VINAYAKA MISSION'S RESEARCH FOUNDATION, SALEM
(Deemed to be University)

FACULTY OF ENGINEERING AND TECHNOLOGY

REGULATIONS-2015

CURRICULUM AND SYLLABUS

FROM

I TO VIII SEMESTERS

FOR

B.E.CIVIL ENGINEERING [REGULAR)

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ABOUT THE COURSE

Civil engineering is perhaps the broadest of the engineering fields, for it deals with the creation, improvement, and protection of the communal environment, providing facilities for living, industry and transportation, including large buildings, roads, bridges, canals, railroad lines, airports, water-supply systems, dams, irrigation, harbours, docks, aqueducts, tunnels, and other engineered constructions. The civil engineer must have a thorough knowledge of all types of surveying, of the properties and mechanics of construction materials, the mechanics of structures and soils, and of hydraulics and fluid mechanics. Among the important subdivisions of the field are construction engineering, irrigation engineering, transportation engineering, soils and foundation engineering, geodetic engineering, hydraulic engineering, and coastal and ocean engineering.

Man first started his life as a civil Engineer. It was the invention of wheel that favored the development of human race in to culture one. Our aim is to achieve a target of producing creative innovative and dignified Civil Engineers. Every Civil Engineer needs the skill for preliminary investigation, analysis, design and execution and maintenance.

Preliminary investigation provides adequate information that are required for the successful completion of the project. This may include collection of environmental data, local material availability, soil and geological conditions, availability of labour force, traffic characteristics etc.

Detailed survey and other field tests are to be conducted before proceeding with the analysis. During the analysis period, different options of the project have to be considered thoroughly and the final one has to be detected.

After the analysis, a decision on the materials to be used has to be made. Then the design is made with one or more approaches and the optimal one is chosen such that the project will be economical with out sacrificing the safety and durability aspects.

Next stage is the execution which is done with proper construction planning for completion of the project in a short duration of time such that the facility shall be available to the society early.

A well constructed project should not get spoiled with out proper maintenance. It needs streamlined maintenance plan and proper execution. Civil engineering is perhaps the broadest of the engineering fields, for it deals with the creation, improvement, and protection of the communal environment, providing facilities for living, industry and transportation, including large buildings, roads, bridges, canals, railroad lines, airports, water-supply systems, dams, irrigation, harbours, docks, aqueducts, tunnels, and other engineered constructions. The civil engineer must have a thorough knowledge of all types of surveying, of the properties and mechanics of construction materials, the mechanics of structures and soils, and of hydraulics and fluid mechanics. Among the important subdivisions of the field are construction engineering, irrigation engineering, transportation engineering, soils and foundation engineering, geodetic engineering, hydraulic engineering, and coastal and ocean Engineering.

The course aims at packing up Engineers with above mentioned concepts of motivating and leading the construction industry a full-fledged one for a bright India.

CURRICULUM

OBJECTIVES

i) KNOWLEDGE

"Knowledge is Power" the saying pays an active attention by bringing out the essence of life. "You become what you think!" said, Vivekananda. Still then it could be well felt that most of us worship the great men who told the sayings but don't follow them. Is not that true? Human beings are in a wild struggle for the want of money, bread and happiness. But do we achieve the things that we long for in our life? Life is not meant to search but to enjoy. Enjoyment should be the fullest up to the brim. Engineering is always a joy when learned with enthusiasm, the eager to learn, the love to conquer humanity, will drive the life a more meaningful one. Knowledge makes you sharp, brings elation to the brain. Civil engineering is perhaps the broadest of the engineering fields, for it deals with the creation, improvement, and protection of the communal environment. Intelligent hard work never fails. A thirst for knowledge, a drive to win, a passion to achieve can always be accompanied of having sound knowledge in what ever field you choose. Just remember Darwin's theory of survival of the fittest. If you want to survive enter this competitive world with your brain and get ready for a high tech environment of Civil Engineers.

ii) SKILLS

Are you really skilled? What do you mean by skill then? Perhaps it nothing but proficiency and excellence in what ever you start with .You need virtue of scientific education and training in the field of Engineering to develop the Engineering skills. Every Engineer has the role to play. For instance a simple train journey to work or school illustrates the number of different kinds of engineers who have involved in some way in making the journey possible. Mechanical and electrical engineers have involved with the design of locomotives and coaches. Civil Engineers with the design and construction of railway tracks, bridges and station buildings; Electronics engineers with the design and installation of communication facilities; Computer Engineers with automatic control and regulation of movement of trains; Chemical engineers with the production of paints and Diesel. Rapid movement of new technologies and new construction techniques and materials has implications upon all branches of engineering. No one is born skilled; It is the Education that nourish him.

iii) INTERPRETATION

It was the interpretation that had led man to this extent to rule this world and to some extent he had conquered time also. The Engineering science has no end at all. Fire was the first interpretation of man. Today he makes the computers interpret humans. Civil Engineering has been redefined with the advent of Finite element analysis softwares like NASTRAN, ANSYS other packages like STAAD pro, SAP, STRUDS etc., It's an interesting thing to note down that Artificial intelligence has come down with flying colours for Civil Engineering that for constructing a bridge or fly over, it has been made possible that about 200 designs can be done at a moment and the appropriate can be chosen at interest.

Its not what field you choose upon but how do you interpret. The engineering interpretation of Tsunami has ended up with an innovative design of folded plate design that could keep the people at comfort. Folded plates offer the combined advantages of both plates and shells. Some times folded plates are called as prismatic shells. All structural theories distinguish sharply between the structures having small deflections and those having large deflections. For the former the law of superposition is applicable while for the latter the so – called "Structural theories of second order "must be used. One of the most important bridge structures, "Howrah Bridge" is made fully of rivets and no where it has bolts and nuts. How enthusiastic the designer was? How creative? One of our Civil Engineering staff often use to say "Design starts from the top while Construction from the bottom!" Our aim is create innovative, creative and dignified Civil Engineers. We wish you to achieve the aim by joining hand with us.

SEMESTER I

	COURSE CODE	COURSE TITLE	DEPT. OFFERING THE COURSE	L	T	P	C
THEORY							
1	34115101	Calculus for Engineers	MATHS	3	1	0	4
2	34115102	English for Engineers	ENGLISH	3	0	0	3
3	34115103	Physics for Engineers	PHYSICS	3	0	0	3
4	35015101	Essentials of Computer Science and Engineering	COMPUTER SCIENCE	3	0	0	3
5	34615101	Essentials of Electrical and Electronics Engineering	EEE/ECE	3	0	0	3
PRACTICAL							
6	341151L1	Physics Lab	PHYSICS	0	0	4	2
7	346151L1	Electrical and Electronics Engineering Lab	EEE/ECE	0	0	4	2
8	344151L1	Workshop Practices	MECHANICAL	0	0	4	2
9	350151L1	Computer Lab	COMPUTER SCIENCE	0	0	4	2
TOTAL				**15**	**1**	**16**	**24**

SEMESTER II

SL.NO	COURSE CODE	COURSE TITLE	DEPT. OFFERING THE COURSE	L	T	P	C
THEORY							
1	34115203	Transforms and Matrices	MATHS	3	1	0	4
2	34115201	Business English	ENGLISH	3	0	0	3
3	34115202	Chemistry for Engineers	CHEMISTRY	3	0	0	3
4	35015201	C Programming	COMPUTER SCIENCE	3	0	0	3
5	34415201	Engineering Mechanics	MECHANICAL	3	1	0	4
PRACTICAL							
6	341152L1	Engineering Chemistry Lab	CHEMISTRY	0	0	4	2
7	344152L2	Engineering Graphics Lab	MECHANICAL	0	0	4	2
8	350152L1	C Programming Lab	COMPUTER SCIENCE	0	0	4	2
9	341152L2	Yoga and Meditation		0	0	4	2
TOTAL				**15**	**2**	**16**	**25**

SEMESTER III

SL.No.	COURSE CODE	COURSE TITLE	DEPT. OFFERING THE COURSE	L	T	P	C
THEORY							
1		PDE Application and Complex Analysis	MATHS	3	1	0	4
2		Mechanics of Solids- I	CIVIL	3	1	0	4
3		Construction Materials	CIVIL	3	0	0	3
4		Mechanics of Fluids	CIVIL	3	1	0	4
5		Surveying I	CIVIL	3	0	0	3
6		Engineering Geology	CIVIL	3	0	0	3
PRACTICALS							
1		Strength of Materials lab	CIVIL	0	0	4	2
2		Survey Practical I Lab	CIVIL	0	0	4	2
TOTAL				**18**	**3**	**8**	**25**

SEMESTER IV

SL.No.	COURSE CODE	COURSE TITLE	DEPT. OFFERING THE COURSE	L	T	P	C
THEORY							
1		Numerical Methods	MATHS	3	1	0	4
2		Construction Techniques, Equipment and Practices	CIVIL	3	0	0	3
3		Mechanics of Solids- II	CIVIL	3	1	0	4
4		Environmental Engineering I	CIVIL	3	0	0	3
5		Applied Hydraulic Engineering	CIVIL	3	1	0	4
6		Surveying II	CIVIL	3	0	0	3
PRACTICALS							
1		Hydraulic Engineering Lab	CIVIL	0	0	4	2
2		Survey Practical II Lab	CIVIL	0	0	4	2
		TOTAL		**18**	**3**	**8**	**25**

SEMESTER V

SL.No.	COURSE CODE	COURSE TITLE	DEPT. OFFERING THE COURSE	L	T	P	C
THEORY							
1		Structural Analysis	CIVIL	3	1	0	4
2		Design of Reinforced Concrete Elements	CIVIL	3	1	0	4
3		Environmental Engineering -II	CIVIL	3	0	0	3
4		Design of Steel Structures	CIVIL	3	1	0	4
5		Mechanics of Soils	CIVIL	3	1	0	4
6		Elective – I	-	3	0	0	3
PRACTICALS							
1		Computer Aided Building Drawing Lab	CIVIL	0	0	4	2
2		Soil Mechanics Lab	CIVIL	0	0	4	2
3.		Professional Communication and Personality Development	ENGLISH	0	0	4	2
TOTAL				**18**	**4**	**12**	**28**

SEMESTER VI

S.No.	COURSE CODE	COURSE TITLE	DEPT. OFFERING THE COURSE	L	T	P	C
THEORY							
1		Modern Methods of Structural Analysis	CIVIL	3	1	0	4
2		Design of Reinforced Concrete and Masonry structures	CIVIL	3	1	0	4
3		Highway Engineering	CIVIL	3	0	0	3
4		Disaster Mitigation and Management	CIVIL	3	0	0	3
5		Foundation Engineering	CIVIL	3	1	0	4
6		Elective II		3	0	0	3
PRACTICALS							
1		Computer Aided Design and Drawing Lab	CIVIL	0	0	4	2
2		Concrete and Construction Technology Lab	CIVIL	0	0	4	2
3		Survey Camp	CIVIL	-	-	-	2
TOTAL				**18**	**3**	**8**	**27**

SEMESTER VII

S.No.	COURSE CODE	COURSE TITLE	DEPT. OFFERING THE COURSE	L	T	P	C
THEORY							
1		Estimation and Quantity Surveying	CIVIL	3	1	0	4
2		Irrigation Engineering	CIVIL	3	0	0	3
3		Construction Planning and Scheduling	CIVIL	3	0	0	3
4		Repair and Rehabilitation of structures	CIVIL	3	0	0	3
5		Railway , Airport and Harbour Engineering	CIVIL	3	0	0	3
6		Elective III		3	0	0	3
PRACTICALS							
1		Comprehension Lab	CIVIL	0	0	4	2
2		Design Project	CIVIL	0	0	4	2
3		Environmental Engineering Lab	CIVIL	0	0	4	2
TOTAL				**18**	**1**	**12**	**25**

SEMESTER VIII

SL.No.	COURSE CODE	COURSE TITLE	DEPT. OFFERING THE COURSE	L	T	P	C
THEORY							
1		Elective IV		3	0	0	3
2		Elective V		3	0	0	3
3		Elective VI		3	0	0	3
PRACTICALS							
1		Project work and Viva Voce	CIVIL	0	0	12	6
TOTAL				**9**	**0**	**12**	**15**

TOTAL CREDITS: 194

LIST OF ELECTIVES

SL.NO	COURSE CODE	COURSE TITLE	DEPT. OFFERING THE COURSE	L	T	P	C
1		Hydrology	CIVIL	**3**	**0**	**0**	**3**
2		Remote Sensing Techniques and Applications	CIVIL	**3**	**0**	**0**	**3**
3		Housing Planning and Management	CIVIL	**3**	**0**	**0**	**3**
4		Traffic Engineering and Management	CIVIL	**3**	**0**	**0**	**3**
5		Management of Irrigation Systems	CIVIL	**3**	**0**	**0**	**3**
6		Prefabricated structures	CIVIL	**3**	**0**	**0**	**3**
7		Ground Improvement Techniques	CIVIL	**3**	**0**	**0**	**3**
8		Introduction to Soil Dynamics and Machine Foundations	CIVIL	**3**	**0**	**0**	**3**
9		Geographical Information System	CIVIL	**3**	**0**	**0**	**3**
10		Electronic Surveying	CIVIL	**3**	**0**	**0**	**3**
11		Air Pollution Management	CIVIL	**3**	**0**	**0**	**3**
12		Bridge Structures	CIVIL	**3**	**0**	**0**	**3**
13		Tall Buildings	CIVIL	**3**	**0**	**0**	**3**
14		Structural Dynamics	CIVIL	**3**	**0**	**0**	**3**
15		Wind Engineering	CIVIL	**3**	**0**	**0**	**3**
16		Total Quality Management	MBA	**3**	**0**	**0**	**3**
17		Industrial Waste Management	CIVIL	**3**	**0**	**0**	**3**
18		Computer Aided Design Of Structures	CIVIL	**3**	**0**	**0**	**3**
19		Industrial Structures	CIVIL	**3**	**0**	**0**	**3**
20		Smart Structures and smart Materials	CIVIL	**3**	**0**	**0**	**3**
21		Finite Element Techniques	CIVIL	**3**	**0**	**0**	**3**

22		Design of Plate and Shell Structures	CIVIL	**3**	**0**	**0**	**3**
23		Cyber Security	CSE	**3**	**0**	**0**	**3**
24		Disaster Mitigation Techniques	CIVIL	**3**	**0**	**0**	**3**
25		Ground water Engineering	CIVIL	**3**	**0**	**0**	**3**
26		Principles of structural dynamics and seismic design	CIVIL	**3**	**0**	**0**	**3**
27		Environmental Science and Engineering	CHEMISTRY	**3**	**0**	**0**	**3**
28		Transport Economics	CIVIL	**3**	**0**	**0**	**3**
29		Mass Transport Management	CIVIL	**3**	**0**	**0**	**3**
30		Engineering Management and Ethics	MBA	**3**	**0**	**0**	**3**

I SEMESTER

YEAR	SEMESTER	TITLE OF PAPER	L	T	P	C
I	I	**CALCULUS FOR ENGINEERS** **Common to BE&B.TECH.- First Semester** (MECH, ECE, CSE, CSSE, EEE, EIE, CIVIL, IT, MECHT,S&AE, TEXTILE CHEMISTY, AERO, ETC , AUTO& BME)	3	1	0	4

OBJECTIVES

The Syllabus for the calculus for Engineers has been framed catering to the needs for Engineering students. It is purely application oriented. Functions of several variables which are useful in many ways, particularly for evaluation of extreme values and for evaluation of surface and Volume integrals.

UNIT I

APPLICATION OF DIFFERENTIAL CALCULUS **12**

Curvature – Cartesian and Parametric Co-ordinates – Centre and radius of curvature – Circle of curvature – Evolute

UNIT II

FUNCTIONS OF SEVERAL VARIABLES **12**

Partial Derivatives – Total Differential - Maxima and Minima – constrained Maxima and Minima by Lagrangian Multiplier Method.

UNIT III

INTEGRATION **12**

Concept of integration-Integration of Rational andTrigonometric functions – Using Partial Fractions – Integration by parts.

UNIT IV

MULTIPLE INTEGRAL **12**

Double integration –change of order of integration- Cartesian and polar coordinates –Area as a double integral – Triple integration.

UNIT V

VECTOR CALCULUS **12**

Directional derivatives – Gradient, Divergence and Curl – Irrotational and solenoidal- vector fields – Vector integration – Green's theorem, Gauss divergence theorem and Stoke's theorem (excluding proof).

Lecture Hours: 45
Tutorial Hours: 15
Total hours : 60

OUTCOME:

The student will be able to apply the fundamental theorems of calculus.

TEXT BOOK:

1. **"**Engineering Mathematics**"** by Department of Mathematics, VMU
2. Veerarajan, T., "Engineering Mathematics", Tata McGraw Hill Publishing Co., NewDelhi, 2006.
3. Dr.A .Singaravelu , Engineering Mathematics Volume I & Volume II by Meenakshi Publications.

REFERENCES:

1. Grewal, B.S., "Higher Engineering Mathematics" (36th Edition), Khanna Publishers, Delhi 2001.
2. Kreyszig, E., "Advanced Engineering Mathematics" (8th Edition), John Wiley and Sons (Asia) Pvt Ltd., Singapore, 2001.
3. Kandasamy .P.,Thilagavathy. K., and Gunavathy. K., "Engineering Mathematics", Volumes I & II (4th edition), S.Chand& Co., New Delhi., 2001.
4. T. Veerarajan, "Engineering Mathematics" (for semester III), Third Edition Tata McGraw- Hill Publishing Company limited.

YEAR	I	ENGLISH FOR ENGINEERS	L	T	P	C
SEMESTER	I		3	0	0	3

(COMMON TO ALL BRANCHES)

OBJECTIVES

- To enable students to develop LSRW skills in English.
- To become effective communicators in English.
- To ensure that learners use Electronic media materials for developing language skills.

UNIT – I **9**

Self introduction - Simulations using E Materials - Whatsapp, Face book, Hiker, Twitter- Effective Communication with Minimum Words - Interpretation of Images and Films - Identify the different parts of speech– Common Errors in English – Scientific Vocabulary, (definition and meaning) - Listening Skills- passive and active listening, Listening to native speakers, , guided note taking - Characteristics of a good listener– Telephonic conversation with dialogue.

UNIT – II **9**

Articles - Phonetics (Vowels, Consonants and Diphthongs) – Pronunciation Guidelines – Listening to Indian speakers from different regions, intrusion of mother tongue – Homophones – Homonyms, Note taking and Note making - Difference between Spoken and Written English- Use of appropriate language - Listening and Responding to Video Lectures (Green India, environment, social talks) - Extempore.

UNIT – III **9**

Tense forms- Verbal & Non verbal communication – Describing objects – Process Description- Speaking Practice – Paragraph Writing on any given topic (My favourite place, games / Hobbies / School life, etc.) –Types of paragraphs- Telephone Etiquettes.

UNIT – IV **9**

Impersonal Passive Voice- Conditional Sentences – Technical & Non technical Report Writing (Attend a technical seminar & submit a report) – News Letters & Editing –Skimming & Scanning - How to Improve Reading Speed – Designing Invitations & Poster Preparation.

UNIT – V **9**

Sentence Pattern (SVOCA) - Statement of Comparison - Transcoding – Informal letters - SWOT analysis– Resume Writing- Difference –Bio – data, Resume and CV.

Total: 45 hours

OUTCOMES:

1. By teaching this syllabus, our UG Engineering graduates will enable to enhance wide range vocabulary to use at right place in right time.
2. Students who undergo this syllabus will fulfill practice in professional writing and comprehension skill and meet the industry requirements.

TEXT BOOK

1 **English for Effective Communication,** Departments of English, VMKV & AVIT. Erode: SCM Publishers, 2009.

REFERENCE BOOKS

1 M.Ashraf Rizvi, Effective Technical Communication. New Delhi: Tata McGraw Hill Publications, 2007.

2 Pickett and Laster. Technical English: Writing, Reading and Speaking. New York: Harper and Row Publications, 2002.

3 Cutts, Martin. The Plain English Guide – How to Write Clearly and Communicate Better. New Delhi: Oxford University Press, 1995.

4 Narayanaswami.V.R. Strengthen Your Writing. Chennai: Orient Longman Ltd., 1996.

5 Prof.K.R.Lakshmi Narayanan & Dr.T.Murugavel, Communication Skills for Engineers, Chennai: SCI Publications, 2002.

SEMESTER	CODE	SUBJECT	L	T	P	C
I		PHYSICS FOR ENGINEERS	3	0	0	3

AIM:

To familiarize students with the basic concepts of Physics and their application in Engineering & Technology.

OBJECTIVE:

- To understatnd the elastic properties of materials
- To understatnd the properties of crystals
- To understatnd the significance of laser and its applications in technology
- To understatnd the basic principles of optical fibres and their applications
- To understatnd the Non-Destructive Testing techniques

UNIT I –Properties of matter **9**

Elasticity – Hooke's law – Stress-strain diagram - Relationship between three moduli of elasticity (qualitative) - Poisson's ratio – Young's modulus by uniform bending and non-uniform bending – Experimental determination of rigidity modulus – I-shaped girders.

UNIT II – Crystal Physics **9**

Unit cell – Bravais lattice – Miller indices – Calculation of number of atoms per unit cell – atomic radius – coordination number – packing factor for SC, BCC, FCC, HCP structures – Crystal imperfections – point, line, surface and volume defects.

UNIT III – Lasers **9**

Laser characteristics - Stimulated Emission – Population Inversion - Einstein coefficients – Lasing action – Types of Laser – Nd:YAG laser, CO_2 laser, GaAs laser – Applications of Laser – Holography – construction and reconstruction of a hologram

UNIT IV – Fibre Optics **9**

Principle and propagation of light in optical fibres – numerical aperture and acceptance angle – types of optical fibres (material, refractive index, mode) – Applications: Fibre optic communication system – fibre optic displacement sensor and pressure sensor.

UNIT V - Non – Destructive Testing **9**

Introduction – Types of NDT - Liquid penetrant method – characteristics of penetrant and developer - ultrasonic flaw detector – Ultrasonic scanning methods - X-ray Radiography: displacement method – X-ray Fluoroscopy.

Total hours : 45

OUTCOME:

The fundamental knowledge in physics will improve the scientific thinking of students

TEXT BOOK

"Engineering Physics", compiled by Department of Physics, Vinayaka Missions University, Salem.

REFERENCE BOOKS

1. Beiser, Arthur, "Concepts of Modern Physics", 5th Ed., McGraw-Hill, 2009.

2. Halliday.D, Resnick.R, Walker.J, Fundamentals of Physics, Wiley & sons, 2013.

3.Gaur R. K. and Gupta S. L., "Engineering Physics", Dhanpat Rai publishers, New Delhi, 2001.

4. Avanadhanulu.M.N., Arun Murthy.T.V.S, Engineering Physics Vol. I, S.Chand, 2014.

5. Rajendran. V, "Engineering Physics", Tata Mc Graw Hill Publication and Co., New Delhi, 2009.

SEMESTER	CODE	SUBJECT	L	T	P	C
I		ESSENTIALS OF COMPUTER SCIENCE AND ENGINEERING	3	0	0	3

(Common to all Branches)

AIM:

The aim is to introduce the fundamentals of Computer to the students

OBJECTIVES:

- To provide basic knowledge on hardware and software components of computers.
- To introduce and demonstrate various software applications
- To introduce Problem solving methodologies
- To learn about Implementation of Algorithms
- To learn about HTML

UNIT I - Basics of Computer and Information Technology 10

Computer – Generations, Types of Computers, Block diagram of a computer- Components of a computer system - Hardware and software definitions - Categories of software – Booting - Installing and Uninstalling a Software - Software piracy - Software terminologies - Applications of Computer - Role of Information Technology - History of Internet - Internet Services.

UNIT II - Software Applications (Practical Learning) 7

Office Automation: Application Packages - Word processing (MS Word) - Spread sheet (MS Excel) – Presentation (MS PowerPoint).

UNIT III - Problem Solving Methodologies 10

Problems Solving Techniques - Program Development Cycle – Algorithm Development - Flow chart generation – Programming Constructs (Sequential, Decision-Making, Iteration) - Types and generation of programming languages

UNIT IV Implementation of Algorithms 9

Implementation of Algorithms-program verification-The efficiency of algorithms-The analysis of algorithms-Fundamental Algorithms

UNIT V HTML 9

Basics of HTML – Applications of HTML – HTML Fonts – anchor tag and its attributes – Using images in HTML programs – list tag - Table tag – HTML forms

TOTAL HOURS: 45

OUTCOMES:

At the end of the course, the student should be able to:

- Apply good programming design methods for program development.
- Design and implement C programs for simple applications.

TEXT BOOKS

Essentials of Computer Science and Engineering – by VMU

SEMESTER	CODE	SUBJECT	L	T	P	C
I		ESSENTIALS OF ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	0	3

A) ELECTRICAL ENGINEERING

UNIT I Electrical Circuits & Meters 9

Definition of electromotive force, current, power and energy-InternationalSystem of units-Ohm's law and Kirchhoff's laws-solution of series and parallel Circuits.

Generation of alternating voltage-average and RMS values-solution of simple R,RL,RC and RLC circuits- Calculation of power and power factor in ACcircuits.

