnels. Find the shape and size of tunnels. 5. Tunnel cross sections for highway and railways. 6. Investigation and surveying for tunnels. 7. Describe shaft construction and its purpose. 8. Describe the tunneling in soft rock – needle beam methods. 9. Describe the tunneling in hard rock – full – face heading methods. 10. Bench method and Drift method. 11. Take precautions in construction of tunnels. 12. Describe the drills and drilling equipment. 13. Types of explosives used in tunneling. 14. Define tunnel lining and ventilation.

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

Lecture	Tutorial	Practical	Total
3		3	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	25	25	17/50	150	4

7.Course Content

Unit	Topic	Contact hr
1	Overview of Transportation Engineering 1.1 Role of Railway transportation in the development of nation. 1.2 Modes of transportation system – roads, railway, airways, waterways, Importance of each mode, comparison and their relative merits and demerits. 1.3 Necessity & importance of Cross drainage works in railways.	2
2	Railway Engineering. 2.1 Alignment and Gauges, Classification of Indian Railways, zones of Indian Railway. Alignment- Factors governing rail alignment. Gauges – types, factors affecting selection of gauge. Rail track cross sections – standard cross section of BG & M.G Single & double line in cutting and embankment. 2.2 Permanent ways Ideal requirement, component parts. Rails – function & its types. Rail Joints – requirements, types, Creep of rail , causes & prevention of creep. Sleepers – functions & Requirement, types – wooden, metal, concrete sleepers their suitability, sleeper density. Ballast – function & different types with their properties, relative merits & demerits. Rail fixtures & fastenings – fish plate, bearing plates, spikes, bolts, keys, anchors & anti creepers. 2.3 Railway Track Geometrics. Coning of wheels, tilting of rails, Gradient & its types, Super elevation, Limits of Super elevation on curves, cant deficiency negative cant, grade compensation on curves. 2.4 Branching of Tracks Definition of point & crossing, a simple split switch turnout consisting of points and crossing lines Sketch showing different components, their functions & working.	18

	Line sketches of track junctions-crossovers, Scissor cross over, Diamond crossing, triangle. Inspection of points and crossings 2.5 Station and Yards : Site selection for railway stations, Requirements of railway station, Types of stations (way side, crossing, junction & terminal), Station yards , types of station yard, Passenger yards, Goods yard, Locomotive yard – its requirements, water column , Marshalling yard – its types. 2.6 Track Maintenance- Necessity, types, Tools required and their function, organization, duties of permanent way inspector, gang mate, key man	
3	Bridge Engineering : 3.1 Site selection and investigation Factors affecting selection of site of a bridge. Bridge alignment, Collection of design data Classification of bridges according to function, material, span, size, alignment, position of HFL. 3.2 Component parts of bridge. Plan & sectional elevation of bridge showing component parts of substructure & super structure. Different terminology such as effective span, clear span, economical span, waterway, afflux, scour, HFL, freeboard, etc. Foundation – function, types, Piers-function, requirements, types. Abutment – function, types Wing walls – functions and types. Bearing – functions, types of bearing for RCC & steel bridges. Approaches –in cutting and embankment. Bridge flooring- open and solid floors 3.3 Permanent and Temporary Bridges- Permanent Bridges - Sketches & description in brief of culverts, causeways, masonry, steel, movable steel bridges, RCC girder bridge, Temporary Bridges- timber, flying, floating bridges 3.4 Inspection & Maintenance Of Bridge. Inspection of bridges, Maintenance of bridges & types – routine & special maintenance.	12
4	Tunnel Engineering. 4.1 Definition, necessity, advantages, disadvantages 4.2 Classification of tunnels. 4.3 Shape and Size of tunnels 4.4 Tunnel Cross sections for highway and railways 4.5 Tunnel investigations and surveying –Tunnel surveying locating	8

	center line on ground, transferring center line inside the tunnel. 4.6 Shaft - its purpose & construction. 4.7 Methods of tunneling in Soft rock-needle beam method, fore-poling method, line plate method, shield method. 4.8 Methods of tunneling in Hard rock-Full-face heading method, Heading and bench method, drift method. 4.9 Precautions in construction of tunnels 4.10 Drilling equipment-drills and drills carrying equipment 4.11 Types of explosives used in tunneling. 4.12 Tunnel lining and ventilation.	
5	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	
1	Overview of Transportation Engineering	1	3		4
2	Railway Engineering	1+1+1+1=4	6	20	30
3	Bridge Engineering	1+1+1=3	3	14	20
4	Tunnel Engineering	1+1=2	3	11	16
Total		10	15	45	70

9.Table of Specification for Theory Design of Steel Structure (CV-601)

Sl no	Topic	Time allotted in hours (b)	Percentage Weight age ©	K	C	A	HA
1	Overview of Transportation Engineering	2	4	1	3		
2	Railway Engineering	18	40	7	7	16	
3	Bridge Engineering	12	26	3	7	10	
4	Tunnel Engineering	8	17	3	4	9	
11	Internal assessment	6	13	-	-	-	-
		∑b=46 hrs.+ 6hrs internal assessment	100	14	21	35	

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	Overview of Transportation Engineering	1	3		***4***					
2	Railway Engineering	2	2	6	***10***	5	5	10		***20***
3	Bridge Engineering	1	2	3	***6***	2	5	7		***14***
4	Tunnel Engineering	1	1	3	***5***	2	3	6		***11***
	Total				***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.

Text Books: -

Titles of the Book	Name of author	Edition Name of the Publisher
Railway Engineering	S.C. Saxena	Dhanpatrai& sons
Railway Track	K.R. Antia	The New Book Co. Pvt. Ltd Mumbai
Principles of Railway Engineering	S.C. Rangwala	Charotar Publication
Principles and Practice of Bridge Engineering	S.P.Bindra	Dhanpatrai& sons
A Text Book of Transportation Engineering	L.Arora and S.P.Luthra	IPH New Delhi
Elements of Bridge Engineering	J.S. Alagia	Charotar Publication
Bridge Engineering	D.R. Phatak	Everest Publisher
Elements of Bridges	D. JohnosVicter	Oxford & IBH Publishing co.
Road, Railway and Bridges	Birdi& Ahuja.	Std. Book House
Tunnel Engineering	S.C. Saxena	Dhanpatrai& sons
Explosive Engineering	C. B. Navalkar	--

IS / International Codes. : IS 4880, I.S. 5878, Part-I to X.

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8.Course Title :- RAILWAY BRIDGE & TUNNEL ENGINEERING (Optional) (PRACTICAL)

1. **Course Code :- CV-605**
2. **Semester :- 6th (Civil)**

Practical :

Skills to be developed:

INTELLECTUAL SKILLS:

1. Identify the method for testing of materials related to Road, Bridge and Tunnel
2. Identify the method for repairing and maintenance of bridge and tunnel
3. Diagnosis the defect of the structure

MOTOR SKILLS:

1. Observe results carefully
2. Handle instruments carefully.

List of practical

1. Determination of Abrasion value of ballast and stone
2. Determination of impact value of stone.
3. Determination of CBR value of soil in the laboratory
4. Determination of CBR value of soil in the field
5. Determination of field density of soil by core cutter method
6. Determination of water content of soil in the field

Or

Preparation of a mini project report related to

1. **Railway bridge**
2. **Ideal railway station**
3. **Geometric design of railway track**
4. **Construction of tunnel**
5. **Inspection and maintenance of tunnel**
6. **Any other related topic suggested by concerned teachers**

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Remarks

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

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