Construction and principles of operation of moving coil,moving iron anddynamometer instruments.

UNIT II DC Machines (Qualitative Treatment Only) 8

Dc machines –parts-DC generator-EMF equation-Different types of DCgenerators and their applications-DC motors and their applications-different types-speed control-Starters.

UNIT III AC Machines (Qualitative Treatment Only) 6

Construction & principle of operation of transformers-Single phase & Three phasetransformers-Construction and operation of AC motors-Single phase and three phase Induction motors-applications-construction, principles of operation and application of synchronous motors.

B) ELECTRONICS ENGINEERING

UNIT I: SEMICONDUCTOR DEVICES 8

Passive and Active Components - Resistors, Inductors, Capacitors, Characteristics of PN Junction Diode - Zener Diode and its Characteristics - Half wave and Full waveRectifiers - Voltage Regulation. Bipolar Junction Transistor, FET, MOSFET & UJT.

UNIT II: DIGITAL FUNDAMENTALS 8

Number Systems – Binary, Octal, Decimal and Hexa-Decimal – Conversion from one to another – Logic Gates – AND, OR, NOT, XOR, Universal Gates – Adders, Multiplexer, De Multiplexer, Encoder, Decoder – Memories – PAL, PLA.

UNIT III: COMMUNICATION AND ADVANCED GADGETS 8

Modulation andDemodulation – AM, FM, PM – RADAR – Satellite Communication – Optical Fibre Communication, Mobile Communication, Digital TV, HD Video Camera, Smart Phones – Block diagrams Only.

OUTCOMES:

- ability to identify the electrical components explain the characteristics of electrical

machines.

- ability to identify electronics components and use of them to design circuits.

TEXT BOOKS

1. "Basic Electrical and Electronics Engineering", compiled by Department of EEE&ECE faculty of Engineering & technology, VMRFDU, Anuradha Agencies,2006.
2. Edward Hughes, "Electrical and Electronics Technology", Pearson Education Limited, Ninth edition,2005.
3. "Basic Electrical and Electronics Engineering", Compiled by Department of EEE & ECE, Faculty of Engineering and Technology, VMRFDU, Anuradha agencies,2006.
4. Edward Hughes, "Electrical and Electronics Technology",Pearson Education Limited, Ninth edition, 2005.
5. "Basic Electrical and Electronics Engineering", Compiled byDepartment of EEE & ECE, Faculty of Engineering and Technology, VMRFDU, Anuradha agencies,2006

REFERENCES

1. B.R. Guptha, "Principles of Electrical Engineering " ,S.Chand& Co,2002.
2. I.J.Nagrath, "Elements of Electrical Engineering", Tata McGraw Hill Publishing Co.,2002.
3. H.Cotton." Advanced Electrical Technology", Wheeler,1983.
4. Principles of Communication Engineering, S.Chand& Co, 1994.
5. John Kennedy "Electronics Communication System" TataMcGraw Hill, 2003
6. Millman and Halkias, "Electronic Devices and Circuits", TataMcGraw hill.

SEMESTER	CODE	SUBJECT	L	T	P	C
I		PHYSICS LAB (REAL & VIRUTAL)	0	0	4	2

AIM:

To understand the experiments through online virtual demonstration followed by real hands-on experience.

OBJECTIVE:

- To understand the working principle of various physics equipments
- To learn about taking reading precisely
- To know about the systematic handling of equipments

(Common to all branches of B. E.)

LIST OF EXPERIMENTS

1. Young's modulus of a bar - Non-uniform bending

2. Rigidity modulus of a wire - Torsional Pendulum

3. Viscosity of a liquid - Poiseuille's method

4. Velocity of ultrasonic waves in liquids - Ultrasonic Interferometer

5. Particle size determination using Laser

6. Wavelength of spectral lines – grating - Spectrometer

7. Thickness of a wire - Air wedge Method

8. Thermal conductivity of a bad conductor - Lee's disc

9. Band gap determination of a thermistor - Post Office Box

10. Specific resistance of a wire – Potentiometer

OUTCOME:

Students will have the knowledge of taking measurements precisely.

SEMESTER	CODE	SUBJECT	L	T	P	C
I		ELECTRICAL AND ELECTRONICS ENGINEERING LAB	0	0	4	2

(Common to ECE,ETCE,MECHT,BME,BT,BF,EEE,E&I,CSE,IT,CSSE AND CIVIL)

OBJECTIVE:

To provide exposure to the students with hands on experience on various basic Engineering practices in Electrical and Electronics Engineering.

LIST OF EXPERIMENTS

A) ELECTRICAL ENGINEERING LAB

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring
4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of an electrical equipment.

B) ELECTRONICS ENGINEERING LAB

1. Characteristics of PN junction Diode.
2. Characteristics of Zener diode.
3. Input, Output characteristics of BJT.
4. Transfer characteristics of JFET.
5. Amplitude Modulation
6. Frequency Modulation.

OUTCOME:

- ability to fabricate electrical and electronics circuits

SEMESTER	SUBJECT	L	T	P	C
I	**WORKSHOP PRACTICES** **(Common to all Branches - Except Bio-Tech & Bio info)**	0	0	4	2

AIM:

To provide exposure to the students with hands on experience on various basic Engineering practices in Mechanical Engineering

FITTING

1. Square Joint
2. Dove Tail Joint

CARPENTRY

1. Half Lap Joint
2. Dove Tail Joint

WELDING

1. Arc Welding of butt Joint.
2. Arc Welding of Lap Joint

CASTING

1. Foundry – Mould Preparation using single piece pattern

DEMONSTRATION

1. Sheet Metal – Fabrication of cone
2. Black Smithy – Round to square rod

OUTCOME:

- ability to use welding equipments to join the structures

REFERENCE:

1.“Basic Workshop Practice”, Department of Mechanical Engineering, Vinayaka Missions University

SEMESTER	CODE	SUBJECT	L	T	P	C
I		COMPUTER LAB	0	0	4	2

(Common to all Branches)

1. Implement Mail Merge in MS-Word and send letters to parents regarding the semester fee structure of the student.
2. Using MS-Word, create a leave letter addressed to your faculty advisor
3. A) Using MS-Word, create a table for a list of students with different font sizes and colours
   B) Using MS-Word, create a flow-chart using the basic shapes available. Use page border, a watermark, header and footer
4. Using MS-PowerPoint, create a presentation about the university
5. Using MS-PowerPoint, create a story line with various animations and transition effects.
6. Using MS-Excel, Analyze Students performance using MS-Excel and prepare a chart type report.
7. Using MS-Excel, create a pivot table
8. Using MS-Excel, create look-up tables
9. Using MS-Excel, create graphs for the weather condition in various cities of India
10. Create an HTML page Create an HTML page to
    a) Click on a link and go to the bottom of the page using <a href>
    b) Display an image.
11. Create an HTML page to
    a) Display ordered and unordered lists of your friends names and sports persons
    b) Display a table with 3 columns and 4 rows.

OUTCOMES:

At the end of the course, the student should be able to:

- Apply good programming design methods for program development

YEAR	SEMESTER	TITLE OF PAPER	L	T	P	C
I	II	**TRANSFORMS AND MATRICES** **Common to BE - Second Semester** (MECH, ECE, CSE, CSSE, EEE, EIE, CIVIL, IT, MECHT,S&AE, TEXTILE CHEMISTY, AERO, ETC , AUTO& BME)	3	1	0	4

OBJECTIVES

The Syllabus of Transforms and Matrices has been framed catering to the needs for Engineering students. It is purely application oriented. Transform techniques are very useful in the field of signal and system analysis. Laplace transform techniques are useful to solve ordinary Differential equations.

Fourier transform is an important tool for solving differential and integral equations

Z - transform plays an important role in analysis of Discrete signals. This is a prelude to learn higher semester courses.

UNIT I

MATRICES **12**

Characteristic equation – Eigen values and eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors (Without proof) – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form.

UNIT II

LAPLACE TRANSFORMS **12**

Laplace transform – transform of elementary functions – basic properties – derivatives and integrals of transforms – transforms of derivatives and integrals – initial and final value theorems – Transform of periodic functions.

UNIT III

INVERSE LAPLACE TRANSFORMS & APPLICATIONS **12**

Inverse Laplace transform – Convolution theorem – Initial and Final value theorem-Solution of linear ODE of second order with constant coefficients and first order simultaneous equation with constant coefficients using Laplace transforms.

UNIT IV

FOURIER TRANSFORMS **12**

Fourier transform pairs - Fourier Sine and Cosine transforms – Properties - Transforms of simple functions - Convolution theorem - Parseval's identity.

UNIT V

Z-TRANSFORMS **12**

Z-Transform – Elementary Properties – Inverse Z-Transform – Convolution Theorem – Formation of Difference Equations – Solution of Difference Equations using Z-Transform.

Lecture Hours: 45
Tutorial Hours: 15
Total hours : 60

OUTCOME:

- This course equips students to have basic knowledge and understanding in one fields of materials, integral and differential calculus

TEXT BOOKS

1. **"**Engineering Mathematics**"** by Department of Mathematics, VMU
2. Veerarajan, T., "Engineering Mathematics", Tata McGraw Hill Publishing Co., NewDelhi, 2006.
3. Dr.A .Singaravelu , Engineering Mathematics Volume I & Volume II by Meenakshi Publications.
4. A.Singaravelu,"Transforms and Partial Differential Equations", MeenakshiAgencies,Chennai

REFERENCE BOOKS

1. Grewal, B.S., "Higher Engineering Mathematics" (36th Edition), KhannaPublishers,Delhi 2001.
2. Kreyszig, E., "Advanced Engineering Mathematics" (8th Edition), John Wiley and Sons (Asia) Pvt Ltd., Singapore, 2001.
3. Kandasamy .P.,Thilagavathy. K., and Gunavathy. K., "Engineering Mathematics",Volumes I,II& III (4th edition), S.Chand& Co., New Delhi., 2001

SEMESTER	CODE	SUBJECT	L	T	P	C
II		BUSINESS ENGLISH	3	0	0	3

(For I year B.E., all branches)

OBJECTIVES:

- To impart and enhance corporate Communication
- To enable learners to develop presentation skills.
- To build confidence in learners to use English in Business contexts.

UNIT – I **9**

Subject and verb agreement (Concord) – Preposition and Relative Pronoun – Cause and effect- Phrasal Verbs – Idioms and Phrases – Listening comprehension - Listening to Audio Files and Answering Questions – Framing Questions – Negotiation skills, Persuasion Skills and Debating skills.

UNIT – II **9**

Stress (Word stress and Sentence stress) – Intonation – Difference between British and American English– Vocabulary – Indianism - Compound Words(including technical terminology).

UNIT – III **9**

Reading Skills – Understanding ideas and making inferences – Group Discussion – Types of Interviews, FAQs – e- mail Netiquette, Sample e-mails – Watching Documentary Films and responding to questions.

UNIT – IV **9**

Corporate communication – Recommendation - Instruction – Check List- circulars- Inter office memo – Minutes of meeting and Writing agenda – Discourse Markers- Rearranging the jumbled sentences – Technical Articles – Project Proposals, Making Presentations on given topics – Preparing Power Point Presentations.

UNIT – V **9**

Critical Reading – Book Review - Finding Key Information and Sifting Facts from Opinions – Business letters (Calling for Quotation, Placing orders and Complaint letters) – Expansion of an Idea. – Creative Writing.

Total: 45 hours

OUTCOMES:

- It is hoped that this syllabus will able to communicate with a range of formal and informal context.
- This syllabus will enable the students to undergo in activities, demonstrating interaction skills and consider how own communication is adjusted in different scenario.

REFERENCE BOOKS

1. Grammar Builder- I, II, III -Cambridge University Press.
2. Technical English-Writing, Reading and Speaking- Pickett and Lester, Harper and Row publication

SEMESTER	CODE	SUBJECT	L	T	P	C
II		CHEMISTRY FOR ENGINEERS	3	0	0	3

OBJECTIVE

- To impart in basic knowledge in chemistry so that the student will understand the engineering concept and they can face the competitive examinations effectively.
- To improve the knowledge in the instrument applications.
- To inculcate the knowledge of advanced material.

UNIT I : ELECTROCHEMISTRY, BATTERIES AND FUEL CELLS 9 Hrs

Ostwald Law and Debye Huckle's law - Electrode potential - Nernst equation – Electrodes (SHE, Calomel and Glass)- cells - EMF measurement-emf and galvanic series.

Primary battery (Daniel and dry cell) – secondary battery (lead Acid storage battery and Nickel-Cadmium battery) – Fuel cell (H2-O2 fuel cell)

UNIT II : WATER TECHNOLOGY & CORROSION 9 Hrs

Sources of water – impurities – Hardness and its determination (problems to be avoided) – boiler troubles – water softening (zeolite & Demineralisation) – Domestic water treatment – Desalination (Electrodialysis & Reverse Osmosis).

Corrosion – Types – principles – corrosion control methods (Electroplating,Electroless plating, Sacrificial anode and Impressed current method).

UNIT III: CHEMISTRY OF ADVANCED MATERIALS 9 Hrs

Refractories – properties and uses, Portland cement –manufacturing, setting and hardening –Special cement, ceramics.

Organic electronic material, shape memory alloys, smart materials,polymers(PVC,Teflon, Bakelite)- fibers(optical fibre) & composites (FRP,MMC & PMC)

UNIT IV : PHASE EQUILIBRIA & NUCLEAR CHEMISTRY 9 Hrs

Phase rule: statement and explanation of terms involved – One component system (water) – Condensed phase rule – Two component system (Lead-silver) .

Nuclear Chemistry – Fission – Fusion – working of nuclear reactor – Radiations and harmful effects.

UNIT V : CHROMATOGRAPHY AND SPECTROSCOPY 9 Hrs

Chromatography — classification (Paper, Column, Thin Layer, Gas, HPLC). Principle and applications.

Spectroscopy – Electromagnetic radiation – Beer Lambert's law – UV – Visible – IR – Atomic absorption & flame emission spectroscopy (Principle,Instrumentation, block diagram).

OUTCOME:

- The student will come out with ethical responsibility in his/her profession.

TEXT BOOK: Engineering Chemistry by VMU.

REFERENCES:

1. A text book of Engineering Chemistry by S.S. Dara, S.Chand & company Ltd., New Delhi

2. Engineering Chemistry by Jain & Jain, 15th edition Dhanpatrai Publishing Company (P) Ltd., New Delhi

3. A text book of Engineering Chemistry by Shashi Chawla,Edition 2012 Dhanpatrai & Co., New Delhi.

4. Engineering Chemistry by Dr.A.Ravikrishnan,Sri Krishna Publications, Chennai.

SEMESTER	CODE	SUBJECT	L	T	P	C
II		C PROGRAMMING	3	0	0	3

(Common to all branches of B.E./B.Tech. students for 2012-2013 batch)

AIM:

The aim is to introduce C programming to the students.

OBJECTIVES:

- To introduce Basics of C
- To understand Control Structures & Arrays
- To learn about String concept, Structure and Union in C
- To introduce the concepts of Functions and Pointers
- To introduce Memory and File management concepts in C

UNIT I - Basics of C **9**

Identifiers, variables, expression, keywords, data types, constants, scope of variables. Operators: arithmetic, logical, relational, conditional and bitwise operators - Special operators: size of () & comma (,) operator - Precedence and associatively of operators - Type conversion in expressions.

UNIT II - Control Structures & Arrays **9**

Basic input/output and library functions: Single character input/output i.e. getch(), getchar(), getche(), putchar() - Formatted input/output: printf() and scanf() – Library functions (mathematical and character functions). Decision Making and Branching – Looping statements. Arrays – Initialization – Declaration – One dimensional and two dimensional arrays.

UNIT III String, Structure & Union **9**

Strings: Declaration-Initialization and string handling functions. Structure and Union: structure declaration and definition – Accessing a Structure variable – Structure within a structure – Union.

UNIT IV Functions and Pointers **9**

Function –Function Declaration–function definition- Pass by value – Pass by reference – Recursive function – Pointers - Definition – Initialization – & and * operators - Pointer to functions-Function returning pointers – Pointers and arrays

UNIT V Memory and File management **9**

Static and dynamic memory allocation - Storage class specifier - Preprocessor directives. File handling concepts – File read – write- Functions for file manipulation: fopen, fclose, gets, puts, fprintf, fscan, getw, putw, fputs, fgets, fread, fwrite - Random access to files: fseek, ftell, rewind - File name as Command Line Argument.

OUTCOMES:

- Design and implement C programs for simple applications.
- Develop recursive programs

TOTAL HOURS: 45

TEXT BOOKS:

1. Balaguruswami.E, "Programming in C", TMH Publications,1997

REFERENCE BOOKS:

1. Behrouz A. Forouzan & Richard F. Gilberg, "Computer Science A Structured Programming using C", Cengage Learning, 3rd Edition, 2007

2. Gottfried , "Programming with C", schaums outline series, TMH publications,1997

3. Mahapatra , "Thinking in C", PHI publications, 2nd Edition, 1998.

4. Subbura.R , "Programming in C", Vikas publishing, 1st Edition, 2000

SEMESTER	SUBJECT	L	T	P	C
II	ENGINEERING MECHANICS (Common to MECH,CIVIL,AUTO & AERO)	3	1	0	4

OBJECTIVES:

- To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering

UNIT 1. BASICS & STATICS OF PARTICLES 9

Introduction - Units and Dimensions - Laws of Mechanics - Lame's theorem. Parallelogram and triangular law of forces - Coplanar Forces - Resolution and Composition of forces - Equilibrium of a particle - Forces in space - Equilibrium of a particle in space - Equivalent systems of forces - Principle of transmissibility - Single equivalent force.

UNIT 2. EQUILIBRIUM OF RIGID BODIES 9

Free body diagram - Types of supports and their reactions - requirements of stable equilibrium - Moments and Couples - Moment of a force about a point and about an axis - Vectorialrepresentaion of moments and couples - Scalar components of a moment - Varignon's theorem - Equilibrium of Rigid bodies in two dimension - Equilibrium of Rigid bodies in three dimensions.

UNIT 3. PROPERTIES OF SURFACES AND SOLIDS 9

Determination of Areas and Volumes - First moment of area the Centroid of sections - Rectangle, circle, triangle from integration - T section, I section, Angle section, Hollow section by using standard formula - second and product moments of plane area - Rectangle, triangle, circle from integration - T section, I section, Angle section, Hollow section by using standard formula - Parallel axis theorem and perpendicular axis theorem - Polar moment of inertia - Principle moments of inertia of plane areas - Principle axes of inertia - Mass moment of inertia.

UNIT 4. FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS 9

Frictional force - Laws of Coloumb friction - simple contact friction - Rolling resistance - Belt friction. Translation and Rotation of Rigid Bodies - Velocity and acceleration - General Plane motion.

UNIT 5. DYNAMICS OF PARTICLES 9

Displacement, Velocity and acceleration, their relationship - Relative motion - Curvilinear motion - Newton's law - Work Energy equation of particles - Impulse and Momentum - Impact of elastic bodies.

TOTAL: 45 PERIODS

OUTCOMES:

- bility to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
- ability to analyse the forces in any structures.
- ability to solve rigid body subjected to dynamic forces.

TEXT BOOKS :

1. Beer & Johnson, Vector Mechanics for Engineers. Vol. I Statics and Vol. II Dynamics, McGraw Hill International Edition, 1995.

2. KottiswaranN,Engineering Mechanics-Statics &Dynamics,SriBalaji Publications,2014.

3. Meriam, Engineering Mechanics, Vol. I Statics & Vol. II Dynamics 2/e, Wiley Intl., 1998.

REFERENCE BOOKS :

1. Rajasekaran.S, and Sankara Subramanian G, "Engineering Mechanics", Vikas Publishing Co. New Delhi.

2. Irving H. Sharma, Engineering Mechanics - Statics & Dynamics, III Edition, Prentice Hall of India Pvt. Ltd., 1993.

3. K.L.Kumar, Engineering Mechanics III Edition, Tata McGraw Hill Publishing Co. Ltd., 1998

SEMESTER	CODE	SUBJECT	L	T	P	C
II		ENGINEERING CHEMISTRY LAB	0	0	4	2

(Common to all branches of I B.E., students for 2012-2013 batch)

OBJECTIVE

To learn the relevant experience using laboratory experiments To improve the knowledge in the instrument applications.

1. Estimation of total hardness of water sample by EDTA method.
2. Estimation of dissolved oxygen by Winkler's method.
3. Estimation of ferrous ion by Potentiometry.
4. Precipitation reaction by Conductometry.
5. Acid base reaction by pH metry.
6. Estimation of copper from its ore.
7. Estimation of iron by spectrophotometer.
8. Estimation of sodium by flame photometer.
9. Separation of mixture of components using thin layer chromatography.
10. Corrosion experiment by weight loss methods.

OUTCOME:

The student will have the experience in handling the instruments relevant to his/her theory.

SEMESTER	CODE	SUBJECT	L	T	P	C
II		ENGINEERING GRAPHICS LAB	0	0	4	2

(Common to MECH, AUTO, AERO, ECE, EIE, EEE, ETC& MECT)

OBJECTIVES:

- To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products.
- To expose them to existing national standards related to technical drawings.

Concepts and conventions (Not for Examination)

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREE HAND SKETCHING 9

Conics – Construction of ellipse-Free hand sketching-Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT II PROJECTION OF POINTS, LINES 9

Projection of points, Projection of straight lines located in the first quadrant: inclined to both planes – Determination of true lengths and true inclinations – rotating line method only.

UNIT III PROJECTION OF SOLIDS 9

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 9

Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section. Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones

UNIT V ISOMETRIC VIEW AND PERSPECTIVE PROJECTION 9

Principles of isometric View – isometric scale – isometric view of simple solids- Introduction to Perspective projection

OUTCOMES:

On Completion of the course the student will be able to

- perform free hand sketching of basic geometrical constructions and multiple views of objects.
- do orthographic projection of lines and plane surfaces.
- draw projections and solids and development of surfaces.
- prepare isometric and perspective sections of simple solids.

TEXT BOOKS:

1. N.D. Bhatt, "Engineering Drawing" Charotar Publishing House, 46th Edition, (2003).

2. K. V. Natarajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2006).

REFERENCES:

1. M.S. Kumar, "Engineering Graphics", D.D. Publications, (2007).

2. K. Venugopal & V. Prabhu Raja, "Engineering Graphics", New Age International (P) Limited (2008).

3. M.B. Shah and B.C. Rana, "Engineering Drawing", Pearson Education (2005).

4. K. R. Gopalakrishnana, "Engineering Drawing" (Vol.I&II), Subhas Publications (1998).

5. Dhananjay A.Jolhe, "Engineering Drawing with an introduction to AutoCAD"Tata McGraw Hill Publishing Company Limited (2008).

6. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, (2008).

SEMESTER	CODE	SUBJECT	L	T	P	C
II		C PROGRAMMING LAB	0	0	4	2

(COMMON TO CSE, IT, CSSE, M.Sc, MECH, AUTO, AERO, CIVIL, BIO-TECH, BIO-INFO)

OBJECTIVES:

- The student should be made to:
- Be familiar with the use of Office software.
- Be exposed to presentation and visualization tools.
- Be exposed to problem solving techniques and flow charts.
- Be familiar with programming in C.
- Learn to use Arrays, strings, functions, structures and unions

LIST OF EXPERIMENTS:

1. Write a C Program to Implementation of Sine and cosine series
2. Write a C Program to calculate Simple Interest
3. Write a C Program to generate Fibonacci Series using for loop
4. Write a C program to calculate factorial using while loop
5. Write a C Program to
   a) Find the greatest of three numbers using if condition.
   b) Find the greatest of three numbers using conditional operator.
6. Write a C program for finding the roots of a given quadratic equation using conditional control statements
7. Write a C program to
   a) Compute matrix multiplication using the concept of arrays.
   b) Illustrate the concept of string handling functions.
8. Write a C program to
   a) Find the largest element in an array using pointers.
   b) Convert a binary number to decimal or decimal to binary using functions.
9. Write a C program to read data from keyboard, write it to a file named student again read the same data from student file and write it into data file.
10. Write a C program to store employee details using the concept of structures.

OUTCOMES:

At the end of the course, the student should be able to:

- Apply good programming design methods for program development.
- Design and implement C programs for simple applications.
- Develop recursive programs.

SEMESTER	CODE	SUBJECT	L	T	P	C
II		YOGA AND MEDITATION	0	0	4	2

YEAR	SEMESTER	TITLE OF PAPER	L	T	P	C
II	III	PDE APPLICATIONS AND COMPLEX ANALYSIS (Common to BE-CIVIL,EEE,S&AE, TEXTILE CHEMISTRY,MECHAT& EIE)	3	1	0	4

OBJECTIVES:

- Partial differential equations arises in most of the Engineering discipline when the number of independent variables in the given problem under discussion is two or more.
- Fourier series is used to express even aperiodic functions in terms of periodic functions making them amenable for further processing.
- Fourier series has the wide application in the field of heat diffusion, wave propagation and in signal and systems analysis.

UNIT-I 12

PARTIAL DIFFERENTIAL EQUATIONS

Formation - Solutions of standard types f(p,q)=0, clairauts form, f(z,p,q)=0,f(p,x)=g(q,y) of first order equations - Lagrange's Linear equation - Linear partial differential equations of second and higher order with constant coefficients.

UNIT-II 12

FOURIER SERIES

Dirichlet's conditions - General Fourier series - Half-range Sine and Cosine series - Parseval's identity – Harmonic Analysis.

UNIT-III 12

BOUNDARY VALUE PROBLEMS

Classification of second order linear partial differential equations - Solutions of one - dimensional wave equation, one-dimensional heat equation - Steady state solution of two-dimensional heat equation - Fourier series solutions in Cartesian coordinates.

UNIT-IV 12

ANALYTIC FUNCTIONS

Function of a complex variable – Analytic function – Necessary conditions - Cauchy Riemann equations – Sufficient conditions (excluding proof) – Harmonic conjugate–Constructions of analytic functions-conformal mapping(w=z+c,w=z2,w=1/z)-bilinear transformation

UNIT V 12

COMPLEX ANALYSIS

Statement and application of Cauchy‟s integral theorem and integral formula – Taylor‟s and Laurent‟s expansions –Residues – Cauchy‟s residue theorem-contour integration over unit circle.

Lecture Hours: 45
Tutorial Hours: 15
Total hours : 60

OUTCOMES:

- The understanding of the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

TEXT BOOK:

1. A.Singaravelu,"Transforms and Partial Differential Equations", MeenakshiAgencies,Chennai

2. Kandasamy .P.,Thilagavathy. K., and Gunavathy. K., "Engineering Mathematics", Volumes I & II (4th edition), S.Chand& Co., New Delhi.

REFERENCES:

1**.** T. Veerarajan, "Engineering Mathematics" (for semester III), Third Edition Tata McGraw- Hill Publishing Company limited.

2**.**Grewal, B.S., "Higher Engineering Mathematics" (35th Edition), KhannaPublishers,Delhi 2000.

3 .Kreyszig, E., "Advanced Engineering Mathematics" (8th Edition), John Wiley and Sons,(Asia) PteLtd.,Singapore, 2000.

SEMESTER	CODE	SUBJECT	L	T	P	C
III		MECHANICS OF SOLIDS I	3	1	0	4

AIM

The aim of the course is to understand the concepts of stress and strain and their use in the analysis and design of structures.

OBJECTIVE

- The subject of Mechanics of Solids cuts broadly across all branches of engineering profession. At the end of this course, the student will have knowledge about behaviour of members subjected to various types of forces.
- To study the basics of stress and strain in two dimension
- Analysis of trusses using various methods.
- To acquire knowledge about types of beam, loading conditions
- The subject can be mastered best by solving numerous problems.

UNIT -1 STRESS, STRAIN AND DEFORMATION OF SOLIDS 9

Rigid bodies and deformable solids - Stability, strength and stiffness - tension, compression and shear stresses - Deformation of simple and compund bars - Thermal Stresses - Elastic Constants.

UNIT - 2 ANALYSIS OF PLANE TRUSSES 9

Stability and equilibrium of plane frames - perfect frames - types of trusses - analysis of forces in truss members - Method of joints - Method of tension coefficients - Method of sections.

UNIT -3 TRANSVERSE LOADING ON BEAMS AND STRESSES IN BEAMS 9

Beams - Types and transverse loading on beams - Shear force and bending moment in beams - Cantilevers - Simply supported beams and over-hanging beams.Theory of simple bending - analysis of stresses - Load carrying capacity - Proportioning sections - Leaf springs - Flitched beams - Shear stress distribution - shear flow.

UNIT - 4 TORSION 9

Stresses and deformation in circular and hollow shafts - Stepped shafts - shafts fixed at the both ends - Stresses in helical springs - Deflection of springs.

UNIT -5 ANALYSIS OF STATES OF STRESS (TWO DIMENSIONAL) AND DEFLECTION OF BEAMS 9

Biaxial state of stress - Thin cylinders and shells - Deformation of thin Cylinders and shells - Stresses at a point - Stress as tensor - Stresses on inclined planes - Principal stresses and principal planes - Mohr's circle of stress.Double integration method - Macaulay's method - Area moment theorems for computation of slopes and deflections in beams - Conjugate beam method.

Tutorial: 15 hours

Total Hours: 60 hours

OUTCOMES:

The students will have

- Thorough understanding of the fundamental concepts of stress and strain in mechanics of solids and structures.
- the ability to analyse determinate beams and trusses to determine shear forces, bending moments and axial forces.
- a sufficient knowledge in designing shafts to transmit required power and also springs for its maximum energy storage capacities.

TEXT BOOKS:

1. Er.R.K.Rajput,"Strength of Materials"S.Chand Publications,New Delhi,2006
2. Dr.R.K.Bansal,"A Textbook of Strength of Materials"Laxmi Publications,2010
3. Srinath L.N., " Advanced Mechanics of Solids ", Tata McGraw Hill Publishing Company Ltd., New Delhi,2009

REFERENCES:

1. Junarkar S.B., " Mechanics of Structures ", Vol. 1, 21st Edition, Charotar Publishing House, Anand, India, 2007
2. Kazimi S.M.A., " Solid Mechanics ", Tata McGrawHill Publishing Company, New Delhi, 1991.
3. Raghunath H. M., "Strength of materials" , New Age International (P) Limitted Publishers.
4. Bhavikatti S. S. " Solid and Fluid Mechanics" , New Age International (P) Limitted Publishers.

SEMESTER	CODE	SUBJECT	L	T	P	C
III		CONSTRUCTION MATERIALS	3	0	0	3

AIM

The aim of the course is to know about the various materials, both conventional and modern, that are commonly used in civil engineering construction.

OBJECTIVE

- He should be able to appreciate the criteria for choice of the appropriate material and the various tests for quality control
- The student will learn the use of the materials.
- The student will learn in detail the manufacturing process of all the materials
- Special Materials used for architectural purposes also will be taught in detail

UNIT -1 STONES – BRICKS – CONCRETE BLOCKS 9

Stone as building material – Criteria for selection – Tests on stones – Deterioration and Preservation of stone work – Bricks – Classification – Manufacturing of clay bricks – Tests on bricks – Compressive Strength – Water Absorption – Efflorescence – Bricks for special use – Refractory bricks – Cement, Concrete blocks – Light weight concrete blocks

UNIT -2 LIME – CEMENT – AGGREGATES – MORTAR 9

Lime – Preparation of lime mortar – Cement, Ingredients – Manufacturing process – Types and Grades – Properties of cement and Cement mortar – Hydration – Compressive strength – Tensile strength – Soundness and consistency – Setting time – Aggregates – Natural stone aggregates – Industrial by products – Crushing strength – Impact strength – Flakiness – Abrasion Resistance – Grading – Sand Bulking.

UNIT -3 CONCRETE 9

Concrete – Ingredients – Manufacture – Batching plants – Ready Mix Concrete – Properties of fresh concrete – Slump – Flow and compaction – Principles of hardened concrete – Compressive, Tensile and shear strength – Modulus of rupture – Tests – Mix specification – Mix proportioning – IS method – High Strength Concrete and High Performance Concrete – Other types of Concrete.

UNIT -4 TIMBER AND OTHER MATERIALS 9

Timber - Industrial timber – Plywood – Veneer – Thermocole –Bitumen –Market forms Panels of laminates – Steel – Aluminium and Other Metallic Materials – Composition – Uses – Market forms – Mechanical treatment – Paints – Varnishes – Distempers.

UNIT -5 MODERN MATERIALS 9

Glass – Ceramics – Sealants for joints – Fibre glass reinforced plastic – Clay products – Refractories – Composite materials – Types – Applications of laminar composites – Fibre textiles – Geo membranes and Geotextiles for earth reinforcement

Total Hours: 45

OUTCOME:

At the end of the course

- The student will learn the use of the materials.
- The student will learn in detail the manufacturing process of all the materials
- The students will learn Special Materials used for architectural purposes also will be taught in detail

TEXT BOOKS:

1. Rangwala, S.C., “Engineering Materials ", Charotar Publishing House, Anand, 2008

2. R.K.Rajput, “Engineering Matererials,S.Chand Publications,2008

3. Shetty.M.S., "Concrete Technology (Theory and Practice)", S. Chand and Company Ltd.,2008

REFERENCES:

1 Varghese.P.C, "Building Materials", PHI Learning Pvt. Ltd, New Delhi, 2012.

2 Gambhir.M.L., "Concrete Technology", 3rd Edition, Tata McGraw Hill Education, 2004

3 Duggal.S.K. "Building Materials", 4th Edition, New Age International , 2008.

SEMESTER	CODE	SUBJECT	L	T	P	C
III		MECHANICS OF FLUIDS	3	1	0	4

AIM

The aim of the course is to understand the properties of fluid, Principles of fluid statics, kinematics and dynamics

OBJECTIVE

- The student is introduced to the definition and properties of fluid.
- Principles of fluid statics, kinematics and dynamics are dealt with subsequently.
- The application of similitude and model study is covered subsequently.
- After undergoing this course, the student would have learnt fluid properties
- Application to real situations of fluid flow will be learned

UNIT -1 FLUID PROPERTIES AND STATISTICS 9

Definitions - Fluid and Fluid Mechanics - Dimensions and units - Fluid properties - Continuum - Concept of system and control volume - Pascal's law and Hydrostatic equation - Forces on plane and curved surfaces - Buoyancy - Pressure measurement.

UNIT -2 FLUID KINEMATICS 9

Classification of flows -stream, streak and path lines - Continuity equation - Stream and potential functions - Flow nets - Velocity measurement.

UNIT -3 FLUID DYNAMICS 9

Euler and Bernoulli's equations - Application of Bernoulli's equation - Discharge measurement- Momentum Principle - Laminar flows through pipes and between plates - Hagen Poiseuille equation - Darcy Weisbach formula - Moody diagram -Turbulent flow.

UNIT – 4 BOUNDARY LAYER AND FLOW THROUGH PIPES 9

Definition of boundary layer - Thickness and classification - Displacement and momentum thick nesses - Development of Laminar and Turbulent flows in circular pipes - - Major and minor losses of flow in pipes - Pipes in series and in parallel - Pipe network.

UNIT – 5 DIMENSIONAL ANALYSIS AND MODEL STUDIES 9

Dimensional analysis - Rayleigh's method - Buckingham P -Theorem - similitude and models - Scale effect and distorted models.

Tutorial : 15 hours

Total Hours: 60hours

OUTCOMES:

- The students will be able to get a basic knowledge of fluids in static, kinematic and dynamic equilibrium.
- They will also gain the knowledge of the applicability of physical laws in addressing problems in hydraulics.

TEXT BOOKS:

1. Kumar K.L., “Engineering Fluid Mechanics ", Eurasia Publishing House (P) Ltd., New Delhi, 2008
2. Dr.R.K.Bansal, “FluidMechanics”, LakshmiPublications, 2008

REFERENCES:

1. Streeter, Victor L. and Wylie, Benjamin E., " Fluid Mechanics ", McGraw-Hill Ltd., 1998.

2. Natarajan M.K., “Principles of Fluids Mechanics ", Anuradha Agencies, Vidayal Karuppur, Kumbakonam, 1995.

3. Jain A. K. "Fluid Mechanics", Khanna Publishers, 2010 4. Roberson J.A and Crowe C.T., "Engineering Fluid Mechanics", Jaico Books Mumbai, 2000.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
III		SURVEYING I	3	0	0	3

AIM

To measure the land area, to prepare map and to find out the elevation of a point for constructional purpose.

OBJECTIVE

At the end of the course the student will posses knowledge about

- Chain surveying,
- Compass surveying,
- Plane table surveying, Levelling,
- Theodolite surveying
- Engineering surveys.

UNIT -1 INTRODUCTION AND CHAIN SURVEYING 9

Definition - Principles - Classification - Fields and office work - Scales - Conventional signs- Survey instruments, their care and adjustment - Ranging and chaining - Reciprocal ranging - Setting perpendiculars - well-conditioned triangles - Traversing - Plotting - Enlarging and Reducing figures.

UNIT – 2 COMPASS SURVEYING AND PLANE TABLE SURVEYING 9

Prismatic compass - Surveyor's compass - Bearing - Systems and conversions - Local attraction – Magnetic declination - Dip - Traversing - Plotting - adjustment of error - Plane table instruments and accessories - Merits and demerits - Methods - Radiation - Intersection - Resection - Traversing.

UNIT -3 LEVELLING AND APPLICATIONS 9

Level line - Horizontal line - Levels and Staves - Sprit level - Sensitiveness - Bench marks - Temporary and permanent adjustments - Fly and Check leveling - Booking - reduction - Curvature and Refraction - reciprocal levelling - Longitudinal and cross sections - Plotting - Calculation of areas and volumes - Contouring - Methods -Characteristics and uses of contours - Plotting - Earth work volume - Capacity of reserviors.

UNIT -4 THEODOLITE SURVEYING **9**

Theodolite - Vernier and micro optic - Description and uses - temporary and permanent adjustments of vernier transit - Horizontal angles - Vertical angles - Heights and Distances - Traversing - Closing error and distribution - Gales's tables - Omitted measurements.

UNIT - 5 ENGINEERING SURVEYS **9**

Reconnaissance, Preliminary and location surveys for engineering projects - Layout - Setting out works – Route Surveys for highways, railways and waterways - Mine Surveying - Instruments - Tunnels - Correlation of underground and surface surveys - Shafts - Audits.

Total Hours : 45 hours

OUTCOMES:

- Students are expected to use all surveying equipments, prepare LS & CS, contour mapsand carryout surveying works related to land and civil engineering projects.

TEXT BOOKS:

1. Kanetkar T.P., " Surveying and Levelling ", Vols. I and II, United Book Corporation, Pune, 2006
2. Punmia B.C., " Surveying ", Vols. I , II and III, Laxmi Publications, 2005.

REFERENCES:

1. Clark D., " Plane and Geodetic Surveying ", Vols. I and II, C.B.S. Publishers and Distributors, New Delhi, Sixth Edition, 1991.
2. James M. Anderson and Edward M. Mikhail, " Introduction to Surveying ", McGraw Hill Book Company, 1995.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
III		ENGINEERING GEOLOGY	3	0	0	3

OBJECTIVE

At the end of this course the student shall be able to understand about

- Geological formations,
- classification of rocks
- Morphology of rocks
- Importance of the study of geology for civil engineers with regard to founding structures like dams, bridges, buildings, etc.
- The student shall also be able to appreciate the importance of geological formation in causing earthquakes and landslides and literate the rural people

UNIT -1 GENERAL GEOLOGY 9

Geology in Civil Engineering - Branches of geology - Earth Structure and composition - Elementary knowledge on continental drift and plate tectonics. Earth processes - Weathering - Work of rivers, wind and sea and their engineering importance - Earthquake belts in India. Groundwater - Mode of occurrence - prospecting - importance in civil engineering.

UNIT -2 MINERALOGY 9

Elementary knowledge on symmetry elements of important crystallographic systems - physical properties of minerals - study of the following rock forming minerals - Quartz family. Feldpar family, Augite, Hornblende, Biotite, Muscovite, Calcite, Garnet - properties, behavior and engineering significance of clay minerals - Fundamentals of process of formation of ore minerals - Coal and Petroleum - Their origin and occurence in India.

UNIT -3 PETROLOGY 9

Classification of rocks - Distinction between Igneous, Sedimentatary and Metamorphic rocks. Decription occurence, engineering properties and distribution of following rocks. Igneous rocks - Granite, Syenite, Diorite, Gabbro, Pegmatite, Dolerite and Basalt Sedimentary rocks

sandstone, Limestone, Shale Conglo, Conglomerate and breccia. Metamorphic rocks, Quartzite, Marble, Slate, Thyllite, Gniess and Schist.

UNIT -4 STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD 9

Attitude of beds - Outcrops - Geological maps - study of structures - Folds, Faults and joints - Their bearing on engineering Construction. Seismic and Electrical methods for Civil Engineering investigations. Remote sensing techniques - study of air photos and satellite images - Interpretation for Civil Engineering

UNIT V - GEOLOGY FOR ENGINEERING PROJECTS 9

Geological Investigations - Geophysical Investigations - Remote Sensing-Techniques - Geological Considerations for Dam Reservoirs, Tunnels and Road-Cuts - Practice in Geology - Demonstration for Clinometer, Electrical Resistivity Meter, Geological Maps - Identification of Crystals, Minerals and Rocks..

Total Hours: 45

OUTCOMES:

The students completing this course

- Will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.
- Will realize the importance of this knowledge in projects such as dams, tunnels, bridges,roads, airport and harbor
- Can choose the types of foundations and other related aspects.

TEXT BOOKS:

1. Parbin Singh, “Engineering and General Geology ", Katson Publication House, 2009
2. P.C. Rao & D.B. Rao,”A Text Book Of Geology”,Discovery Publishing House, 2010

.

REFERENCES:

1. Legeet, " Geology and Engineering ", McGraw Hill Book Company, 1998.
2. Blyth, " Geology for Engineers ", ELBS, 1995.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
III		STRENGTH OF MATERIALS LAB	0	0	4	2

AIM

To be exposed to testing of different materials under the action of various forces and to determine the characteristics experimentally.

OBJECTIVE

The Experimental work involved in this laboratory should make the student understand the fundamental modes of loading of the structures and also make measurements of loads, displacements and strains. Relating these quantities, the student should be able to obtain the strength of the material and stiffness properties of structural elements.

Total Hours: 45

LIST OF EXPERIMENTS

1. Tension test on mild steel and torsteel rods
2. Compression test on wooden specimen
3. Double shear test on mild steel and Aluminium rods
4. Torsion test on mild steel rods
5. Impact test on metal specimen
6. Hardness test on metals
7. Deflection test on metal beam
8. Compression test on Helical spring
9. Tension test on Helical spring
10. Y deflection test on carriage spring

The student should learn the use of deflectometer, extensometer, compressometer and strain gauges.

OUTCOMES:

- The students will have the required knowledge in the area of testing of materials and components of structural elements experimentally.

LIST OF EQUIPMENTS

(For a batch of 30 students)

S. NO.	DESCRIPTION OF EQUIPMENTS	QUANTITY
1.	UTM of minimum 400 KN capacity	1
2.	Torsion testing machine for steel rods	1
3.	Izod impact testing machine	1
4.	Hardness testing machine	1 each
5.	Beam deflection test apparatus	1
6.	Extensometer	1
7.	Compressometer	1
8.	Dial gauges	few

SEMESTER	CODE	COURSE TITLE	L	T	P	C
III		SURVEY PRACTICAL ILAB	0	0	4	2

AIM

To measure the land area, preparation of map, elevation of point, setting out works by practical work.

OBJECTIVE

At the end of the course the student will

1. Posses knowledge about Survey field techniques
2. Develop skills to use electronic instruments for distance measurement

1. CHAIN SURVEYING

Ranging – changing and traverse.

2. COMPASS SURVEYING.

Traverse.

3. PLANE TABLE SURVEYING.

Triangulation to find the distance between inaccessible points with and with out known scale. – Three-point problem, two point problem.

4. LEVELLING

Study of levels and leveling staff – Fly leveling using dumpy level. – fly leveling using tilting level. – Check leveling.

5. THEODOLITE SURVEYING

Study of theodolite measurement of angles by reiteration and repetition - measurement of vertical angles.

Total Hours: 45

OUTCOME:

- Students completing this course would have acquired practical knowledge on handling basic survey instruments including leveling and development of contour map of given area.

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	Chain	6
2.	Ranging Rod	12
3.	Arrow	30
4.	Tape	6
5.	Cross staff	6
6.	Peg	30
7.	Prismatic compass	6
8.	Tripod stand	6
9	Plane Table	6
10	Plumb Bob	6
11	Trough compass	6
12	Alidade	6
13	Spirit level	6
14	Dumpy level	6
15	Levelling Staff	6

YEAR	SEMESTER	TITLE OF PAPER	L	T	P	C
II	IV	NUMERICAL METHODS (COMMON TO MECH, AERO, S&AE, TEXTILE CHEMISTRY, AUTO, MECT, CIVIL EIE & EEE)	3	1	0	4

OBJECTIVES:

- Computing the trajectory of a spacecraft requires the accurate numerical solution of a system of ordinary differential equations.
- It is used in Kinematics Simulation, Complex System Optimization
- Car companies can improve the crash safety of their vehicles by using computer simulations of car crashes. Such simulations essentially consist of solving partial differential equations numerically.
- Numerical linear algebra is important for data analysis.
- Airlines use sophisticated optimization algorithms to decide ticket prices, airplane and crew assignments and fuel needs. Historically, such algorithms were developed within the overlapping field of operations research.

UNIT-I

SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS 12

Method of false position, Newton-Raphson method for single variable, Solutions of a linear system by Gaussian, Gauss-Jordan, Jacobian and Gauss- Seidel methods. Inverse of a matrix by Gauss-Jordan method. Eigen value of a matrix by Power Method.

UNIT-II

INTERPOLATION AND APPROXIMATION 12

Interpolation with Newton's divided differences, Lagrange's polynomial, Newton forward and backward differences, central difference Formula (Stirling's and Bessel's).

UNIT-III

NUMERICAL DIFFERENTIATION AND INTEGRATION 12

Numerical differentiation with interpolation polynomials, Numerical integration by Trapezoidal and Simpson's (both $1/3^{rd}$ and $3/8^{th}$) rules. Rombergs rule, Two and Three point Gaussian quadrature formula. Double integrals using Trapezoidal and Simpson's rule.

UNIT-IV

INITIAL VALUE PROBLEMS OF ODE **12**

Solution of equations related to simple harmonic motion, Oscillations of a spring mass system, Simple pendulum, Oscillatory electrical circuit and Deflection of beams with initial conditions - using Taylor series. Euler, Modified Euler and Runge-Kutta methods.

UNIT-V

BOUNDARY VALUE PROBLEMS FOR ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS **12**

Finite difference solution for the second order ordinary differential equations, Finite difference solution for one dimensional heat equation (both implicit and explicit). One dimensional wave equation and two dimensional Laplace and Poisson equations.

Lecture Hours: 45

Tutorial Hours: 15

Total hours : 60

OUTCOME:

The students will have a clear perception of the power of numerical techniques, ideas andwould be able to demonstrate the applications of these techniques to problems drawn fromindustry, management and other engineering fields

TEXT BOOK

1. N.Subramanian,Numerical Methods,SCM Publishers,Erode.
2. B.S.Grewal,"Higher Engineering Mathematics"Khanna Publishers,New Delhi.

REFERENCES

1. Sastry, S.S., " Introductory Methods of Numerical Analysis (Third Edition) ", Printice Hall of India, New Delhi, 1998.

2. T.Veerarajan, T.Ramachandran, " Numerical Methods with Programs in C and C++", Tata McGraw-Hill (2004).

3. Grewal, B.S. and Grewal, J.S., Numerical Methods in Engineering and Science Khanna Publishers, New Delhi, 1999.

4. A.Singaravelu " Numerical Methods"Meenakshi Agency,Chennai.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
IV		CONSTRUCTION TECHNIQUES, EQUIPMENT AND PRACTICES	3	0	0	3

AIM

To bring about a complete understanding of construction techniques in substructure super structure and repair construction.

OBJECTIVE

The main objective of this course is to make the student aware of

- The various construction techniques, practices
- The equipment needed for different types of construction activities.
- The student shall have a reasonable knowledge about the various construction procedures for sub to super structure
- The equipment needed for construction of various types of structures from foundation to super structure.
- Building services in a building

UNIT I CONCRETE TECHNOLOGY 9

Cements – Grade of cements - concrete chemicals and Applications – Grade of concrete - manufacturing of concrete – Batching – mixing – transporting – placing – compaction of concrete – curing and finishing - Testing of fresh and hardened concrete – quality of concrete – Extreme Weather Concreting - Ready Mix Concrete.

UNIT II CONSTRUCTION PRACTICES 9

Specifications, details and sequence of activities and construction co-ordination – Site Clearance – Marking – Earthwork - masonry – stone masonry – Bond in masonry - concrete hollow block masonry – flooring – damp proof courses – construction joints – movement and expansion joints – pre cast pavements – Building foundations – basements – temporary shed – centering and shuttering – slip forms – scaffoldings – de-shuttering forms – Fabrication and erection of steel trusses – frames – braced domes – laying brick –– weather and water proof – roof finishes – acoustic and fire protection.

UNIT III SUB STRUCTURE CONSTRUCTION 9

Techniques of Box jacking – Pipe Jacking -under water construction of diaphragm walls and basement-Tunneling techniques – Piling techniques - well and caisson - sinking cofferdam -

cable anchoring and grouting-driving diaphragm walls, sheet piles - shoring for deep cutting - well points -Dewatering and stand by Plant equipment for underground open excavation.

UNIT IV SUPER STRUCTURE CONSTRUCTION 9

Launching girders, bridge decks, off shore platforms – special forms for shells - techniques for heavy decks – in-situ pre-stressing in high rise structures, Material handling - erecting light weight components on tall structures - Support structure for heavy Equipment and conveyors - Erection of articulated structures, braced domes and space decks.

UNIT V CONSTRUCTION EQUIPMENT 9

Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, front end waders, earth movers – Equipment for foundation and pile driving. Equipment for compaction, batching and mixing and concreting - Equipment for material handling and erection of structures - Equipment for dredging, trenching, tunneling,

Total hours: 45

OUTCOME:

- Students completing the course will have understanding of different construction techniques, practices and equipments. They will be able to plan the requirements for substructure and superstructure a construction.

TEXT BOOKS :

1) Arora S.P. and Bindra S.P., "Building Construction, Planning Techniques and Method of Construction", Dhanpat Rai and Sons, 1997.
2) Varghese, P.C. "Building construction", Prentice Hall of India Pvt. Ltd, New Delhi, 2007.
3) Shetty, M.S, "Concrete Technology, Theory and Practice", S. Chand and Company Ltd, New Delhi, 2008.

REFERENCES:

1) Jha J and Sinha S.K., "Construction and Foundation Engineering", Khanna Publishers, 1999.
2) 1. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., "Construction Planning, Equipment and Methods", 5th Edition, McGraw Hill, Singapore, 1995.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
IV		MECHANICS OF SOLIDS II	3	1	0	4

AIM

The aim of the course is to understand the basic analytical methods, that is, the fundamental Concepts and techniques of solid engineering mechanics.

OBJECTIVE

- This subject is useful for a detailed study of forces and their effects along with some suitable protective measures for the safe working condition.
- This knowledge is very essential for an Engineer to enable him in designing all types of structures and machines.
- The student will study the causes of failure by various failure theories
- The student will learn the state of stress in three dimensions with respect to various theories
- To impart the knowledge of Unsymmetrical bending in beams

UNIT - 1 ENERGY PRINCIPLES **9**

Strain energy and strain energy density - Strain energy in traction, shear, flexure and torsion - Castigliano's and Engessor's energy theorems - Principle of virtual work - application of energy theorems for computing deflections in beams and trusses - Maxwell's reciprocal theorem.

UNIT - 2 INDETERMINATE BEAMS **9**

Propped Cantilever and Fixed Beams - Fixed end moments and Reactions for standard cases ofloading - slopes and deflections in fixed beams - Continuous beams - Theorem of three moments - Analysis of continuous beams - S.F. and B.M. diagrams for continuous beams.

UNIT - 3 COLUMNS **9**

Eccentrically loaded short columns middle third rule - core of section - Columns of unsymmetrical sections - Euler’s theory of long columns - Critical loads for prismatic columns with different end conditions Rankine - Gordon Formula eccentrically loaded long columns.

UNIT - 4 STATE OF STRESS IN THREE DIMENSIONS 9

Determination of principal stresses and principal planes – Volumetric strain –Theories of failure – Principal stress - Principal strain – shear stress – Strain energy and distortion energy theories – application in analysis of stress, load carrying capacity

UNIT -5 ADVANCED TOPICS IN BENDING OF BEAMS 9

Unsymmetrical bending of beams of symmetrical and unsymmetrical sections - curved beams - Winkler Bach Formula – Thick Cylinders - Compound Cylinders.

Tutorial =15

Total Hours = 60

OUTCOMES:

The students will have

- Thorough understanding of the fundamental concepts of stress and strain in mechanics ofsolids and structures.
- the ability to analyse determinate beams and trusses to determine shear forces, bendingmoments and axial forces.
- a sufficient knowledge in designing shafts to transmit required power and also springs forits maximum energy storage capacities.

TEXT BOOKS:

1. Rajput , “Strength Of Materials” , Chand Publications,NewDelhi,2011
2. Dr.R.K.Bansal,”A Textbook of Strength of Materials”,Laxmi ublications,NewDelhi,2010
3. Srinath N., “Advanced Mechanics of Solid ", Tata McGraw Hill Publishing Company, New Delhi, 2009.

REFERENCES:

1. Junarkar S.B., “Mechanics of Structures ", Vol.1, 21st Edition, Charotar Publishing House, Anand, India, 1995.
2. Kazimi S.M.A. “Solid Mechanics ", Tata McGraw Hill Publishing Company, New Delhi, 1991.
3. Ghosh D,Dutta A. K. “A Textbook of Strength of Materials”, New Age International (P) Limited Publishers.
4. Swaroop, Adarsh “Mechanics of Materials”, New Age International (P) Limitted Publishers.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
IV		ENVIRONMENTAL ENGINEERING – I	3	0	0	3

AIM

To learn the fundamental concepts of Environmental Impact Assessment in the field of environmental engineering.

OBJECTIVE

On completion of the course

- The student is expected to know about the design principles involved in treatment of municipal water.
- The student is expected to know laying of joints and testing of pipes
- The student will study about the Design principles of water treatment and teach rural about basic water treatment methods
- The student will learn about the analysis of water distribution
- The student will have a knowledge about how to supply water to a building

UNIT 1 PLANNING FOR WATER SUPPLY 9

Objectives of Public Water Supply – Design Period – Population Forecasting – Water Demand – Sources of Water – Source Selection – Water Quality – Characterisation – Water Quality Standards.

UNIT 2 CONVEYANCE SYSTEM 9

Water Supply – Intake Structures – Pipe Materials – Hydraulics of Flow in Pipes – Transmission Main Design – Laying, Jointing & Testing of Pipes – Appurtenances – Pumps – Design of pumping mains.

UNIT 3 DESIGN PRINCIPLES OF WATER TREATMENT 9

Objectives – Selection of unit operations and processes – Principles of coagulation and flocculation, sedimentation, filtration, disinfection – Design principles of flash mixer, flocculator, clarifiers, filters – Disinfection devices – Softening – Demineralisation – Aeration – Iron removal – Defluoridation – Operation and Maintenance aspects - Residue Management

UNIT 4 WATER DISTRIBUTION 9

Requirements of Water Distribution – Components – Service Reservoirs – Network Design – Economics – Computer Applications – Analysis of Distribution Networks – Appurtenances – Operations and Maintenance – Leak Detection.

UNIT 5 WATER SUPPLY IN BUILDINGS 9

Principles of Design of Water Supply in Buildings – House Service Connection – Design of water distribution pipes in buildings - applications

Total Hours = 45

OUTCOMES:

The students completing the course will have

- an insight into the structure of drinking water supply systems, including water transport, treatment and distribution
- an understanding of water quality criteria and standards, and their relation to public health,
- the ability to design and evaluate water supply project alternatives on basis of chosen selection criteria

TEXT BOOKS:

1. Garg, S.K., "Environmental Engineering I" , Khanna Publishers, New Delhi, 2005
2. Modi, P.N., "Environmental Engineering I", Standard Book House, Delhi – 6, 2006

REFERENCES:

1. Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi, 1999
2. Hand book on Water Supply and Drainage, SP35, B.I.S., New Delhi, 1987
3. Punmia, B.C., Ashok K Jain and Arun K Jain, "Water Supply Engineering", Laxmi Publications Pvt. Ltd., New Delhi, 2005

SEMESTER	CODE	COURSE TITLE	L	T	P	C
IV		APPLIED HYDRAULIC ENGINEERING	3	1	0	4

AIM

The purpose of this course is to get exposure about the application of hydraulic engineering in the field by means of studying the various devices, equipments, machinery, and structures.

OBJECTIVE

- Student is introduced to open channel flow characteristics including hydraulic jump and surges.
- Hydraulic machines viz flow through turbines and pumps including their performance characteristics and design aspects are taught.
- Student, at the end of the semester will have the abilities to analyse flow characteristics in open channel and
- Design hydraulic machines.
- All types of pumps, their working principle will be taught

UNIT -1 OPEN CHANNEL FLOW **9**

Open channel flow - types and regime of flow - Velocity distribution in open channel - wide open channel - specific energy - critical flow and its computation.

UNIT -2 UNIFORM FLOW **9**

Uniform flow - Velocity measurement - Manning's and Chezy's formula - determination of roughness coefficients - determination of normal depth and velocity - most economical sections - minimum permissible velocity determination - non-erodible channels.

UNIT - 3 VARIED FLOW **9**

Dynamic equation of gradually varied flow - assumptions - characteristics of flow profiles - drawdown and backwater curves - profile determination - graphical integration, direct step, standard step method-hydraulic jump - types - energy dissipation - surges - surge through channel transitions

UNIT -4 TURBINES **9**

Impact of jets on plane and curved plates - turbines - classification - radial flow turbines - draft tube - axial flow turbines - performance of turbines - similarity laws - centrifugal pump - minimum speed to start the pump - multistage pumps – cavitations.

UNIT - 5 PUMPS **9**

Positive displacement pumps - reciprocating pump - negative slip - flow separation conditions - air vessels - indicator diagram and its variation - savings in work done - rotary pumps.

Tutorial =15

Total Hours = 60

OUTCOMES:

- The students will be able to apply their knowledge of fluid mechanics in addressingproblems in open channels.
- They will possess the skills to solve problems in uniform, gradually and rapidly varied flowsin steady state conditions.
- They will have knowledge in hydraulic machineries (pumps and turbines).

TEXT BOOKS:

1. Jain A.K., " Fluid Mechanics (including Hydraulic Machines) ", Khanna Publishers, 8th edition, 1995.
2. R.K.Bansal,"Fluid Mechanics and Hydraulic Machines",Laxmi Publications,2005

REFERENCES:

1. Subramanya K., " Flow in Open channels ", Tata McGraw Hill Publishing Company, 2001.
2. Ramamirtham S., "Fluid Mechanics, Hydraulics and Fluid Mechines ", Dhanpat Rai & Sons, Delhi, 1998.
3. John A. Roberson, "Hydraulic Engineering ", Jaico Publishing House, 1998.
4. Modi P.N. and Seth S.M., "Hydraulics and Fluid Mechanics", Standard Book House, New Delhi, 2002

SEMESTER	CODE	COURSE TITLE	L	T	P	C
IV		SURVEYING II	3	0	0	3

AIM

To learn the different aspects of surveying and the advancement in the different types of Surveying. The course will enable the engineers to the new frontiers of science like Tacheometric surveying, Control, Survey Adjustments, Total Station, Astronomical Survey , Photogrammetric and Remote Sensing.

OBJECTIVE

At the end of the course the student will posses knowledge about

- Tachometric surveying,
- Control surveying,
- Survey adjustments,
- Total Station
- Photogrammetric.

UNIT -1 TACHEOMETRIC SURVEYING 9

Tachometric systems - Tangential, Stadia and sub tense methods - Stadia systems - Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Stadia constants - Analectic lens - Subtense bar.

UNIT -2 CONTROL SURVEYING 9

Working from whole to part - Horizontal and vertical control methods - Triangulation - Signals - Base line - Instruments and accessories - Corrections - Satellite station - Reduction to centre - Trigonometric leveling – Single and reciprocal observations - Modern trends.

UNIT -3 SURVEY ADJUSTMENTS 9

Errors - Sources, precautions and corrections - Classification of errors - True and most probable values - weighted observations - Method of Equal shifts - Principle of least squares - Normal equation - Correlates - Level nets - Adjustment of simple triangulation networks.

UNIT 4 TOTAL STATION SURVEYING **9**

Basic Principle – Classifications -Electro-optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser Total Station instruments. Microwave system,Measuring principle, working principle, Sources of Error, Microwave Total Station instruments. Comparison between Electro-optical and Microwave system. Care and maintenance of Total Station instruments. Modern positioning systems – Traversing and Trilateration.

UNIT -5 ADVANCED TOPICS IN SURVEYING **9**

Route Surveying - Reconnaissance - Route surveys for highways, railways and waterways - hydrographic surveying – Tides - MSL - Sounding methods - Strength of fix - Sextants and station pointer- Astronomical Surveying – field observations and determination of Azimuth by altitude and hour angle methods – fundamentals of Photogrammetry and Remote Sensingbasic concepts of GPS..

Total Hours : 45 hours

OUTCOMES:

On completion of this course students shall be able to

- Understand the advantages of electronic surveying over conventional surveying methods
- Understand the working principle of GPS, its components, signal structure, and errorsources
- Understand various GPS surveying methods and processing techniques used in GPSobservations

TEXT BOOKS:

1. Kanetkar T.P., “Surveying and Levelling " , Vols. I and II, United Book Corporation, Pune, 2006
2. Punmia B.C., “Surveying ", Vols. I, II and III, Laxmi Publications, 1999.

REFERENCES:

1 S. S. Bhavikatti,” Surveying And Levelling”,I. K. International Pvt Ltd -2009

2 James M. Anderson and Edward M. Mikhail, “Introduction to Surveying ", McGraw HillBookCompany, 1985.

3 Satheesh Gopi, rasathishkumar, N. madhu, “Advanced Surveying, Total Station GPS and Remote Sensing" Pearson education , 2007

SEMESTER	CODE	COURSE TITLE	L	T	P	C
IV		HYDRAULIC ENGINEERING LAB	0	0	4	2

AIM

The aim of this course is to get exposure about the function of various hydraulic equipments.

OBJECTIVE

Student should be able to verify the principles studied in theory by conducting the experiments.

LIST OF EXPERIMENTS

CYCLE -I

1. Determination of co-efficient of discharge for orifice
2. Determination of co-efficient of discharge for notches
3. Determination of co-efficient of discharge for venturimeter
4. Determination of co-efficient of discharge for orifice meter
5. Study of impact of jet on flat plate (normal / inclined)
6. Study of friction losses in pipes

CYCLE -II

1. Study of minor losses in pipes
2. Study on performance characteristics of Pelton turbine.
3. Study on performance characteristics of Francis turbine
4. Study on performance characteristics of Kaplan turbine
5. Study on performance characteristics of Centrifugal pumps (Constant speed / variable speed)
6. Study on performance characteristics of reciprocating pump.

Total Hours: 45

OUTCOMES:

- The students will be able to measure flow in pipes and determine frictional losses.
- The students will be able to develop characteristics of pumps and turbines.

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	Venturimeter	1
2.	Orificemeter	1
3.	Reciprocating pump	1
4.	Jet pump	1
5.	Gear oil pump	1
6.	Pipe Friction	1
7.	Centrifugal pump	1

SEMESTER	CODE	COURSE TITLE	L	T	P	C
IV		SURVEY PRACTICAL II LAB	0	0	4	2

AIM

To measure the elevation of points by advanced methods and instruments.

OBJECTIVE

At the end of the course the student will posses knowledge about Survey field techniques.

LIST OF EXPERIMENTS

1. Tangential system (using theodolite, leveling staff)
2. Stadia system (using theodolite, leveling staff)
3. Subtense system (using theodolite, tape, cross staff, leveling staff)
4. Foundation marking (using theodolite, tape, ranging rods)
5. Simple curve - right / left handed (using theodolite, tape, ranging rods)
6. Transition curve (using theodolite, tape, ranging rods)

Total Hours: 45

OUTCOMES:

- Students completing this course would have acquired practical knowledge on handling survey instruments like Theodolite, Tacheometery and Total station and haveadequate knowledge to carryout Triangulation and Astronomical surveying including general field marking for various engineering projects and curves setting.

REFERENCES:

1.James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, 7th Edition, McGraw Hill, 2001.

2. Bannister and S. Raymond, "Surveying", 7th Edition, Longman, 2004.

3. Roy S.K., "Fundamentals of Surveying", 2nd Edition, Prentice Hall of India, 2004.

4. Arora K.R., Surveying Vol I & II, Standard Book house , 10th Edition, 2008

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	Chain	6
2.	Ranging Rod	12
3.	Arrow	30
4.	Tape	6
5.	Cross staff	6
6.	Peg	30
7.	Theodolite	6
8.	Tripod stand	6
9	Levelling Staff	6

SEMESTER	CODE	COURSE TITLE	L	T	P	C
V		STRUCTURAL ANALYSIS	3	1	0	4

AIM

Preparation of influence lines and effect of rolling loads. Introduce classical methods in analyzing indeterminate structures (trusses, beams and plane frames).

OBJECTIVE

- The basics of a structures subjected to internal forces like axial forces, shearing forces, bending and torsional moments while transferring the loads acting on it will be taught
- Analysis of arches
- Structural analysis deals with analysing these internal forces in the members of the structures.
- Slope deflection and moment distribution methods will be used for calculation of deflection
- At the end of this course students will be conversant with classical method of analysis.

UNIT 1 DEFLECTION OF DETERMINATE STRUCTURES 9

Principles of virtual work for deflections – Deflections of pin-jointed plane frames and rigid plane frames – Willot diagram - Mohr's correction

UNIT 2 SLOPE DEFLECTION METHOD 9

Continuous beams and rigid frames (with and without sway) – Simplification for hinged end – Support displacements.

UNIT 3 MOMENT DISTRIBUTION METHOD 9

Distribution and carryover of moments – Stiffness and carry over factors – Analysis of continuous beams – Plane rigid frames with and without sway.

UNIT 4 MOVING LOADS AND INFLUENCE LINES 9

(DETERMINATE & INDETERMINATE STRUCTURES)

Influence lines for reactions in statically determinate structures – influence lines for members forces in pin-jointed frames – Influence lines for shear force and bending moment in beam sections.Muller Breslau's principle – Influence lines for continuous beams and single storey rigid frames.

UNIT 5 ARCHES **9**

Arches as structural forms – Examples of arch structures – Types of arches – Analysis of three hinged, two hinged and fixed arches, parabolic and circular arches – Settlement and temperature effects.

Tutorial :15

Total Hours: 60

OUTCOMES:

Students will be able to

- analysis trusses, frames and arches
- analyse structures for moving loads and will be conversant with classical methods of analysis.

TEXT BOOKS:

1 Vaidyanadhan, R and Perumal, P, "Comprehensive Structural Analysis – Vol. 1 & Vol. 2", Laxmi Publications Pvt. Ltd, New Delhi, 2003.

2 Punmia.B.C, Ashok Kumar Jain and Arun Kumar Jain, "Theory of structures", Laxmi Publications Pvt. Ltd., New Delhi, 2004

3 Reddy. C.S., "Basic Structural Analysis", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2013.

4 BhavaiKatti, S.S, "Structural Analysis – Vol. 1 & Vol. 2", Vikas Publishing Pvt Ltd., New Delhi, 2008

REFERENCES:

1 Devadas Menon, "Structural Analysis", Narosa Publishing House, 2008

2 Ghali.A., Nebille and Brown. T.G., "Structural Analysis - A unified classical and matrix approach" Sixth Edition, SPON press, New York, 2013.

3 Gambhir. M.L., "Fundamentals of Structural Mechanics and Analysis"., PHI Learning Pvt. Ltd., New Delhi, 2011.

4 L.S. Negi & R.S. Jangid, "Structural Analysis", Tata McGraw Hill Publications, New Delhi, 6th Edition, 2003.

SEMESTER	CODE	COURSE TITLE	L	T	P	C

V		**DESIGN OF REINFORCED CONCRETE ELEMENTS**	**3**	**1**	**0**	**4**

AIM

To impart comprehensive knowledge on the design of reinforced concrete elements by Limit State method.

OBJECTIVES

- All the methods of design of Reinforced concrete structures will be studied
- This course covers the different types of philosophies related to Design of Reinforced Concrete Structures with emphasis on Limit State Method.
- The design of Basic elements such as slab, beam, column and footing which form part of any structural system with reference to Indian standard code of practice for Reinforced Concrete Structures and Design Aids are included.
- At the end of course the student shall be in a position to design the basic elements of reinforced concrete structures.
- Design of masonry wall will be taught

UNIT 1 METHODS OF DESIGN OF CONCRETE STRUCTURES 9

Concept of elastic method ultimate load method and limit state method- advantages of limit state method over other methods-design codes and specification -Introduction to IS 456 - limit state philosophy as detailed in current IS code.

UNIT 2 LIMIT STATE DESIGN FOR FLEXURE 9

Analysis and design of one way and two way slabs – rectangular slab subjected to uniformly distributed and concentrated loads – boundary conditions and corner effects – singly and doubly reinforced rectangular and flanged beams - design aids for flexure-deflection .

UNIT 3 LIMIT STATE DESIGN FOR SHEAR TORSION BOND AND ANCHORAGE 9

Behaviour of RC beams in shear and torsion-shear and torsion reinforcement-limit state design of RC members for combined bending shear and torsion- use of design aids

UNIT 4 LIMIT STATE DESIGN OF COLUMNS 9

Types of columns-analysis and design of short columns for axial, uniaxial and bi axial bending-design of long columns- use of design aids

UNIT 5 LIMIT STATE DESIGN OF FOOTING 9

Design of wall footing – Design of axially and eccentrically loaded rectangular pad and sloped footings – Design of combined rectangular footing for two columns only

TUTORIAL = 15

Total Hours = 60

OUTCOME:

- The student shall be in a position to design the basic elements of reinforced concrete structures.

TEXT BOOKS:

1. Vargheese P C," Limit State Design of Reinforced Concrete", Prentice Hall of India, Private, Limited New Delhi, 2004
2. Unnikrishna Menon and Pillai,'Reinforced concrete Design",Tata Mc Graw hill,2007
3. Dayaratnam P," Brick and Reinforced Brick Structures", Oxford & IBH Publishing Company Private Limited 2008

REFERENCES:

1. S. Ramamrutham, R. Narayan,"Design of Reinforced Concrete Structures (conforming to IS 456) Dhanpat Rai, 1993
2. Krishna, Raju N. Pranesh, R.N.Reinforced Concrete Design:IS:456-2000 Principles and Practice"new age publications,2003
3. Bhavikatti, S S, "Design of R.C.C. Structural Elements Vol. I new age Publications,2005
4. IS456:2000, Code of practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi, 2000 7.
5. SP16, IS456:1978 "Design Aids for Reinforced Concrete to Bureau of Indian Standards, New Delhi, 1999

SEMESTER	CODE	COURSE TITLE	L	T	P	C
V		ENVIRONMENTAL ENGINEERING – II	3	0	0	3

AIM

Students are expected to know about the design principles involved in treatment of municipal water and waste water.

OBJECTIVE

On completion of the course, the student is expected to know about the principles involved in

- Transmission of water system
- Treatment of waste water.
- Sewage Disposal
- Sludge Disposal method
- Advances in sewage treatment

UNIT 1 SEWERAGE SYSTEM: COLLECTION & TRANSMISSION 9

Sources of wastewater – Quantity of sanitary sewage – Estimation of storm runoff – Wastewater characteristics and significance – Effluent disposal standards – Design of sewers – Computer applications – Laying, jointing and testing of sewers – Sewer appurtenances – Pump selection – Drainage in buildings – Sanitary fixture and fittings – Systems of Sanitary plumbing – House Drainage – House Sewer connection.

UNIT 2 SEWAGE TREATMENT – PRIMARY TREATMENT 9

Objectives – Unit Operations & Processes - Materials for sewers – Layout of wastewater Treatment Plant - Characteristics and composition of sewage – Principles, functions and design of screen, grit chambers and primary sedimentation tanks.

UNIT 3 SEWAGE TREATMENT – SECONDARY TREATMENT 9

Secondary Treatment – Activated Sludge Process and Trickling filter – Stabilisation Ponds and Septic tanks – Advances in Sewage Treatment

UNIT 4 SEWAGE DISPOSAL **9**

Methods – Dilution – Self purification of surface water bodies – Oxygen sag curve – Land disposal – Sewage farming – Deep well injection – Soil dispersion system – Wastewater reclamation techniques.

UNIT 5 SLUDGE TREATMENT AND DISPOSAL **9**

Thickening – Sludge digestion – Biogas recovery – Design of Drying beds – Conditioning and Dewatering – Sludge disposal.

Total Hours: 45

OUTCOMES:

The students completing the course will have

- ability to estimate sewage generation and design sewer system including sewage pumpingstations
- required understanding on the characteristics and composition of sewage, self purificationof streams
- ability to perform basic design of the unit operations and processes that are used in sewage treatment

TEXT BOOKS:

1. Garg S.K., Environmental Engineering Vol. II, Khanna Publishers, New Delhi, 2005
2. G.S. Birdie and J.S. Birdie, Water supply & Sanitary Engg. Dhanapat Rai & Sons, New Delhi 2000.

REFERENCES:

1. Manual on Sewerage and Sewage Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1993.
2. H.S. Peavy, D.R. Rowe and George Tchobanoglous, Environmental Engineering, McGraw-Hill Company, New Delhi, 1995
3. Rao, C.S.Environmental Pollution Control Engineering , New age publishers, 2006.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
V		DESIGN OF STEEL STRUCTURES	3	1	0	4

AIM

The aim of the course is to understand the basic concepts and the design of structural steel members subjected to compressive, tensile and bending loads, as per current codal (IS 800 -2007) provisions including connections.

OBJECTIVES:

- To introduce the students to limit state design of structural steel members subjected to compressive, tensile and bending loads, including connections.
- Design of structural systems such as roof trusses, gantry girders as per provisions of current code (IS 800 - 2007) of practice.

UNIT I INTRODUCTION 9

Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures – Connections using rivets, welding, bolting – Design of bolted and welded joints – Eccentric connections - Efficiency of joints.

UNIT II TENSION MEMBERS 6

Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag

UNIT III COMPRESSION MEMBERS 12

Types of compression members – Theory of columns – Basis of current codal provision for compression member design – Slenderness ratio – Design of single section and compound section compression members – Design of laced and battened type columns – Design of column bases – Gusseted base

UNIT IV BEAMS 9

Design of laterally supported and unsupported beams – Built up beams – Beams subjected to uniaxial and biaxial bending – Design of plate girders - Intermediate and bearing stiffeners – Flange and web splices.

UNIT V ROOF TRUSSES AND INDUSTRIAL STRUCTURES 9

Roof trusses – Roof and side coverings – Design of purlin and elements of truss; end bearing – Design of gantry girder.

Tutorial: 15 hours

Total Hours: 60 hours

OUTCOMES:

- The students would have knowledge on the design of structural steel members subjected to compressive, tensile and bending forces, as per current code and also know to design structural systems such as roof trusses and gantry girders**.**

TEXT BOOKS:

1. Gambhir. M.L., "Fundamentals of Structural Steel Design", McGraw Hill Education India Pvt. Ltd., 2013
2. Shiyekar. M.R., "Limit State Design in Structural Steel", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2nd Edition, 2013.
3. Subramanian.N, "Design of Steel Structures", Oxford UniversityPress, New Delhi, 2013.

REFERENCES:

1. Narayanan.R.et.al. "Teaching Resource on Structural Steel Design", INSDAG, Ministry of Steel Publications, 2002 .
2. Duggal. S.K, "Limit State Design of Steel Structures", Tata McGraw Hill Publishing Company, 2005
3. Bhavikatti.S.S, "Design of Steel Structures" By Limit State Method as per IS:800–2007, IK International Publishing House Pvt. Ltd., 2009

4. Shah.V.L. and Veena Gore, "Limit State Design of Steel Structures", IS 800–2007 Structures Publications, 2009.

5. IS800 :2007, General Construction In Steel - Code of Practice, (Third Revision), Bureau of Indian Standards, New Delhi, 2007

SEMESTER	CODE	COURSE TITLE	L	T	P	C
V		MECHANICS OF SOILS	3	1	0	4

AIM

This course is aimed to develop analytical skills in dealing with soil as a medium of water flow, a medium for structural supports and a primary building material.

OBJECTIVE

The course introduces the basic principles of engineering behaviour of soils, and by the end of this course students should be able to:

- Give an Engineering classification of a given soil.
- Understand the principle of effective stress, and then calculate stresses that influence soil behaviour.
- Calculate water flow through ground, and understand the effects of seepage on the stability of structures.
- Determine soil deformation parameters, and calculate settlement magnitude and rate of settlement.
- Appreciate the difference between total and effective stress approaches in soil strength determination, and discriminate between drained and undrained conditions.
- Specify soil compaction requirements.

UNIT - 1 INTRODUCTION 9

Nature of soil - Soil description and classification for engineering purposes - IS Classification system - Phase relationships - Soil compaction - Theory, comparison of laboratory and field compaction methods - Ground improvement by compaction.

UNIT -2 SOIL WATER AND WATER FLOW 9

Soil water - static pressure in water - Permeability measurement in the laboratory and field - Seepage - Introduction to flow nets - Simple problems.

UNIT - 3 STRESS DISTRIBUTION AND SETTLEMENT 9

Effective stress concepts in solids - Stress distribution in soil media - Use of influence charts - Components of settlement - Immediate and consolidation settlement - Terzaghi's one dimensional consolidation theory.

UNIT -4 SHEAR STRENGTH 9

Shear strength of cohesive and cohesion less soils - Mohr - Coulomb failure theory - saturated soil mass - Measurement of shear strength, direct shear - Triaxial compression, UCC and Vane shear tests - Pore pressure parameters.

UNIT - 5 SLOPE STABILITY 9

Slope failure mechanisms - Types - Infinite slopes - Finite slopes - Total stress analysis for saturated clay - Method of slicese - friction circle method - Use of stability number - Slope protection measures.

Tutorial= 15

Total Hours = 60

OUTCOME:

- Students have the ability to determine Index properties and classify the soil. They can alsoknow to determine engineering properties through standard tests and empirical correctionwith index properties.

TEXT BOOKS:

1. Punmia P.C., Ashok Kumar Jain,Arun Kumar Jain, " Soil Mechanics and Foundations ", Laximi Publications Pvt.Ltd,New Delhi,2005

2. Arora K.R., " Soil Mechanics and Foundation Engineering ", Standard Publishers and Distributors, New Delhi, 1997.

REFERENCES:

1. Holtz R.D. and Kovacs W.D., “Introduction to Geotechnical Engineering ", Prentice-Hall, 2010

2. McCarthy D.F., “Essentials of Soil Mechanics and Foundations ", Prentice-Hall, 1997.

3. Sutten B.H.C., “Solving Problems in Soil Mechanics", Longman Group Scientific and Technical, U.K. England, 1994.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
V		ELECTIVE I	3	0	0	3

The Elective Subject Can be Selected from Elective List

SEMESTER	CODE	COURSE TITLE	L	T	P	C
V		COMPUTER AIDED BUILDING DRAWING LAB	0	0	4	2

AIM

The aim of this course is to prepare the plan, elevation and sections of various types of buildings using any design software

OBJECTIVE

At the end of this course the student should be able to draft on computer building drawings (Plan, elevation and sectional views) in accordance with development and control rules satisfying orientation and functional requirements for the following:

1. Buildings with load bearing walls (Flat and pitched roof) –
   Including details of doors and windows
2. RCC framed structures
3. Office Buildings
4. Industrial buildings – North light roof structures – Trusses
5. Perspective view of one and two storey buildings

The student has to train the rural people using computer aided building drawing lab to prepare plans for all types of building and issue certificates

Total hours: 45 hours

OUTCOME:

- The students will be able to draft the plan, elevation and sectional views of the buildings, industrial structures, framed buildings using computer softwares.

REFERENCES:

1. Balagopal T.S. Prabhu, K. Vincent Paul, and C. Vijayan, "Building Drawing and Detailing," Spades Publishers, Calicut, 1987.
2. M.G. Shah, C.M. Kale, and S. Y. Patki, "Building drawing with an integrated approach to built environment – 4th Edition," Tata McGraw Hill, 2002.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
V		SOIL MECHANICS LAB	0	0	4	2

AIM

To provide the hands on training in determination of Engineering and index properties of soils, applied in field problems.

OBJECTIVE

At the end of this course, the student acquires the capacity to test the soil to assess its Engineering and Index properties.

LIST OF EXPERIMENTS

Cycle - 1

1. Grain size distribution - Sieve analysis
2. Grain size distribution - Hydrometer analysis
3. Atterberg limits test
4. Determination of moisture - Density relationship using standard proctor.
5. Permeability determination (constant head and falling head methods)

Cycle – 2

1. Specific gravity of soil grains
2. Relative density of sands
3. Determination of shear strength parameters
    a) Direct shear test on cohesion less soil
    b) Unconfined compression test in cohesive soil
    c) Triaxial compression test
4. One dimensional consolidation test (Determination of co-efficient of consolidation only)

Total Hours: 45

OUTCOME:

- Students know the techniques to determine index properties and engineering properties such as shear strength, compressibility and permeability by conducting appropriate tests.

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	Pyconometer	1
2.	Casagrande's Apparatus	2
3.	Plastic limit Apparatus	2
4.	Shrinkage Limit Apparatus	2
5.	Standard Proctor's Apparatus	1
6.	Hydrometer Apparatus	1
7.	Direct shear Apparatus	1
8.	Triaxial compression Apparatus	1

REFERENCES:

1. "Soil Engineering Laboratory Instruction Manual ", Published by the Engineering College Co operative Society, Chennai, 1996.

2. "I.S.Code of Practice (2720) Relevant Parts ", as amended from time to time.

YEAR	III	PROFESSIONAL COMMUNICATION AND	L	T	P	C
SEMESTER	V	PERSONALITY DEVELOPMENT	0	0	4	2

(Common to All Branches)

AIM: To develop graduates with good Presentation and Writing skills (Professional & Technical)

OBJECTIVES: To improve Aptitude Skills, train to improve self-learning/researching abilities, Presentation Skills & Technical Writing (Reports, Brochures, Manuscripts/Articles)

METHODOLOGY: Modular Evaluation will be done based on Continuous Internal Assessment as Assignments. Final Evaluation will be based on a record on FAQ Resume with covering letter, Technical and Non – technical report and Power point presentations.

UNIT I – COMMUNICATION AND SELF DEVELOPMENT: Basic Concepts of Communication; Barriers in Communication; How to Overcome Barriers to Communication.

UNIT II - GRAMMAR & SYNTAX: Subject verb concord, tenses, Homophones, Homonyms, Spotting errors.

UNIT III - READING AND WRITING SKILLS: Reading Comprehension; and suggesting title for given passage Back office job for organizing a conference / seminar (member of organizing committee and submit a report; Jumbled sentences, respond to real time advertisement and prepare a covering letter with CV

UNIT IV – SPEAKING SKILLS: Hard and Soft Skills; Feedback Skills;Skills of Effective Speaking; Component of an Effective Talk; How to make an effective oral presentation.

UNIT V – TECHNICAL REPORT, RESEARCH CASE STUDY & REPORTING: MainTypes and Structure of Reports; Collecting Data; Technical Proposals; Visual Aids; General Tips for Writing Reports. Research Case Study and reporting, How to make an effective power point presentation.

Total Hours: 45

OUTCOME:

1. By teaching this syllabus, our UG Engineering graduates will enable to enhance wide range vocabulary to use at right place in right time.
2. Students who undergo this syllabus will fulfill practice in professional writing and comprehension skill and meet the industry requirements.

TEXT BOOK

I The Functional Aspects of Communication Skills, Prajapati Prasad and Rajendra K. Sharma, S. K Kataria & Sons, New Deihl, Rep"nt 2007.

REFERENCE BOOKS

1 Business Communication, Sinha K. K, S. Chand, New Delhi.

2. Business Communication, Asha Kaul, Prentice Hall of India.

3 Business Correspondence and Report Writing' A Practical Approach to Business and

Technical Communication, Sharma, R.C. and Krishna Mohan, Tata McGraw-HilI.

4 A New Approach to English Grammar for High Schools, Madan Sabina, Spectrum Books, New Delhi

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VI		MODERN METHODS OF STRUCTURAL ANALYSIS	3	1	0	4

AIM

To learn advanced methods like matrix methods of structural analysis of structures, plastic theory, analysis of special structures like arches and suspension cables and influence line for indeterminate structures.

OBJECTIVE

- This course is in continuation of Structural Analysis I. Here in advanced method of analysis like Matrix method and Plastic Analysis are covered.
- Advanced topics such as FE method and Space Structures are covered.
- Advanced method of analysis like finite element and matrix will be taught
- After completion of the course the student will be able to Differentiate between various structural forms such as beams, plane truss, space truss, plane frame, space frame, arches, cables, plates and shells.
- The student studies to calculate the degree of static and kinematic indeterminacy of a given structure such as beams, truss and frames.

UNIT I FLEXIBILITY METHOD FOR INDETERMINATE FRAMES 9

Equilibrium and compatibility – Determinate vs Indeterminate structures – Indeterminacy - Primary structure – Compatibility conditions – Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames (with redundancy restricted to two).

UNIT II MATRIX STIFFNESS METHOD 9

Element and global stiffness matrices – Analysis of continuous beams – Co-ordinate transformations – Rotation matrix – Transformations of stiffness matrices, load vectors and displacements vectors – Analysis of pin-jointed plane frames and rigid frames.

UNIT 3 FINITE ELEMENT METHOD 9

Introduction – Discretisation of a structure – Displacement functions – Truss element – Beam element.

UNIT 4 PLASTIC ANALYSIS OF STRUCTURES 9

Statically indeterminate axial problems – Beams in pure bending – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism – Plastic analysis of indeterminate beams and frames – Upper and lower bound theorems

UNIT 5 SPACE AND CABLE STRUCTURES 9

Analysis of Space trusses using method of tension coefficients – Suspension bridges-cables with two and three hinged stiffening girders

TUTORIAL = 15

Total Hours = 60

OUTCOME:

- The student will have the knowledge on advanced methods of analysis of structures including space and cable structures.

TEXT BOOKS

1. Vaidyanathan, R. and Perumal, P., "Comprehensive structural Analysis – Vol. I & II", Laxmi Publications, New Delhi, 2003
2. Manicka Selvam V.K.,Elementary Matrix Analysis of Structures, Khanna Publishers, Delhi,1994

REFERENCES

1. Ghali.A, Nebille,A.M. and Brown,T.G. "Structural Analysis" A unified classical and Matrix approach" –5th edition. Spon Press, London and New York, 2003.
2. Vazirani V.N, & Ratwani, M.M, "Analysis of Structures", Khanna Publishers, Delhi
3. Structural Analysis – A Matrix Approach – G.S. Pandit & S.P. Gupta, Tata McGraw Hill

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VI		DESIGN OF REINFORCED CONCRETE AND MASONRY STRUCTURES	3	1	0	4

AIM

To bring about an exposure to advanced topics in structural design comprising of RCC retaining walls, water tanks, yield line theory, Design of staircases, box culvert and Brick Masonry structures

OBJECTIVES

- This course covers the design of reinforced concrete structures such as retaining wall, water tanks, staircases, flat slabs and bridges.
- At the end of the course student has a comprehensive design knowledge related to structures, systems that are likely to be encountered in professional practice.
- Principles of Prestressing will be studied
- Application of virtual work theory for design of slabs
- Design of bridges using IRC codes

UNIT 1 RETAINING WALLS **9**

Design of cantilever and counterfort retaining walls

UNIT 2 WATER TANK **9**

Underground rectangular tanks – Overhead circular and rectangular tanks – Design ofstaging and foundations.

UNIT 3 PRINCIPLES OF PRESTRESSING **9**

Materials for prestressed concrete – Different methods and systems – introduction to prestressing and post tensioning- Uniform and non uniform prestressing – Losses in prestress – Analysis of simply supported beams with straight and parabolic tendons.

UNIT 4 YIELD LINE THEORY **9**

Application of virtual work method to Square, Rectangular and Triangular slabs.

UNIT 5 ADVANCED TOPICS **9**

Design of staircases (ordinary and doglegged) – Design of deep beams -flat slabs – Design of Reinforced concrete walls – Principles of design of road bridges for IRC loading

Tutorial = 15

Total Hours = 60

OUTCOME:

- The student shall have a comprehensive design knowledge related to various structural systems.

TEXT BOOKS:

1. P.C.Varghese,"Advanced Reinforced Concrete structures", PHI Learning Pvt. Ltd., 09-Jan-2009

2. J. N. Bandyopadhyay," Design Of Concrete Structures" PHI Learning Pvt. Ltd., 2008

REFERENCES:

1. Gambhir.M.L., "Design of Reinforced Concrete Structures", Prentice Hall of India Private Limited, 2012.

2. Dayaratnam, P., "Brick and Reinforced Brick Structures", Oxford & IBH Publishing House, 1997 3.Punmia B.C, Ashok Kumar Jain, Arun K.Jain, "R.C.C. Designs Reinforced Concrete Structures", Laxmi Publications Pvt. Ltd., New Delhi, 2006.

4. Varghese.P.C., "Advanced Reinforced Concrete Design", Prentice Hall of India Pvt. Ltd., New Delhi, 2012

NOTE:IS 456:2000,SP 16, IRC Bridge codes, BIS 3370, ISI 343 are permitted in the Examinations.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VI		HIGHWAY ENGINEERING	3	0	0	3

AIM

The purpose of this course is to provide a knowledge on highway planning, geometric design of highways, highway maintenance and public transportation. In addition, rigid and Flexible pavements design, properties of highway materials and various practices adopted for construction.

OBJECTIVE

- The objective of the course is to educate the students on the various components of Highway Engineering.
- It exposes the students to highway planning, engineering surveys for highway alignment,
- Design of Geometric Elements of Highways and Urban roads, Rigid and Flexible pavements design.
- The students further learn the desirable properties of highway materials and various practices adopted for construction.
- This course enables the students to develop skill on evaluation of the pavements and to decide appropriate types of maintenance.

UNIT -1 HIGHWAY PLANNING AND ALIGNMENT 9

Highway Development in India, Macadam's Method of Road Construction, Jayakar Committee Recommendations and Realisations, Twenty-year Road Development Plans, Concepts of On-going Highway Development Programmes at National Level, Institutions for Highway Development at National level - Indian Roads Congress, National Highway Authority of India, Ministry of Road Transport and Highways (MORTH) and Central Road Research Institute. Requirements of Ideal Alignment, Factors Controlling Highway Alignment Engineering Surveys for Alignment - Conventional Methods and Modern Methods (Remote Sensing, GIS and GPS techniques)Classification and Cross Section of Urban and Rural Roads (IRC), Highway Cross Sectional Elements – Right of Way, Carriage Way, Camber, Kerbs, Shoulders and Footpaths [IRC Standards]

UNIT -2 GEOMETRIC DESIGN OF HIGHWAYS 9

Design of Horizontal Alignments – Superelevation, Widening of Pavements on Horizontal Curves and Transition Curves [Derivation of Formulae and Problems] Design of Vertical Alignments – Rolling, Limiting, Exceptional and Minimum Gradients, Summit and Valley Curves Sight Distances - Factors Affecting Sight Distances, PIEV Theory, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections, Intermediate Sight Distance and Illumination Sight Distance [Derivations and Problems in SSD and OSD] Geometric Design of Hill Roads [IRC Standards Only]

UNIT -3 DESIGN OF RIGID AND FLEXIBLE PAVEMENTS 9

Rigid and Flexible Pavements- Components and their Functions Design Principles of Flexible and Rigid Pavements, Factors Affecting the Design of Pavements - ESWL, Climate, Sub-grade Soil and Traffic Design Practice for Flexible Pavements [CBR method, IRC Recommendations-Problems] Design Practice for Rigid Pavements – [IRC Recommendations-Problems]

UNIT -4 HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE 9

Desirable Properties and Testing of Highway Materials: - (Tests have to be demonstrated in Highway Engineering Laboratory) Soil – California Bearing Ratio Test, Field Density Test Aggregate - Crushing, Abrasion and Impact Tests- Bitumen - Penetration, Ductility, Viscosity, Binder Content and Softening Point Tests. Construction Practice - Water Bound Macadam Road, Bituminous Road and Cement Concrete Road [as per IRC and MORTH specifications] Highway Drainage [IRC Recommendations]

UNIT -5 HIGHWAY MAINTENANCE 9

Types of Defects in Flexible Pavements – Surface Defects, Cracks, Deformation, Disintegration – Symptoms, Causes and Treatments. Types of Pavement Failures in Rigid Pavements – Scaling, Shrinkage, Warping, Structural Cracks, Spalling of Joints and Mud Pumping – and Special Repairs Pavement Evaluation – Pavement Surface Conditions and Structural Evaluation Overlay Design by Benkleman Beam Method [Procedure only]

Total Hours = 45

OUTCOME:

- On completing the course, the students will have the ability to Plan and Design various civilEngineering aspects of Railways, Airports and Harbour.

TEXT BOOKS:

1. Khanna K and Justo C E G, "Highway Engineering", Khanna Publishers, Roorkee, 2001.
2. Kadiyali L R," Principles and Practice of Highway Engineering", Khanna Technical Publications, Delhi, 2000

REFERENCES:

1. IRC Standards (IRC 37 - 2001 & IRC 58 -1998)
2. Bureau of Indian Standards (BIS) Publications on Highway Materials
3. MORTH Guidelines for Highway Engineering

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VI		DISASTER MITIGATION AND MANAGEMENT	3	0	0	3

AIM

The purpose of this course is to provide a knowledge in Disaster Management and create an awareness about disaster preparedness

OBJECTIVE

- To Understand basic concepts in Disaster Management
- To Understand Definitions and Terminologies used in Disaster Management
- To Understand the Challenges posed by Disasters
- To understand Impacts of Disasters

UNIT 1 INTRODUCTION **9**

Concept of disaster; Different approaches; Concept of Risk; Levels of disasters; Disaster phenomena and events *(Global, national and regional)*; Natural and man-made hazards

UNIT 2 RISK ASSESSMENT AND VULNERABILITY ANALYSIS **9**

Response time, frequency and forewarning levels of different hazards; Characteristics and damage potential of natural hazards; hazard assessment ;Dimensions of vulnerability factors; vulnerability assessment; Vulnerability and disaster risk; Vulnerabilities to flood and earthquake hazards

UNIT 3 DISASTER MANAGEMENT MECHANISM **9**

Concepts of risk management and crisis management ; Disaster management cycle ;Response and Recovery ; Development, Prevention, Mitigation and Preparedness; Planning for relief

UNIT 4 DISASTER RESPONSE **9**

Mass media and disaster management; Disaster Response Plan; Communication, Participation, and Activation of Emergency Preparedness Plan; Logistics Management; Psychological Response; Trauma and Stress Management; Rumour and Panic Management ;Minimum Standards of Relief; Managing Relief; Funding

UNIT 5 DISASTER MANAGEMENT IN INDIA **9**

Strategies for disaster management planning; Steps for formulating a disaster risk reduction plan; Disaster management Act and Policy in India; Organisational structure for disaster management in India; Preparation of state and district disaster management plans

OUTCOMES:

The students will be able to

- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation
- Draw the hazard and vulnerability profile of India, scenarious in the Indian context,
- Disaster damage assessment and management

TEXT BOOKS

1. Alexander, D. *Natural Disasters,* ULC press Ltd, London, 1993.
2. Carter, W. N. *Disaster Management: A Disaster Management Handbook,* Asian Development Bank, Bangkok, 1991.
3. Chakrabarty, U. K. *Industrial Disaster Management and Emergency Response,* Asian Books Pvt. Ltd., New Delhi 2007.

REFERENCES

1. Abarquez I. & Murshed Z. *Community Based Disaster Risk Management: Field Practitioner's Handbook,* ADPC, Bangkok, 2004.
2. Goudie, A. *Geomorphological Techniques,* Unwin Hyman, London 1990.
3. Goswami, S. C. *Remote Sensing Application in North East India,* Purbanchal Prakesh, Guwahati, 1997.
4. *Manual on Natural Disaster Management in India*, NCDM, New Delhi, 2001.
5. *Disaster Management in India,* Ministry of Home Affairs, Government of India, New Delhi, 2011.
6. *National Policy on Disaster Management,* NDMA, New Delhi, 2009.
7. *Disaster Management Act. (2005),* Ministry of Home Affairs, Government of India, New Delhi, 2005.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VI		FOUNDATION ENGINEERING	3	1	0	4

AIM

To develop an understanding of the behavior of foundations for engineering structures and to gain knowledge of the design methods that can be applied to practical problems.

OBJECTIVE

At the end of this course student acquires

- The capacity to investigate the soil condition
- To design suitable foundation.
- The methods of minimizing settlement
- Design aspects of combined and mat foundation
- The knowledge about pressure distribution on retaining walls

UNIT -1 SITE INVESTIGATION AND SELECTION OF FOUNDATION 9

Introduction – Scope and objectives – Method of exploration boring – Sampling – disturbed and undisturbed sampling – sampling techniques – Bore log and report – Penetration tests (SPT and SCPT) – Data interpretation – Selection of foundation based on soil condition.

UNIT -2 SHALLOW FOUNDATION 9

Introduction – Location and depth of foundation – codal provisions – bearing capacity of shallow foundation on homogeneous deposits – bearing capacity from insitu tests – Factors influencing bearing capacity – codal provisions – Settlement – Components of settlement – Settlement of foundations on granular and clay deposits – Allowable and maximum differential settlements of buildings – Codal provision – Methods of minimizing settlement.

UNIT -3 FOOTINGS AND RAFTS 9

Types of foundation – structural design of spread footing – Design aspects of combined and mat foundation – Codal provisions.

UNIT -4 PILES 9

Types of piles – Factors influencing the selection of pile – Carrying capacity in granular and cohesive soils – Static and dynamic formulae – Capacity from insitu tests (SPT and SCPT) – Piles subjected to uplift – Negative skin friction – Group capacity – Settlement of pile groups – Interpretation of pile load test – Pile caps – Codal provisions.

UNIT -5 RETAINING WALLS 9

Earth pressure theory – Plastic equilibrium in soils – active and passive states – Rankine's theory – Coloumb's wedge theory – Classical and limit equilibrium solution – Earth pressure on retaining walls of simple configurations – pressure on the wall due to single line load alone – Graphical method (Culmann's method alone) – Stability of retaining wall.

Tutorial : 15 hours

Total Hours: 60 hours

OUTCOME:

- Students will have the ability to select type of foundation required for the soil at a place and able to design shallow, foundation, deep foundation and retaining structures.

TEXT BOOKS:

1. Punmia, B.C., Soil mechanics and foundations, Laxmi publications pvt. Ltd., New Delhi, 2005
2. Arora, K.R. Soil mechanics and foundation engineering, standard publishers and distributors, New Delhi, 1997.

REFERENCES:

1. Khan, I.H., A text book of Geotechnical Engineering, Prentice Hall of India, New Delhi,1999.
2. Gopal Ranjan and Rao, A.S.R. Basic and applied soil mechanics, Wiley Eastern Ltd., New Delhi (India), 1997.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VI		ELECTIVE II	3	0	0	3

The Elective Subject Can be Selected from Elective List

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VI		COMPUTER AIDED DESIGN AND DRAWING LAB	0	0	4	2

AIM

This course helps to know the design of R.C.C cantilever and counterfort retaining walls, Design of solid slab, Design of various types of steel structures

OBJECTIVE

At the end of the course the student acquires hands on experience in design and preparation of structural drawings for concrete / steel structures normally encountered in Civil Engineering practice.

LIST OF EXPERIMENTS

1. Design and drawing of R.C.C. cantilever and counter fort type retaining walls with reinforcement details.
2. Design of solid slab and R.C. Tee beam bridges for IRC loading and reinforcement detail
3. Design of rectangular, pressed and hemispherical bottomed steel tank –staging – rivetedjoints detailed drawing
4. Design of circular, rectangular and intze type water tank reinforcement details
5. Design of plate girder – twin girder deck type railway bridge – through type and deck type highway bridges – Truss girder bridges – detailed drawing – riveted connection

Total Hours = 45

OUT COMES:

- At the end of the course the student acquires hands on experience in design and preparation of structural drawings for concrete / steel structures normally encountered in Civil Engineering practice.

TEXT BOOKS:

1. Structural design & drawing (concrete & steel) – Krishnaraju, CBS Publishers.2005

2. Krishnaraju,N. “Structural Design & Drawing, Universities Press, 2009.

REFERENCES:

1. Krishnamurthy, D., “Structural Design & Drawing – Vol. II and III, CBS Publishers, 2010.
2. Shah V L and Veena Gore, “Limit State Design of Steel Structures” IS800-2007, Structures Publications, 2009.
3. Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, “Comprehensive Design of Steel Structures, Laxmi Publications Pvt. Ltd., 2003.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VI		CONCRETE AND CONSTRUCTION TECHNOLOGY LAB	0	0	4	2

AIM

To understand and perform various tests on cement, aggregates and concrete.

OBJECTIVE

The Experimental work involved in this laboratory should make the student the properties and strength of the construction material

LIST OF EXPERIMENTS

Cycle -I

1. Compressive Strength Test on Bricks
2. Water Absorption Test on Bricks
3. Specific gravity Test on Cement
4. Soundness Test on Cement
5. Consistency and Setting Time Test on Cement

Cycle -II

6. Compaction Factor test on Concrete
7. Crushing Strength Test on Aggregates
8. Impact Resistance Test on Aggregates
9. Slump cone on concrete
10. Cube and Cylinder strength on concrete

The student will have to trainrural people to check the quality of building materials in the lab by the students through the knowledge acquired in this lab

Total Hours: 45

OUTCOME:

- Student knows the techniques to characterize various pavement materials through relevant tests.

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	Universal Testing Machine	1
2.	Slump cone	1
3.	Flow table	1
4.	Crushing test Apparatus	1
5.	Specific gravity Bottle	2
6.	Vicats Apparatus	2
7.	Le Chateliars Apparatus	1
8.	Compaction Factor Apparatus	1

TEXT BOOKS:

1. M.S. Shetty, Concrete Technology (Theory and Practice), S. Chand & Company Ltd., 2003

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VI		SURVEY CAMP	-	-	-	2

Ten days survey camp using Theodolite, cross staff, levelling staff, tapes, plane .The camp must involve work on a large area of not less than 400 hectares. at the end of the camp, each student shall have mapped and contoured the area. the camp record shall include all original field observations, calculations and plots.

i Triangulation

ii Trilateration

iii Road Profile leveling

iv Calculation of area using Offset Method

v Height of a building

Total Hours: 45

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	Chain	6
2.	Ranging Rod	12
3.	Arrow	30
4.	Tape	6
5.	Cross staff	6
6.	Peg	30
7.	Theodolite	6
8.	Tripod stand	6
9.	Levelling Staff	6
10.	Dumpy Level	6

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VII		ESTIMATION AND QUANTITY SURVEYING	3	1	0	4

AIM

This course helps to understandestimating of quantities of items of works involved in buildings, water supply and sanitary works, road works and irrigation works

OBJECTIVE

- This covers the rate analysis, valuation of properties and preparation of reports for estimation of various items.
- At the end of this course the student shall be able to estimate the material quantities, prepare a bill of quantities, make specifications and prepare tender documents.
- Student should also be able to prepare value estimates.
- Student will also be able to Exercise on cash flow in Civil engineering projects

UNIT -1 ESTIMATION 9

Philosophy – purpose - Methods of estimation – advantages – types of estimates – approximate estimates – definite estimate – estimation of quantities for buildings, roads, canals and hydraulic structures – Sluices – Head and wing wall type

UNIT -2 SPECIFICATIONS AND TENDERS 9

Specifications-Detailed and general specifications-construction specifications – sources – types of specifications – Tender notices – types – corrigendum notice – tender procedures – Drafting model tenders

UNIT -3 CONTRACTS 9

Contract – types of contracts – formation of contract - contract conditions - contract problems-contract for labour, material, design and construction – drafting of contract documents – construction contracts – arbitration and legal requirements.

UNIT -4 VALUE ENGINEERING **9**

Basics - principles of valuation – Value and cost –value engineering – value analysis – phases in value engineering – information – function – Escalation – evaluation - recommendation implementation – Audit-Depreciation-rent fixation.

UNIT 5 REPORT PREPARATION **9**

Principles for report preparation – report on estimate of residential building – Culvert – Roads – Water supply and sanitary installations – cost control in construction projects – Exercise on cash flow in Civil Engineering projects

Tutorial: 15

Total Hours: 60

OUTCOME:

- The student shall be able to estimate the material quantities, prepare a bill of quantities, make specifications and prepare tender documents. Student shall be able to prepare value estimates.

TEXT BOOKS:

1. Estimating and costing in civil Engineering – B.N.Dutta, S.Dutta & Company, Lucknow,2005
2. Rangwala,"Estimating Costing and Valuation," - Charotar Publishing House ,2011

REFERENCES:

1. A text book on Estimating and costing – G.S.Birdie – Dhanpat Rai and Sons, New Delhi.1982
2. Kohli, D.D and Kohli, R.C., "A Text Book of Estimating and Costing (Civil)", S. Chand & Company Ltd., 2004

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VII		IRRIGATION ENGINEERING	3	0	0	3

AIM

The purpose of this course is to learn about the irrigation engineering aspects and to obtain knowledge about operation and management of irrigation water

OBJECTIVE

- At the end of the semester, the student shall understand the need and mode of irrigation.
- The student also shall know the irrigation management practices of the past, present and future.
- The structures involved the elementary hydraulic design of different structures and the concepts of maintenance shall also form part.
- Water distribution efficiency and optimization techniques will be explained
- Finally, the student shall be in a position to conceive and plan any type of irrigation project.

UNIT -1 SOIL – PLANT WATER RELATIONSHIP 9

Definition – Need – Benefits- developments – Historical - Scope in the country and state. Soil – Water relationship - Wilting point – Soil fertility- Principal crops – Crop rotation – Crops and cropping season.

UNIT -2 CROP WATER REQUIREMENTS 9

Duty and Delta – Definitions – Factors affecting Duty – Methods of Improving Duty, Consumptive use of water (Evapo – Transpiration) – Estimation of Evapo – Transpiration – Blaney and Criddle Method – Penman Methods – Lysimeter.

UNIT -3 SOURCES, CONVEYANCE AND DISTRIBUTION OF WATER 9

Sources of Water – Rivers – Streams – Reservoirs and Tanks. Lift irrigation – Devices and equipment for Lift irrigation. Components of irrigation networks – Main and Branch canal – Distributors – Minors – Water courses and field chak. Water application methods – Surface irrigation – Border – Check and Furrow – Subsurface irrigation – Sprinkler and Drip irrigation.

UNIT -4 CONTROL AND REGULAR WORKS 9

Canal regulation works – Necessity and location of falls – Head and cross regulator – Canal escapes. Cross drainage works – Types of cross drainage work. River training works – Classification of River training works – Groynes or Spurs – Bank protection.

UNIT -5 IRRIGATION WATER MANAGEMENT 9

Irrigation Efficiencies – Water conveyance efficiency – Water application efficiency – Water storage efficiency – Water distribution efficiency. Need for optimization – Need for interdisciplinary and participation approach. Roles and responsibilities of farmer's and government agencies in Turn Over.

Total Hours = 45

OUT COMES:

- The students will have knowledge and skills on Planning, design, operation andmanagement of reservoir system.
- The student will gain knowledge on different methods of irrigation including canal irrigation.

TEXT BOOKS

1 Garg, S.K., "Irrigation Engineering and Hydraulic Structures",Khanna Publishers,2009.

2. Sharma R.K., Irrigation Engineering and Hydraulic Structures, Oxford and IBH Publishing Company, New Delhi, 1994.

REFERENCES :

1. Dilip Kumar Majumdar, "Irrigation Water Management (Principles & Practices)", Prentice Hall of India (P), Ltd.

2. Sathyanarayana Murthy, Irrigation Design and Drawing, Published by Mrs.L.Banumathi, Tuni,East Godavari District, A.P. 1998.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VII		CONSTRUCTION PLANNING AND SCHEDULING	3	0	0	3

OBJECTIVE

At the end of this course the student is expected to have learnt how to

- Plan construction projects
- Schedule the activities using network diagrams
- Determine the cost of the project,
- Control the cost of the project by creating cash flows
- Budgeting and how to use the project information as an information and decision making tool.

UNIT I - CONSTRUCTION PLANNING 9

Basic concepts in the development of construction plans-choice of Technology and Construction method-Defining Work Tasks- Definition- Precedence relationships among activities-Estimating Activity Durations-Estimating Resource Requirements for work activities-coding systems.

UNIT II - SCHEDULING PROCEDURES AND TECHNIQUES 9

Relevance of construction schedules-Bar charts - The critical path method-Calculations for critical path scheduling-Activity float and schedules-Presenting project schedules-Critical path scheduling for Activity-on-node and with leads, Lags and Windows-Calculations for scheduling with leads, lags and windows-Resource oriented scheduling-Scheduling with resource constraints and precedences -Use of Advanced Scheduling Techniques-Scheduling with uncertain durations-Crashing and time/cost trade offs -Improving the Scheduling process –Introduction to application software.

UNIT III - COST CONTROL MONITORING AND ACCOUNTING

The cost control problem-The project Budget-Forecasting for Activity cost control - financial accounting systems and cost accounts-Control of project cash flows-Schedule control-Schedule and Budget updates-Relating cost and schedule information.

UNIT IV- QUALITY CONTROL AND SAFETY DURING CONSTRUCTION

Quality and safety Concerns in Construction-Organizing for Quality and Safety-Work and Material Specifications-Total Quality control-Quality control by statistical methods -

Statistical Quality control with Sampling by Attributes-Statistical Quality control by Sampling and Variables-Safety.

UNIT V - ORGANIZATION AND USE OF PROJECT INFORMATION

Types of project information-Accuracy and Use of Information-Computerized organization and use of Information -Organizing information in databases-relational model of Data bases-Other conceptual Models of Databases-Centralized database Management systems-Databases and application programs-Information transfer and Flow

Tutorial = 15

Total Hours = 60

OUTCOME:

The student should be able to plan construction projects, schedule the activities using network diagrams, determine the cost of the project, control the cost of the project by creating cash flows and budgeting and to use the project information as decision making tool

TEXT BOOKS

1. Chitkara, K.K. "Construction Project Management Planning", Scheduling and Control, Tata McGraw-Hill Publishing Co., New Delhi, 1998.

2. Srinath,L.S., "Pert and CPM Priniples and Applications ", Affiliated East West Press, 2001

REFERENCES

1. Chris Hendrickson and Tung Au, "Project Management for Construction – Fundamentals Concepts for Owners", Engineers, Architects and Builders, Prentice Hall, Pitsburgh, 2000.

2. Moder.J., C.Phillips and Davis, "Project Management with CPM", PERT and Precedence Diagramming, Van Nostrand Reinhold Co., Third Edition, 1983.

3. Willis., E.M., "Scheduling Construction projects", John Wiley and Sons 1986.

4. Halpin,D.W., "Financial and cost concepts for construction Management", John Wiley and Sons, New York, 1985

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VII		REPAIRAND REHABILITATION OF STRUCTURES	3	0	0	3

AIM

The aim of the course is to understandthe assessment procedure for evaluating damaged structure and also the testing techniques.

OBJECTIVE

- At the end of the semester, the student shall understand quality of concrete,
- The students also acquire knowledge on the factors that affects the durability and other characters of the concrete.
- They will come to know the assessment procedure for evaluating damaged structure and also the testing techniques
- Materials used for repairing the damaged structures and also the repair techniques
- Finally, the student shall be in a position to repair and rehabilitate any type of structures.

UNIT -1 GENERAL 9

Quality assurance for concrete construction as built concrete properties, strength, permeability, thermal properties and cracking

UNIT -2 INFLUENCE ON SERVICEABILITY AND DURABILITY 9

Effects due to climate, temperature, chemicals, wear and erosion, design and construction errors , corrosion mechanism, Effects of cover thickness and cracking, Method of corrosion production, corrosion inhibitors, corrosion resistant steels, coatings, cathodic production

UNIT -3 MAINTENANCE AND REPAIR STRATEGIES 9

Definitions: Maintenance, Repair, Rehabilitation, Facets of maintenance, Importance of maintenance, preventive measures on various aspects, assessment procedure for evaluating damaged structure, causes of deterioration – Testing techniques

UNIT -4 MATERIALS FOR REPAIR **9**

Special concrete and mortar, Concrete chemicals, special elements for accelerator, strength gain, expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, fibre reinforced concrete.

UNIT -5 TECHNIQUES FOR REPAIR **9**

Rust Eliminators and Polymers coatings for rebars during repair foamed concrete, mortar and dry pack, vacuum concrete, Guniting, shotcrete epoxy injection, mortar repair for cracks, shoring and under pining. Examples of repairs to structures Repairs to overcome low member strength, deflection, cracking, chemical disruption, weathering wear, fire, leakage, marine exposure

Total Hours: 45

OUTCOMES:

- Students must gained knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition.

procedures.TEXT BOOKS:

1. M.S. Shetty , Concrete Technology – Theory and Practice S.Chand and Company , New Delhi 2008

2. Dr. B. Vidivelli , Rehabilitation of Concrete Structures , Standard Publishers Distributors , 2007

REFERENCES:

1. Denison Campbell, Allen and Harold Roper , Concrete Structures, materials, maintenance and repair , Long man, Scientific and Technical UK 1991

2. Santha kumar A.R. Training Course Notes on Damage Assessment and Repair in Low Cost Housing , “ RHDC – NBO “ , Anna Univ July 91.

terjee B. K., Theory and Design of Concrete Shells, Oxford & IBH, New Delhi, 1998

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VII		RAILWAY , AIRPORT AND HARBOUR ENGINEERING	3	0	0	3

OBJECTIVE

- This course imparts to the students knowledge of planning, design, construction and maintenance of railway tracks.
- The students acquire proficiency in the application of modern techniques such as GIS, GPS and remote sensing in Railway Engineering.
- The student develops skills on airport planning and design with the prime focus on runway and taxiway geometrics.
- Students become conversant with the definition, purpose, location and materials of coastal structures such as piers, breakwaters, wharves, jetties, quays and spring fenders.
- The students acquire knowledge on site investigation for location and planning of harbours.

UNIT -1 RAILWAY PLANNING AND DESIGN 9

Role of Indian Railways in National Development. Engineering Survey for Track Alignment. Permanent Way, its Components and Functions of Each Component, Gauges in Railway Tracks. Coning of Wheels. Geometric Design of Railway Tracks – Gradient, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Vertical Curves and Grade Compensation (Derivations of formulae and Problems)

UNIT -2 RAILWAY TRACK CONSTRUCTION, MAINTENANCE AND OPERATION 9

Points and Crossings, Signaling, Interlocking and Track Circuiting, Construction and Maintenance – Conventional and Modern methods (Remote Sensing, GIS & GPS) for Railway Alignment, Track Construction, Maintenance and Materials - Track Drainage. Lay outs of Railway Stations and Yards

UNIT -3 AIRPORT PLANNING AND DESIGN 9

Airport Planning, Components of Airports, Airport Site Selection Runway Design-Orientation, Geometric Design and Correction for Gradients Terminal area, Airport Layout, Airport Buildings, Passenger Facilities, Parking Area and Airport Zoning

UNIT -4 HARBOUR ENGINEERING & OTHER MODES OF TRANSPORT 9

Definition of Terms - Harbours, Ports, Docks, Tides and Waves. Harbours – Requirements, Classification – Site Investigation for Locations, Planning and Layouts Concept of Satellite Ports. Terminal Facilities – Port Buildings, Warehouse, Transit Sheds, Inter-modal Transfer Facilities, Mooring Accessories, Navigational Aids Coastal Structures- Piers, Breakwaters, Wharves, Jetties, Quays, Spring Fenders Coastal Shipping, Inland Water Transport and Container Transportation. Pipe Ways, Rope Ways

UNIT -5 ECONOMIC EVALUATION OF TRANSPORT PROJECTS 9

Evaluation of Highway and Railway Projects- Cost Benefit Analysis (Benefit Cost Ratio, Net Present Value, International Rate of Returns (Problems) Environmental Impact Assessment, Financial Appraisal Build, Operate and Transfer for Highway and Railway Projects (Basic Concepts only)

Total Hours = 45

OUTCOME:

- The students completing this course would have acquired knowledge on planning, design,construction and maintenance of highways as per IRC standards and other methods.

TEXT BOOKS:

1. S. P. Bindra,"A Course in Docks and Harbour Engineering",Dhanput Rai, 1992
2. Khanna S K, Arora M G and Jain S S, Airport Planning and Design, Nemchand and Brothers,Roorkee, 1994.
3. S.P. Arora, S.C. Saxena,"A Textbook of Railway Engineering"Dhanpat Rai Publications, 2001

REFERENCES:

1. Rangwala, Railway Engineering, Charotar Publishing House, 1995.
2. Rangwala, Airport Engineering, Charotar Publishing House, 1996.
3. Kadiyali L R, Principles and Practice of Highway Engineering, Khanna Technical Publication, Delhi, 1992

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VII		ELECTIVE III	3	0	0	3

The Elective Subject Can be Selected from Elective List

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VII		COMPREHENSION LAB	0	0	4	2

The objective of "Comprehension" is to provide opportunity for the student to apply the knowledge acquired during the earlier semesters to real-life problems which he/she may have to face in future as an engineer. While learning as to how to solve real life problems, the student will receive guidance from teachers and also review various courses (subjects) learnt earlier.

The comprehension assessment will consist of 3 tests covering all the subject of study in Civil Engineering Course.

Total Hours: 45

OUTCOME:

At the end of the course the students able to attend interviews and competitive exams

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VII		DESIGN PROJECT	0	0	4	2

OBJECTIVES:

The objective of this course is to impart and improve the design capability of the student. This course conceives purely a design problem in any one of the disciplines of Civil Engineering; e.g., Design of an RC structure, Design of a waste water treatment plant, Design of a foundation system, Design of traffic intersection etc. The design problem can be allotted to either an individual student or a group of students comprising of not more than three. At the end of the course the group should submit a complete report on the design problem consisting of the data given, the design calculations, specifications if any and complete set of drawings which follow the design.

OUTCOME:

- On completion of the design project students will have a better experience in designing various design problems related to Civil Engineering.

TOTAL: 60 PERIODS

EVALUATION PROCEDURE

The method of evaluation will be as follows:

1. Internal Marks : 50 marks (Decided by conducting 3 reviews by the guide appointed by the Institution)

2. Viva voce examination : 50 marks (Evaluated by the internal examiner appointed by the HOD with the approval of HOI, external examiner appointed by the University and Guide of the course – with equal Weightage)

Total: 100 marks

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VII		ENVIRONMENTAL ENGINEERING LAB	0	0	4	2

OBJECTIVE

This subject includes the list of experiments to be conducted for characterization of water and municipal sewage. At the end of the course, the student is expected to be aware of the procedure for quantifying quality parameters for water and sewage.

LIST OF EXPERIMENTS

CYCLE -I

1. Sampling and preservation methods and significance of characterization of water and Wastewater.
2. Determination of P^H and turbidity Hardness
3. Determination of iron & fluoride
4. Determination of residual chlorine
5. Determination of Chlorides
6. Determination of Ammonia Nitrogen
7. Determination of Sulphate

CYCLE -II

8. Determination of Optimum Coagulant Dosage
9. Determination of available Chlorine in Bleaching powder
10. Determination of dissolved oxygen
11. Determination of suspended, volatile and fixed solids
12. B.O.D. test
13. C.O.D. test
14. Introduction to Bacteriological Analysis (Demonstration only)

To provide adequate knowledge and to assess the quality of water like hardness,pH,etc., for rural people

Total hours: 45

OUTCOME:

- The students completing the course will be able to characterize wastewater and conduct treatability studies.

REFERENCES

1. Standard methods for the examination of water and wastewater, APHA, 20th Edition, Washington, 1998

2. Garg, S.K., "Environmental Engineering Vol. I & II", Khanna Publishers, New Delhi, 1992

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VIII		ELECTIVE IV	3	0	0	3

The Elective Subject Can be Selected from Elective List

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VIII		ELECTIVE V	3	0	0	3

The Elective Subject Can be Selected from Elective List

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VIII		ELECTIVE VI	3	0	0	3

The Elective Subject Can be Selected from Elective List

YEAR	IV	PROJECT WORK AND VIVA VOCE	L	T	P	C
SEMESTER	VIII		0	0	12	6

OBJECTIVE

- The objective of the project work is to enable the students to form the groups of not more than 3 members on a project involving theoretical and experimental studies related to the branch of study.

- Every project work shall have a guide who is the member of the faculty of the institution. Six periods per week shall be allotted in the time table and this time shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars on the progress made in the project.

- The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design and manufacture of a device, a research investigation, a computer or management project or a design problem.

- The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department.

- Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusion.

- This final report shall be typewritten form as specified in the guidelines.

- The continuous assessment shall be made as prescribed in the regulations

OUTCOME:

- On Completion of the project work students will be in a position to take up any challengingpractical problems and find solution by formulating proper methodology.

ELECTIVES

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE-HYDROLOGY	**3**	**0**	**0**	**3**

AIM

The aim of the course is to understand of all the components of the hydrological cycle.

OBJECTIVE

- The mechanics of rainfall, its spatial and temporal measurement and their applications will be understood.
- The mechanics of rainfall, its distribution and measurement of rainfall using Hydrograph.
- Simple statistical analysis and application of probability distribution of rainfall and run off shall also be understood.
- Student will also learn simple methods of flood routing and ground water hydrology.

UNIT -1 PRECIPITATION 9

Hydrologic cycle – Types of precipitation – Forms of precipitation – Measurement of Rainfall – Spatial measurement methods – Temporal measurement methods – Frequency analysis of point rainfall – Intensity, duration, frequency relationship – Probable maximum precipitation.

UNIT -II ABSTRACTION FROM PRECIPITATION 9

Losses from precipitation – Evaporation process – Reservoir evaporation – Infiltration process – Infiltration capacity – Measurement of infiltration – Infiltration indices – Effective rainfall.

UNIT -III HYDROGRAPHS 9

Factors affecting Hydrograph – Baseflow separation – Unit hydrograph – Derivation of unit hydrograph – S curve hydrograph – Unit hydrograph of different deviations - Synthetic Unit Hydrograph

UNIT –IV FLOODS AND FLOOD ROUTING 9

Flood frequency studies – Recurrence interval – Gumbel's method – Flood routing – Reservoir flood routing – Muskingum's Channel Routing – Flood control

UNIT -V GROUND WATER HYDROLOGY **9**

Types of aquifers – Darcy's law – Dupuit's assumptions – Confined Aquifer – Unconfined Aquifer – Recuperation test – Transmissibility – Specific capacity – Pumping test – Steady flow analysis only.

Total Hours : 45

OUTCOMES:

- The students gain the knowledge needed on hydrologic cycle, hydrometeorology and formation of precipitation.
- The students are able to apply the various methods of field measurements and empirical formulae for estimating the various losses of precipitation, stream flow, flood and flood routing.
- The students will know the basics of groundwater and hydraulics of subsurface flows.

TEXT BOOKS

1. Subramanya, K., "Engineering Hydrology", Tata McGraw-Hill Publishing Co., Ltd., 2006

2. Raghunath, H.M., "Hydrology", Wiley Eastern Ltd., 2000

REFERENCES

1. Chow, V.T. and Maidment, "Hydrology for Engineers", McGraw-Hill Inc., Ltd., 2000

2. Singh, V.P., "Hydrology", McGraw-Hill Inc., Ltd.,

3. Raghunath,H.M,Ground Water,New Age International(P) Limited,Publishers.

4**.** Raghunath,H.M, Hydrology:Principles,Analysis & Design, New Age International(P) Limited,Publishers.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE-REMOTE SENSING TECHNIQUES AND APPLICATIONS	**3**	**0**	**0**	**3**

AIM

The aim of the course is to process knowledge of Remote Sensing Techniques and its application in natural resource management.

OBJECTIVE

- Students will learn about the land use mapping techniques,site suitability techniques
- Students will learn about the use of zone mapping for water bodies
- Students will learn about the use of mapping techniques for Agriculture and Earth sciences
- Students will also learn about the recent techniques used for GPS system

UNIT -1 INTRODUCTION **9**

Definition – Physics of remote sensing – electromagnetic radiation (EMR) – remote sensing windows – interaction of EMR with atmosphere, earth surface, soils, water and vegetation – platform and sensors – image interpretations.

UNIT -2 LAND USE STUDIES **9**

Definition of land use – land use / land cover classification – schemes and levels of classification systems with RS data – land use mapping – change detection – urban land use planning, site suitability analysis, transportation planning.

UNIT -3 WATER RESOURCES **9**

Areal assessment of surface water bodies – Capacity survey of water bodies – mapping of snow-covered areas – flood risk zone mapping – identification of groundwater potential zones, recharge areas – droughts, definition, drought assessment and management.

UNIT -4 AGRICULTURE, SOIL AND FORESTRY **9**

Crop inventory mapping – production estimation – command area monitoring – soil mapping – crop stress detection - estimation of soil erosion – forest types and density mapping – forest fire risk zone mapping.

UNIT -5 EARTH SCIENCE **9**

Lithology – lithological mapping – structural mapping – Geomorphology – nature and type of landforms – identification – use of remote sensing data for landslides – targeting mineral resources – Engineering geology and Environmental geology.

Total Hours : 45

Total Hours : 45

OUTCOMES:

On completion of the course the students will have knowledge on

- Principles of Remote Sensing and GIS
- Analysis of RS and GIS data and interpreting the data for modeling applications

TEXT BOOKS

1. Lillesand, T.M., Kiefer, R.W. and J.W.Chipman., Remote Sensing and Image Interpretation. V Edn. John Willey and Sons (Asia) Pvt. Ltd., New Delhi, 2004
2. Lo. C.P.and A.K.W.Yeung, Concepts and Techniques of Geographic Information Systems. Prentice-Hall of India Pvt. Ltd., New Delhi, 2002

REFERENCES

1 .Chandra,A.M,Geo Informatics,New Age International(P) Limited,Publishers.
2. Fazal,Shahab,GIS Basics,New Age International(P) Limited,Publishers.
3. Space Applications Centre. Manual for Forest mapping and Damage detection using satellite data, Report No.IRS-UP/SAC/FMDD/TN/16/90,1990, pp-253.
4. Sabins, F.F.Jr. Remote sensing principles and interpretation, W.H.Freeman & Co., 1978.
5. Manual of Remote Sensing Vol. II. American Society of Photogrammetry

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- HOUSING PLANNING AND MANAGEMENT	**3**	**0**	**0**	**3**

AIM

- The aim of the course is to train the students to have a comprehensive knowledge of planning, design, evaluation.

OBJECTIVE

- An introduction to housing planning
- Construction and financing of housing projects.
- The course focuses on cost effective construction materials and methods.
- Emphasis has also been given on the principles of sustainable housing policies and programmes.

UNIT -1 INTRODUCTION TO HOUSING 9

Definition of Basic Terms – House, Home, Household, Apartments, Multi storeyed Buildings, Special Buildings, Objectives and Strategies of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Bye-laws at Urban and Rural Local Bodies – levels - Development Control Regulations, Institutions for Housing at National, State and Local levels

UNIT -2 HOUSING PROGRAMMES 9

Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighbourhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organisations.

UNIT -3 PLANNING AND DESIGN OF HOUSING PROJECTS 9

Formulation of Housing Projects – Site Analysis, Layout Design, Design of Housing Units (Design Problems)

UNIT -4 CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS 9

New Constructions Techniques – Cost Effective Modern Construction Materials, Building Centers – Concept, Functions and Performance Evaluation

UNIT -5 HOUSING FINANCE AND PROJECT APPRAISAL 9

Appraisal of Housing Projects – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing o f Housing Units, Rents, Recovery Pattern (Problems)

Total Hours : 45

OUTCOME:

- The students should have a comprehensive knowledge of planning, design, evaluation, construction and financing of housing projects.

TEXT BOOKS

1. Meera Mehta and Dinesh Mehta, Metropolitan Housing Markets, Sage Publications Pvt. Ltd., New Delhi, 1999.
2. Francis Cherunilam and Odeyar D Heggade, Housing in India, Himalaya Publishing House,Bombay, 1997.

REFERENCES

1. Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2002.

2.Dhir,B.M,Construction Planning And Management , New Age International(P)Limited,Publishers.

3. Lal,A.K,Hand Book Of Low Cost Housing, New Age International(P)Limited,Publishers.

4.Panchdhari,A.C,Water Supply & Sanitary Installations,New Age International(P)Limited,Publishers.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- TRAFFIC ENGINEERING AND MANAGEMENT	**3**	**0**	**0**	**3**

AIM

The aim of the course is to posses knowledge of traffic surveys and studies such as 'Volume Count', 'Speed and delay', 'Origin and destination', 'Parking', 'Pedestrian' and 'Accident surveys'.

OBJECTIVE

- They achieve knowledge on design of 'at grade' and 'grade separated' intersections.
- They also become familiar with various traffic control and traffic management measures
- To give an overview of Traffic engineering - Various surveys to be conducted, traffic regulation, management and traffic safety

UNIT -1 INTRODUCTION **9**

Significance and scope, Characteristics of Vehicles and Road Users, Skid Resistance and Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics

UNIT -2 TRAFFIC SURVEYS AND ANALYSIS **9**

Surveys and Analysis - Volume, Capacity, Speed and Delays, Origin and Destination, Parking, Pedestrian Studies, Accident Studies and Safety Level of Services- Problems

UNIT -3 TRAFFIC CONTROL **9**

Traffic signs, Road markings, Design of Traffic signals and Signal co-ordination (Problems), Traffic control aids and Street furniture, Street Lighting, Computer applications in Signal design

UNIT -4 GEOMETRIC DESIGN OF INTERSECTIONS **9**

Conflicts at Intersections, Classification of Intersections at Grade, - Chanallised and Unchanallised Intersection - Grade Separators (Concepts only), Principles of Intersection Design, Elements of Intersection Design, Chanallisation and Rotary design (Problems), Grade Separators

UNIT -5 TRAFFIC MANAGEMENT **9**

Traffic Management- Traffic System Management (TSM) and Travel Demand Management (TDM), Traffic Forecasting techniques, Restrictions on turning movements, One-way Streets, Traffic Segregation, Traffic Calming, Tidal flow operations, Exclusive Bus Lanes - Introduction to Intelligence Transport System (ITS)

Total Hours : 45

OUTCOMES:

On completing this course, the Students will be able to

- Analyse traffic problems and plan for traffic systems various uses
- Design Channels, Intersections, signals and parking arrangements
- Develop Traffic management Systems

TEXT BOOKS

1. Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2001.
2. Kadiyali L R, Traffic Engineering and Transport Planning, Khanna Technical Publications, Delhi, 2000.

REFERENCES

1.Indian Roads Congress (IRC) specifications: Guidelines and special publications on Traffic Planning and Management

2.Guidelines of Ministry of Road Transport and Highways, Government of India.

3.Dukkipatti,Rao.V.,Road Vehicle Accident Reconstruction,New Age International(P)Limited,Publishers.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- MANAGEMENT OF IRRIGATION SYSTEMS	**3**	**0**	**0**	**3**

AIM

The aim of the course is to have a clear concept of irrigation water management practices of the past, present and future.

OBJECTIVE

- He/she shall also be able to appreciate the importance due and duly given to stake holders.
- The structural and non structural activities for the management of water resources
- The management plans involved in scheduling
- Case studies on use of ground water will be taught

UNIT -1 IRRIGATION SYSTEM REQUIREMENTS 9

Irrigation systems – Supply and demand of water – Cropping pattern – Crop rotation – Crop diversification – Estimation of total and peak crop water requirements – Effective and dependable rainfall – Irrigation efficiencies.

UNIT -2 IRRIGATION SCHEDULING 9

Time of irrigation – Critical stages of water need of crops – Criteria for scheduling irrigation – Frequency and interval of irrigation

UNIT -3 MANAGEMENT 9

Structural and non-structural strategies in water use and management – Conjunctive use of surface and ground waters – Quality of irrigation water.

UNIT -4 OPERATION 9

Operational plans – Main canals, laterals and field channels – Water control and regulating structures – Performance indicators – Case study

UNIT -5 INVOLVEMENT OF STAKE HOLDERS 9

Farmer's participation in System operation – Water user's associations – Farmer councils – Changing paradigms on irrigation management – Participatory irrigation management

Total Hours : 45

OUTCOME:

At the end of the course the students will do

- The structural and non structural activities for the management of water resources
- The management plans involved in scheduling

TEXT BOOKS

1. Dilip Kumar Majumdar, "Irrigation Water Management – Principles and Practice", Prentice Hall of India Pvt. Ltd., New Delhi, 2000
2. Hand book on Irrigation Water Requirement, R.T. Gandhi, et. al., Water Management Division, Department of Agriculture, Ministry of Agriculture, New Delhi

REFERENCES

1. Hand Book on Irrigation System Operation Practices, Water Resources Management and Training Project, Technical report No. 33, CWC, New Delhi, 1990
2. Maloney, C. and Raju, K.V., "Managing Irrigation Together", Practice and Policy in India, Stage Publication, New Delhi, India, 1994

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- PREFABRICATED STRUCTURES	**3**	**0**	**0**	**3**

AIM

The aim of the course is tolearn the design prefabricated structures

OBJECTIVE

- At the end of this course the student shall be able to appreciate modular construction, industrialized construction
- They shall be able to design some of the prefabricated elements and also have the knowledge of the construction methods using these elements.
- They shall be able to design the joints in prefabricated elements
- They shall also be able to design the loadings in prefabricated elements

UNIT –1 INTRODUCTION **9**

Need for prefabrication – Principles – Materials – Modular coordination – Standarization – Systems – Production – Transportation – Erection.

UNIT –2 PREFABRICATED COMPONENTS **9**

Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs – Wall panels – Columns – Shear walls

UNIT –3 DESIGN PRINCIPLES **9**

Disuniting of structures- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation.

UNIT –4 JOINT IN STRUCTURAL MEMBERS **9**

Joints for different structural connections – Dimensions and detailing – Design of expansion joints

UNIT –5 DESIGN FOR ABNORMAL LOADS **9**

Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse.

Total Hours: 45

OUTCOME:

- The student shall be able to design some of the prefabricated elements and also have the knowledge of the construction methods in using these elements.

TEXT BOOKS

1. CBRI, Building materials and components, India, 1990
2. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., 1994

REFERENCES

1. Koncz T., Manual of precast concrete construction, Vols. I, II and III, Bauverlag, GMBH, 1971.
2. Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 1978.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- GROUND IMPROVEMENT TECHNIQUES	**3**	**0**	**0**	**3**

AIM

The aim of the course is to identify basic deficiencies of various soil deposits

OBJECTIVE

- Further he/she is in a position to decide various ways and means of improving the soil and implementing techniques of improvement.
- About the drainage and dewatering techniques available
- About the various treatments available for soil
- About the reinforcement and grout techniques

UNIT -1 INTRODUCTION 9

Role of ground improvement in foundation engineering - methods of ground improvement – Geotechnical problems in alluvial, laterite and black cotton soils -Selection of suitable ground improvement techniques based on soil condition.

UNIT -2 DRAINAGE AND DEWATERING 9

Drainage techniques - Well points - Vaccum and electroosmotic methods - Seepage analysis for two dimensional flow-fully and partially penetrating slots in homogenous deposits (Simple cases only).

UNIT -3 INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS 9

Insitu densification of cohesionless and consolidation of cohesive soils -Dynamic compaction and consolidation - Vibrofloation - Sand pile compaction - Preloading with sand drains and fabric drains – Stone columns – Lime piles - Installation techniques only - relative merits of various methods and their limitations.

UNIT -4 EARTH REINFORCEMENT 9

Concept of reinforcement - Types of reinforcement material - Applications of reinforced earth – use of Geotextiles for filtration, drainage and separation in road and other works.

UNIT -5 GROUT TECHNIQUES 9

Types of grouts - Grouting equipment and machinery - Injection methods - Grout monitoring – Stabilisation with cement, lime and chemicals - Stabilisation of expansive soils.

Total Hours : 45

OUTCOME:

- Student will be in a position to identify and evaluate the deficiencies if any in the deposits ofa project area and capable of providing alternate methods to improve its character suitableto the project so that the structures built will be stable and serve.

TEXT BOOKS

1. Koerner R.M., "Construction and Geotechnical Methods in Foundation Engineering", McGrawHill, 1994.

2. Purushothama Raj, P. "Ground Improvement Techniques", Laxmi Publications,New Delhi, 2005

REFERENCES

1. Moseley M.P., Ground Improvement Blockie Academic and Professional, Chapman and Hall, Glassgow, 1993.

2. Jones J.E.P., Earth Reinforcement and Soil Structure, Butterworths, 1995.

2. Koerner, R.M., "Design with Geosynthetics", (3rd Edition) Prentice Hall, New Jersey, 2002

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATIONS	**3**	**0**	**0**	**3**

AIM

The aim of the course is toassess the dynamic properties of soil

OBJECTIVE

- Also about the various design parameters required for the design of machine foundation as well as design of foundation for various reciprocating machines.
- About the different vibratory systems available for designing
- About the dynamic properties of soil
- About the various isolation techniques available

UNIT -1 INTRODUCTION **9**

Vibration of elementary systems-vibratory motion-single degree freedom system-free and forced vibration with and without damping

UNIT -2 WAVES AND WAVE PROPAGATION **9**

Wave propagation in an elastic homogeneous isotropic medium- Raleigh, shear and compression waves-waves in elastic half space

UNIT -3 DYNAMIC PROPERTIES OF SOILS **9**

Elastic properties of soils-coefficient of elastic, uniform and non-uniform compression - shear-effect of vibration dissipative properties of soils-determination of dynamic properties of soil-codal provisions

UNIT -4 DESIGN PROCEDURES **9**

Design criteria -dynamic loads - simple design procedures for foundations under reciprocating machines - machines producing impact loads - rotary type machines

UNIT -5 VIBRATION ISOLATION **9**

Vibration isolation technique-mechanical isolation-foundation isolation-isolation by location-isolation by barriers- active passive isolation tests.

Total Hours : 45

OUTCOME:

- At the end of the course, student will have the knowledge to analyse structures subjected to dynamic loading and to design the structures for seismic loading as per code provisions.

TEXT BOOKS

1. Kameswara Rao, "Dynamics Soil Tests and Applications", Wheeler Publishing, New Delhi,2003

2. Swamisaran, "Soil Dynamics and Machine Foundations", Galgotia Publications Pvt. Ltd., 1999

REFERENCES

1. Kameswara Rao, "Vibration Analysis and Foundation Dynamics", Wheeler Publishing, New Delhi, 1998

2. IS code of Practice for Design and Construction of Machine Foundations, McGraw-Hill, 1996.

SEMESTR	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- GEOGRAPHICAL INFORMATION SYSTEM	**3**	**0**	**0**	**3**

AIM

The aim of the course is toposses knowledge about GIS Techniques and its application in the field of Civil Engineering

OBJECTIVE

- To provide exposure to applications of GIS in various application domains through case studies
- Students will learn about the use of zone mapping for water bodies
- Students will learn about the use of mapping techniques for Agriculture and Earth sciences
- Students will also learn about the recent techniques used for GPS system

UNIT -1 GIS TECHNIQUE AND DATA INPUT 9

MAP – Types of Maps – Development of GIS – Components of GIS – Hardware, software, organisation – Types of data – Spatial and non-spatial data – Print, Line and Polygon – Vector and Raster data – Database structures – Files – Vector and Raster data structures.

UNIT -2 DATA ANALYSIS AND MODELLING 9

Data Retrieval – Query – Simple Analysis – Spatial Analysis – Overlay – Vector Data Analysis – Raster Data Analysis – Modelling using GIS – Digital Elevation Model – Cost and path analysis – Expert Systems – Artificial Intelligence – Integration with GIS

UNIT -3 DATA OUTPUT AND ERROR ANALYSIS 9

Data Output – Types – Devices used – Raster and Vector Display Devices – Printers – Plotters – Photowrite Devices – Sources of Errors – Types of Errors – Elimination – Accuracies

UNIT -4 GIS APPLICATIONS IN RESOURCE MANAGEMENT 9

Fields of Applications – Natural Resources – Agriculture – Soil – Water Resources – Wasteland Management - Social Resources - Cadastral Records – LIS

UNIT -5 ADVANCED GIS APPLICATION 9

AM/FM – Utility Network Management – Integration with Remote Sensing – Knowledge based techniques – Multicriteria Techniques – Introduction to Object Oriented Data base Models

Total Hours: 45

OUTCOME:

On completion of the course the students will have knowledge on

- Principles of Remote Sensing and GIS
- Analysis of RS and GIS data and interpreting the data for modeling applications

TEXT BOOKS

1. Burrough P A, Principles of GIS for Land Resources Assessment, Oxford Publication, 2000
2. Michael N Demers, Fundamentals of Geographical Information Systems, Second Edition, John Wiley Publications, 2002

REFERENCES

1. Paul A Longley, Michael F Goodchild etal, Geographical Information Systems Volume I and II, Second Edition, John Wiley Publications, 1999.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- ELECTRONIC SURVEYING	**3**	**0**	**0**	**3**

AIM

The aim of the course is tounderstand the working of EDM equipment and solve the surveying problems with EDM equipment

OBJECTIVES

- At the end of the course the student will posses knowledge about Electronic surveying
- About the propagation of electromagnetic waves and its main principles
- Various implementations of surveying
- The student will Study about different EDM instruments and Total Station.

UNIT I FUNDAMENTALS 9

Methods of measuring distance, historical development, basic principles of EDM, classifications, applications and comparison with conventional surveying.

UNIT II BASIC ELETRONICS 9

Fundamentals of electronics, resonant circuits, semiconductors, Lasers, Cathode ray tube, photo multiplier tube, transducers, oscillators, frequency mixing, modulation and demodulation, Kerrcell modulator, measurement of phase difference, reflectors and power sources.

UNIT III PROPAGATION OF ELECTROMAGNETIC WAVES 9

Definition, classification, applications, propagation properties, wave propagation at lower and higher frequencies. Refractive index, factors affecting, computation of group refractive index for light and near infrared waves at standard conditions and ambient conditions, reference refractive index, first velocity correction, computation of refractive index for microwaves, measurement of atmospheric parameters, mean refractive index, real time application of first velocity correction, second velocity correction and total atmospheric correction

UNIT IV ELECTROMAGNETIC DISTANCE MEASURING SYSTEM 9

Electro-optical system, measuring principle, working principle, sources of error, infrared EDM instruments, Laser EDM instruments and total station. Microwave system, measuring principle, working principle, sources of error, microwave EDM instruments, comparison with

Electrooptical system, care and maintenance of EDM instruments, Modern Positioning Systems. EDM traversing, trilateration and base line measurement using EDM.

UNIT V FIELD STUDIES **9**

Study of different EDM instruments and Total Station. EDM traversing, trilateration and base line measurement using EDM.

Total Hours : 45

OUTCOME:

At the end of the course the students will do

- The different EDM instruments and Total Station.

TEXTBOOKS

1Satheesh Gopi,K.Sathikumar,"Advanced Surveying"Dorling Publication,2008

2. Rueger, J.M. Electronic Distance Measurement, Springer-Verlag, Berlin, 1990.

REFERENCES

1. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1983.

2.Soastamoinen, J.J. Surveyor's guide to electro-magnetic Distance Measurement, Adam Hilger Ltd., 1967.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- AIR POLLUTION MANAGEMENT	**3**	**0**	**0**	**3**

AIM

The aim of the course is to understandthe sources, characteristics and effects of air

OBJECTIVES:

- About noise pollution and the methods of controlling the same.
- The student is expected to know about source inventory and control mechanism.
- To impart knowledge on the sources, effects
- The control techniques of air pollutants and noise pollution

UNIT -1 SOURCES AND EFFECTS OF AIR POLLUTANTS 9

Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles.

UNIT -2 DISPERSION OF POLLUTANTS 9

Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate - Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models – Applications.

UNIT -3 AIR POLLUTION CONTROL 9

Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries.

UNIT -4 AIR QUALITY MANAGEMENT 9

Air quality standards – Air quality monitoring – Preventive measures - Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment and Air quality

UNIT -5 NOISE POLLUTION **9**

Sources of noise pollution – Effects – Assessment - Standards – Control methods - Prevention

Total Hours : 45

OUTCOMES:

The students completing the course will have

- an understanding of the nature and characteristics of air pollutants, noise pollution and basic concepts of air quality management
- ability to identify, formulate and solve air and noise pollution problems
- ability to design stacks and particulate air pollution control devices to meet applicable standards.

TEXT BOOKS

1. Anjaneyulu, D., "Air Pollution and Control Technologies", Allied Publishers, Mumbai, 2002.
2. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi, 1996

REFERENCES

1. W.L.Heumann, Industrial Air Pollution Control Systems, McGraw-Hill, New Yark, 1997
2.Mahajan S.P., Pollution Control in Process Industries, Tata McGraw-Hill Publishing Company,New Delhi, 1991.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- BRIDGE STRUCTURES	**3**	**0**	**0**	**3**

AIM

The aim of the course is to understand&choose appropriate bridge structure and design it for given site conditions.

OBJECTIVES

- To impart exposure on various aspects of structural design of common types of steel and concrete bridges
- Compare the behavior of bridge structures with that of the normal reinforced concrete structures.
- Understand the performance of composite members.
- Finally to learn the design of bridge structures.

UNIT -1 INTRODUCTION 9

Design of through type steel highway bridges for IRC loading - Design of stringers, cross girders and main girders - Design of deck type steel highway bridges for IRC loading - Design of main girders

UNIT -2 STEEL BRIDGES 9

Design of pratt type truss girder highway bridges - Design of top chord, bottom chord, web members - Effect of repeated loading - Design of plate girder railway bridges for railway loading - Wind effects - Design of web and flange plates - Vertical and horizontal stiffeners.

UNIT -3 REINFORCED CONCRETE SLAB BRIDGES 9

Design of solid slab bridges for IRC loading - Design of kerb - Design of tee beam bridges - Design of panel and cantilever for IRC loading

UNIT -4 REINFORCED CONCRETE GIRDERS BRIDGES 9

Design of tee beam - Courbon's theory - Pigeaud's curves - Design of balanced cantilever bridges - Deck slab - Main girder - Design of cantilever - Design of articulation.

UNIT -5 PRESTRESSED CONCRETE BRIDGES 9

Design of prestressed concrete bridges - Preliminary dimensions - Flexural and torsional parameters - Courbon's theory - Distribution coefficient by exact analysis - Design of girder

section - Maximum and minimum prestressing forces - Eccentricity - Live load and dead load shear forces - cable zone in girder –Check for stresses at various sections - Check for diagonal tension - Diaphragms - End block - Short term and long term deflections.

Total Hours: 45

OUTCOMES:

- To develop an understanding of an appreciation for basic concepts in proportioning anddesign of bridges in terms of aesthetics, geographical location and functionality.
- To help the student develop an intuitive feeling about the sizing of bridge elements, ie., develop a clear understanding of conceptual design
- To understand the load flow mechanism and identify loads on bridges.

To carry out a design of bridge starting from conceptual design, selecting suitable bridge,eometry to sizing of its elements

TEXT BOOKS

1. Johnson Victor D., "Essentials of Bridge Engineering", Oxford and IBH Publishing Co. New Delhi, 2007
2. Ponnuswamy S., "Bridge Engineering", Tata McGraw-Hill, New Delhi, 2008

REFERENCES

1. Phatak D.R., "Bridge Engineering", Satya Prakashan, New Delhi, 1990.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- TALL BUILDINGS	**3**	**0**	**0**	**3**

AIM

The aim of the course is tounderstand the problems associated with large heights of structures with respect to loads (wind and earthquake and deflections of the structure).

OBJECTIVES:

- He should know the rudimentary principles of designing tall buildings as per the existing course.
- To provide an insight to the design of tall buildings.
- To enlighten the students on modern techniques available for the analysis of tall buildings

UNIT -1 INTRODUCTION 9

The Tall Building in the Urban Context - The Tall Building and its Support Structure - Development of High Rise Building Structures - General Planning Considerations.

Dead Loads - Live Loads-Construction Loads -Snow, Rain, and Ice Loads - Wind Loads-Seismic Loading –Water and Earth Pressure Loads - Loads - Loads Due to Restrained Volume Changes of Material - Impact and Dynamic Loads - Blast Loads -Combination of Loads.

UNIT -2 THE VERTICAL STRUCTURE PLANE 9

Dispersion of Vertical Forces- Dispersion of Lateral Forces - Optimum Ground Level Space - Shear Wall Arrangement - Behaviour of Shear Walls under Lateral Loading. The Floor Structure or Horizontal Building Plane Floor Framing Systems-Horizontal Bracing- Composite Floor Systems The High - Rise Building as related to assemblage Kits Skeleton Frame Systems - Load Bearing Wall Panel Systems - Panel – Frame Systems - Multistory Box Systems.

UNIT – 3 COMMON HIGH-RISE BUILDING STRUCTURES AND THEIR BEHAVIOUR UNDER LOAD 9

The Bearing Wall Structure- The Shear Core Structure - Rigid Frame Systems- The Wall - Beam Structure: Interspatial and Staggered Truss Systems - Frame - Shear Wall Building Systems - Flat Slab Building Structures - Shear Truss - Frame Interaction System with Rigid - Belt Trusses - Tubular Systems-Composite Buildings - Comparison of High - Rise Structural Systems Other

Design Approaches Controlling Building Drift Efficient Building Forms - The Counteracting Force or Dynamic Response.

UNIT -4 APPROXIMATE STRUCTURAL ANALYSIS AND DESIGN OF BUILDINGS 9

Approximate Analysis of Bearing Wall Buildings The Cross Wall Structure - The Long Wall Structure The Rigid Frame Structure Approximate Analysis for Vertical Loading - Approximate Analysis for Lateral Loading - Approximate Design of Rigid Frame Buildings-Lateral Deformation of Rigid Frame Buildings The Rigid Frame - Shear Wall Structure - The Vierendeel Structure - The Hollow Tube Structure.

UNIT -5 OTHER HIGH-RISE BUILDING STRUCTURE 9

Deep - Beam Systems -High-Rise Suspension Systems - Pneumatic High -Rise Buildings - Space Frame Applied to High - Rise Buildings - Capsule Architecture.

Total Hours: 45

OUTCOME:

- At the end of this course the student should have an understanding on the behaviour of tallbuildings subjected to lateral building. The students should have knowledge about therudimentary principles of designing tall buildings as per the existing codes.

TEXT BOOKS

1. WOLFGANG SCHUELLER " High - rise building Structures", John Wiley and Sons.
2. Bryan Stafford Smith and Alex Coull, " Tall Building Structures ", Analysis and Design, John Wiley and Sons, Inc., 1991.

REFERENCES

1. Coull, A. and Smith, Stafford, B. " Tall Buildings ", Pergamon Press, London, 1997.
2. LinT.Y. and Burry D.Stotes, " Structural Concepts and Systems for Architects and Engineers", John Wiley, 1994.
3. Lynn S.Beedle, Advances in Tall Buildings, CBS Publishers and Distributors, Delhi, 1996.
4. Taranath.B.S., Structural Analysis and Design of Tall Buildings, Mc Graw Hill 1998.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- STRUCTURAL DYNAMICS	**3**	**0**	**0**	**3**

AIM

The aim of the course is tounderstand how to arrive at the dynamic forces and structures

OBJECTIVES:

- They also learn how to idealise the structure into systems of reduced number of degrees of freedom and analyse these systems for the forces.
- They learn about the discritization of various structures
- They learn about the seismic design of various structures
- He should also be able to interpret the results.

UNIT -1 PRINCIPLES OF DYNAMICS 9

Difference between static loading and dynamic loading – Nature of dynamic loads – Wind, Earthquake and Impact Loads – Damping – Viscous and structural damping – single degree of freedom (SDOF) Systems – Formulation of equation of motion – Newton's Law and D'Alembert'sprinciples – Examples of SDOF modeling.

UNIT – 2SINGLE DEGREE FREEDOM SYSTEMS 9

Free vibration response of SDOF system – Response of undamped and damped SDOF system to harmonic excitation – characteristic of resonance – Response to impulse and an arbitrary forcing function – Duhamel Integral formulation.

UNIT – 3MULTIDEGREE OF FREEDOM SYSTEMS 9

MDOF systems – examples – Lumped parameter model – Formulation of equation of motion – Free vibration of MDOF systems as Eigen value problem – concept of mode shapes and natural frequencies – 2 DOF example – orthogonal properties of normal modes.

UNIT – 4 SUPERPOSITION PRINCIPLES 9

Harmonic excitation of 2 DOF system – Principle of mode superposition (principle only) for dynamic analysis – vibration isolation – vibration measuring instruments.

UNIT – 5 DESIGN FOR WIND AND EARTHQUAKE 9

Effect of wind and earthquake on structures – Principles of aseismic design – Methods of Vibration control – codal provisions for design for wind and earthquake (explanation of Provisions only – no design)

Total Hours: 45

OUTCOME:

- At the end of the course, student will have the knowledge to analyse structures subjected to dynamic loading and to design the structures for seismic loading as per code provisions.

TEXT BOOKS

1. Mario Paz," Structural Dynamics Theory and Computation", Van Nostrand Reinhold, 2004

2. Anil K.Chopra, "Dynamics of Structures Theory and Applications to Earthquake Engineering" Pearson Education., 2003.

REFERENCES

1. Clough R.W. and Penzien, J., Dynamics of Structures, McGraw-Hill, 1990

2. Craig R.R. Jr., Structural Dynamics – An Introduction to Computer Methods, John Wiley and Sons, 1981

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- WIND ENGINEERING	**3**	**0**	**0**	**3**

AIM

The aim of the course is tounderstand how to analyses the dynamic effects created by these wind forces.

OBJECTIVES:

At the end of this course the student should be able to appreciate the forces

- Also about the forces generated on structures due to normal wind as well as gusts.
- He should also be able to analyses the dynamic effects produced due to chimney,tower and silos
- He should also be able to analyses the application in design and its implementations

UNIT –1 INTRODUCTION **9**

Terminology – Wind Data – Gust factor and its determination - Wind speed variation with height – Shape factor – Aspect ratio – Drag and lift.

UNIT –2 EFFECT OF WIND ON STRUCTURES **9**

Static effect – Dynamic effect – Interference effects (concept only) – Rigid structure – Aeroelastic structure (concept only).

UNIT –3 EFFECT ON TYPICAL STRUCTURES **9**

Tail buildings – Low rise buildings – Roof and cladding – Chimneys, towers and bridges.

UNIT –4 APPLICATION TO DESIGN **9**

Design forces on multistorey building, towers and roof trusses.

UNIT –5 INTRODUCTION TO WIND TUNNEL **9**

Types of models (Principles only) – Basic considerations – Examples of tests and their use.

Total Hours: 45

OUTCOME:

At the end of the course the student

- able to analyse the dynamic effects created by these wind forces.
- able to analyse the dynamic effects produced due to chimney,tower and silos
- able to analyse the application in design and its implementations

TEXT BOOKS

1. Peter Sachs, "Wind Forces in Engineering, Pergamon Press, New York, 1992.
2. Lawson T.V., Wind Effects on Buildings, Vols. I and II, Applied Science and Publishers, London, 1993.

REFERENCES

1. Devenport A.G., "Wind Loads on Structures", Division of Building Research, Ottowa, 1990.
2. Wind Force on Structures – Course Notes, Building Technology Centre, Anna University, 1995

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- TOTAL QUALITY MANAGEMENT	**3**	**0**	**0**	**3**

(Common to CSE, Mech, Civil, Bio-Tech, Auto)

AIM

The aim of the course is tounderstand the Total Quality Management concept and principles

OBJECTIVE

- The various tools available to achieve Total Quality Management.
- To understand the statistical approach for quality control.
- To create an awareness about the ISO and QS certification process and its need for the industries.
- To understand the statistical approach of quality systems involved

UNIT -1 INTRODUCTION **9**

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

UNIT -2 TQM PRINCIPLES **9**

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

UNIT -3 STATISTICAL PROCESS CONTROL (SPC) **9**

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

UNIT -4 TQM TOOLS **9**

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss

Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

UNIT – 5 QUALITY SYSTEMS **9**

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 – Concept, Requirements and Benefits.

Total Hours: 45

OUTCOME:

- The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

TEXT BOOK

1.Dale H.Besterfiled, et al., Total Quality Management, Pearson Education, Inc. 2003. (Indian reprint 2004). ISBN 81-297-0260-6.

2. Feigenbaum.A.V. "Total Quality Management, McGraw Hill, 1991

REFERENCES

1. James R.Evans & William M.Lidsay, The Management and Control of Quality, (5^{th} Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5).

2. Oakland.J.S. "Total Quality Management Butterworth – Hcinemann Ltd., Oxford. 1989.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- INDUSTRIAL WASTE MANAGEMENT	**3**	**0**	**0**	**3**

AIM

The aim of the course is to know about the polluting potential of major industries in the country and the methods of controlling the same.

OBJECTIVES:

This subject deals with the pollution from major industries and methods of controlling the same.

- The major sources involved in the cleaner production from various industries
- It also deals with the various treatment techniques involved
- Specifically it also involves about the hazardous waste management

UNIT -1 INTRODUCTION 9

Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes

UNIT -2 CLEANER PRODUCTION 9

Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery – Applications.

UNIT -3 POLLUTION FROM MAJOR INDUSTRIES 9

Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Pharmaceuticals, Electroplating industries, Dairy, Sugar, Paper, distilleries, Steel plants, Refineries, fertilizer, thermal power plants – Wastewater reclamation concepts

UNIT -4 TREATMENT TECHNOLOGIES 9

Equalisation – Neutralisation – Removal of suspended and dissolved organic solids - Chemical oxidation – Adsorption - Removal of dissolved in organics – Combined treatment of industrial and municipal wastes – Residue management – Dewatering – Disposal

UNIT -5 HAZARDOUS WASTE MANAGEMENT **9**

Hazardous wastes - Physico chemical treatment – solidification – incineration – Secured land fills

Total Hours: 45

OUTCOMES:

The students completing the course will have

- an insight into the pollution from major industries including the sources and characteristics of pollutants
- ability to plan minimization of industrial wastes
- ability to design facilities for the processing and reclamation of industrial waste water

TEXT BOOKS

1. M.N.Rao & A.K.Dutta, "Wastewater Treatment", Oxford - IBH Publication, 2008

2. W .W. Eckenfelder Jr., "Industrial Water Pollution Control", McGraw-Hill Book Company, New Delhi, 2000

REFERENCES

1. T.T.Shen, "Industrial Pollution Prevention", Springer, 1999.

2. R.L.Stephenson and J.B.Blackburn, Jr., "Industrial Wastewater Systems Hand book", Lewis Publisher, New York, 1998

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- COMPUTER AIDED DESIGN OF STRUCTURES	**3**	**0**	**0**	**3**

AIM

The aim of the course is totrain the student in the use of computers

OBJECTIVES:

- Creating a computer code as well as using commercially
- Available software for the design of Civil Engineering structures.
- Structural analysis involved with the help of finite element techniques
- The design and optimization involved in steel and RCC structures

UNIT –1 INTRODUCTION **9**

Fundamentals of CAD - Hardware and software requirements -Design process - Applications and benefits.

UNIT –2 COMPUTER GRAPHICS **9**

Graphic primitives - Transformations -Wire frame modeling and solid modeling -Graphic standards –Drafting packages

UNIT –3 STRUCTURAL ANALYSIS **9**

Fundamentals of finite element analysis - Principles of structural analysis -Analysis packages and applications.

UNIT –4 DESIGN AND OPTIMISATION **9**

Principles of design of steel and RC Structures -Applications to simple design problems – Optimisation techniques - Algorithms - Linear Programming – Simplex method

UNIT –5 EXPERT SYSTEMS **9**

Introduction to artificial intelligence - Knowledge based expert systems -Rules and decision tables –Inference mechanisms - Simple applications.

Total Hours: 45

OUTCOME:

- Students will be able to implement ideas of computer aided design with advantages and demerits.

TEXT BOOKS

1. Groover M.P. and Zimmers E.W. Jr., "CAD/CAM, Computer Aided Design and Manufacturing", Prentice Hall of India Ltd, New Delhi, 2000
2. Krishnamoorthy C.S.Rajeev S., "Computer Aided Design", Narosa Publishing House,New Delhi, 2006

REFERENCES

1. Harrison H.B., "Structural Analysis and Design", Part I and II Pergamon Press, Oxford, 1990.
2. Rao S.S., "Optimisation Theory and Applications", Wiley Eastern Limited, New Delhi, 1977.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- INDUSTRIAL STRUCTURES	**3**	**0**	**0**	**3**

AIM

The aim of the course is to know about the special aspects with respect to Civil Engineering structures in industries.

OBJECTIVES:

- About the functional requirements involved in the design
- At the end of this course the student shall be able to design RCC structures.
- At the end of this course the student shall be able to design Steel structures.
- At the end of this course the student shall be able to design prefabricated structures.

UNIT –1 PLANNING **9**

Classification of Industries and Industrial structures – General requirements for industries like cement, chemical and steel plants – Planning and layout of buildings and components.

UNIT –2 FUNCTIONAL REQUIREMENTS **9**

Lighting – Ventilation – Accounts – Fire safety – Guidelines from factories act.

UNIT –3 DESIGN OF STEEL STRUCTURES **9**

Industrial roofs – Crane girders – Mill buildings – Design of Bunkers and Silos

UNIT –4 DESIGN OF R.C. STRUCTURES **9**

Silos and bunkers – Chimneys – Principles of folded plates and shell roofs

UNIT –5 PREFABRICATION **9**

Principles of prefabrication – Prestressed precast roof trusses- Functional requirements for Precast concrete units

Total Hours: 45

OUTCOMES:

- At the end of this course the student shall be able to design some of the structures used in industries.

TEXT BOOKS

1. N. Subramanian,"Design of Steel Structures: Theory and Practice,Oxford University Press, Incorporated, Mar-2011
2. P.C.Varghese,"Advanced Reinforced Concrete structures", PHI Learning Pvt. Ltd., 09-Jan-2009

REFERENCES

1. Henn W. Buildings for Industry, vols.I and II, London Hill Books, 1995
2. Handbook on Functional Requirements of Industrial buildings, SP32 – 1986, Bureau of Indian Standards, New Delhi 1990

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE -SMART STRUCTURES AND SMART MATERIALS	**3**	**0**	**0**	**3**

AIM

The aim of the course isdesigned to give an insight into the latest developments regarding smart materials and their use in structures

OBJECTIVES:

- It deals with the measuring techniques for various materials
- It deals with the concepts of sensors for various materials
- It deals with the concepts of signal processing and control systems for various materials
- Further, this also deals with structures which can self adjust their stiffness with load.

UNIT –1 INTRODUCTION **9**

Introduction to Smart Materials and Structures – Instrumented structures functions and response – Sensing systems – Self diagnosis – Signal processing consideration – Actuation systems and effectors.

UNIT –2 MEASURING TECHNIQUES **9**

Strain Measuring Techniques using Electrical strain gauges, Types – Resistance – Capacitance – Inductance – Wheatstone bridges – Pressure transducers – Load cells – Temperature Compensation – Strain Rosettes.

UNIT –3 SENSORS **9**

Sensing Technology – Types of Sensors – Physical Measurement using Piezo Electric Strain measurement – Inductively Read Transducers – The LVOT – Fiber optic Techniques.Chemical and Bio-Chemical sensing in structural Assessment – Absorptive chemical sensors – Spectroscopes – Fibre Optic Chemical Sensing Systems and Distributed measurement.

UNIT –4 ACTUATORS **9**

Actuator Techniques – Actuator and actuator materials – Piezoelectric and Electrostrictive Material – Magnetostructure Material – Shape Memory Alloys – Electro orheological Fluids– Electromagnetic actuation – Role of actuators and Actuator Materials.

UNIT –5 SIGNAL PROCESSING AND CONTROL SYSTEMS 9

Data Acquisition and Processing – Signal Processing and Control for Smart Structures – Sensors as Geometrical Processors – Signal Processing – Control System – Linear and Non-Linear.

Total Hours: 45

OUTCOME:

At the end of the course the students will able to

- designed to give an insight into the latest developments regarding smart materials and their use in structures.

TEXT BOOKS

1. Brain Culshaw – Smart Structure and Materials Artech House – Borton. London-1996.

REFERENCES

1. L. S. Srinath – Experimental Stress Analysis – Tata McGraw-Hill, 1998.

2. J. W. Dally & W. F. Riley – Experimental Stress Analysis – Tata McGraw-Hill, 1998.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - FINITE ELEMENT TECHNIQUES	**3**	**0**	**0**	**3**

AIM

The aim of the course isto understand &analyses linear elastic structures, that has been studied about in core courses, using finite element method.

OBJECTIVES:

- At the end of this course the student shall have a basic knowledge of finite element method
- They shall be able to analyse linear elastic structures, that he has studied about in core courses, using finite element method.
- It deals with finite element analysis of one dimensional problems
- It deals with finite element analysis of two dimensional problems
- It deals with finite element analysis of isoparametric problems and its applications with software packages

UNIT –1 INTRODUCTION – VARIATIONAL FORMULATION 9

General field problems in Engineering – Modelling – Discrete and Continuous models – Characteristics – Difficulties involved in solution – The relevance and place of the finite element method – Historical comments – Basic concept of FEM, Boundary and initial value problems – Gradient and divergence theorems – Functionals – Variational calculus – Variational formulation of VBPS. The method of weighted residuals – The Ritz method.

UNIT –2 FINITE ELEMENT ANALYSIS OF ONE DIMENSIONAL PROBLEMS 9

One dimensional second order equations – discretisation of domain into elements – Generalised coordinates approach – derivation of elements equations – assembly of elements equations – imposition of boundary conditions – solution of equations – Cholesky method – Post processing – Extension of the method to fourth order equations and their solutions – time dependant problems and their solutions – example from heat transfer, fluid flow and solid mechanics.

UNIT –3 FINITE ELEMENT ANALYSIS OF TWO DIMENSIONAL PROBLEMS **9**

Second order equation involving a scalar-valued function – model equation – Variational formulation – Finite element formulation through generalised coordinates approach – Triangular elements and quadrilateral elements – convergence criteria for chosen models – Interpolation functions – Elements matrices and vectors – Assembly of element matrices – boundary conditions – solution techniques.

UNIT –4 ISOPARAMETRIC ELEMENTS AND FORMULATION **9**

Natural coordinates in 1, 2 and 3 dimensions – use of area coordinates for triangular elements in - 2 dimensional problems – Isoparametric elements in 1,2 and 3 dimensional – Largrangean and serendipity elements – Formulations of elements equations in one and two dimensions - Numerical integration.

UNIT –5 APPLICATIONS TO FIELD PROBLEMS IN TWO DIMENSIONALS **9**

Equations of elasticity – plane elasticity problems – axisymmetric problems in elasticity – Bending of elastic plates – Time dependent problems in elasticity – Heat – transfer in two dimensions – incompressible fluid flow.

Total Hours: 45

OUTCOME:

- Students will be in a position to develop computer codes for any physical problems usingFE techniques.

TEXT BOOK

1. Chandrupatla, T.R., and Belegundu, A.D., “Introduction to Finite Element in Engineering”, Third Edition, Prentice Hall, India, 2003
2. S.S.Rao, “The Finite Element Method in Engineering”, Pergaman Press, 2003.

REFERENCES

1. J.N.Reddy, “An Introduction to Finite Element Method”, McGraw-Hill, Intl. Student Edition, 1985.
2. Zienkiewics, “The finite element method, Basic formulation and linear problems”, Vol.1, 4/e, McGraw-Hill, Book Co.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - DESIGN OF PLATE AND SHELL STRUCTURES	**3**	**0**	**0**	**3**

AIM

The aim of the course is to understand the rudimentary principles involved in the analysis

OBJECTIVES:

- About the design of rectangular plates
- About the design of thin shells
- About the Analysis of shells
- About the design of folded plates

UNIT -1 THIN PLATES WITH SMALL DEFLECTION **9**

Laterally loaded thin plates – governing differential equations – Simply supported and fixed boundary conditions

UNIT -2 RECTANGULAR PLATES **9**

Simply supported rectangular plates – Navier's solution and Levy's method.

UNIT -3 THIN SHELLS **9**

Classification of shells-structural actions – membrane theory

UNIT -4 ANALYSIS OF SHELLS **9**

Analysis of spherical dome – cylindrical shells – folded plates

UNIT -5 DESIGN OF SHELLS **9**

Design of spherical dome – cylindrical shells – folded plates

Total Hours: 45

OUTCOME:

At the end of the course the students will do

- the design of rectangular plates
- the design of thin shells
- the Analysis of shells
- the design of folded plates

TEXT BOOKS

1. G.S. Ramaswamy, Design and Construction of Shell Structures, CBS Plublishers, New Delhi, 1996
2. S. Timoshenko & S. Woinowsky – Krieger, “Theory of Plates and Shells”, McGraw Hill Book Company,2010

REFERENCES

1. Szilard R, Theory and analysis of plates, Prentice Hall Inc, 1995

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- CYBER SECURITY	**3**	**0**	**0**	**3**

AIM

To study the critical need for ensuring Cyber Security in real time problems

OBJECTIVES

1. To understand the basics of Cyber Security
2. To know the legal, ethical and professional issues in Cyber Security
3. To know the various attacker techniques

UNIT I CYBER SECURITY FUNDAMENTALS

Network and security concepts – basic cryptography – Symmetric encryption – Public key Encryption – DNS – Firewalls – Virtualization – Radio Frequency Identification – Microsoft Windows security Principles.

UNIT II ATTACKER TECHNIQUES AND MOTIVATIONS

Antiforensics – Tunneling techniques – Fraud Techniques - Threat Infrastructure.

UNIT III EXPLOITATION

Techniques to gain a foot hold – Misdirection, Reconnaissance, and disruption methods.

UNIT IV MALICIOUS CODE

Self Replication Malicious code – Evading Detection and Elevating privileges – Stealing Information and Exploitation.

UNIT V DEFENSE AND ANALYSIS TECHNIQUES

Memory Forensics – Honeypots – Malicious code naming – Automated malicious code analysis systems – Intrusion detection systems – Defense special file investigation tools.

OUTCOME:

At the end of the course the students will understand

- The importance of taking a multi-disciplinary approach to cyber security
- The cyber threat landscape, both in terms of recent emergent issues and those issues which recur over time
- General principles and strategies and strategies that can be applied to systems to make them more robust to attack.

TEXT BOOK

1. James Graham, Richard Howard and Ryan Olson, "Cyber Security Essentials", CRC Press, Taylor & Francis Group, 2011.

REFERENCE BOOKS

1. By Dan Shoemaker, Ph.D., William Arthur Conklin, Wm Arthur Conklin, "Cybersecurity: The Essential Body of Knowledge**",** Cengage Learning, 2012.

2. Ali Jahangiri, "Live Hacking: The Ultimate Guide to hacking Techniques & Counter measures for Ethical Hackers & IT Security Experts", 2009.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - DISASTER MITIGATION TECHNIQUES	**3**	**0**	**0**	**3**

AIM

The aim of approaches to Disaster Risk Reduction is to enhance the knowledge by providing existing models in risk reduction strategies to prevent major causalities during disaster.

OBJECTIVES

- To promote Prevention and Preparedness for disaster
- To undertake Mitigation & Risk Reduction steps
- To prioritize Rescue and Relief operation
- To understand Rehabilitation & Reconstruction

UNIT 1- Introduction to Natural & Man-made Disasters **9**

Understanding Disasters- Geological and Mountain Area Disasters- Wind and Water Related Natural Disaster- Man Made Disasters

UNIT 2- Disaster Preparedness **9**

Introduction to disaster Preparedness- Roles & Responsibilities of Different Agencies and Govt. - Technologies for Disaster Management- Disaster Mitigation

UNIT 3- Rehabilitation, Reconstruction & Recovery **9**

Reconstruction and Rehabilitation as means of development- Damage Assessment- Role of various Agencies in Disaster Management and Development- Information Management Structure- Development of Physical and Economic Infrastructure- Creation of Long-term Job Opportunities and Livelihood Options- Funding Arrangements for Reconstruction- Education and Awareness- Dealing with Victims' Psychology- Role of Information Dissemination- Role of Various Agencies in Recovery Measures- Monitoring and Evaluation of Rehabilitation Work- Constraints in Monitoring and Evaluation- Long-term Recovery

UNIT 4- Disaster Response and Disaster Management **9**

Response Essential Components- Stakeholders Co-ordination in Disaster Response- Human Behaviour and Response Management- Relief Measures

UNIT 5- Risk Assessment and Vulnerability Analysis **9**

Hazard, Risk and Vulnerability: Concept and Relationship- Understanding Risk: Concepts and Elements- Disaster Risk Reduction- Risk Analysis Techniques- People Participation in Risk Assessment-Vulnerability: Concept and Parameters- Vulnerability Analysis

Total Hours: 45

OUTCOMES:

The students will be able to

- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation
- Draw the hazard and vulnerability profile of India, scenarious in the Indian context,
- Disaster damage assessment and management

TEXT BOOKS

1 R. Nishith, Singh AK 2012 Disaster Management in India:Perspectives, issues and strategies New Royal book Company, Lucknow

2 Sharma, Kadambari C, Avina 2010 Disaster Management in India Jnanada Prakashan [P&D], New Delhi

REFERENCES

1 Government Of India. 1997. Vulnerability Atlas Of India. New Delhi.

2 Bryant Edwards (2005): Natural Hazards, Cambridge University Press, U.K.

3 Roy, P.S. (2000): Space Technology for Disaster management: A Remote Sensing & GIS Perspective, Indian Institute of Remote Sensing (NRSA) Dehradun.

4 White, G.F, 1974, Natural Hazards: Local, National, Global, Oxford University Press, New York.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - GROUNDWATER ENGINEERING	**3**	**0**	**0**	**3**

OBJECTIVE

To know the types of aquifers .To understand the surface and subsurface investigation in detail .To integrate the fundamental and basic knowledge of ground water movement. To introduce the different model studies.

UNIT 1 HYDROGEOLOGICAL PARAMETERS9

Introduction - Water bearing Properties of Rock - Properties of aquifer - Transmissivity and storage coefficient - Problems in Specific yield - specific capacity -Darcy's law and permeability - Methods of Estimation - Ground water table fluctuation and its interpretations - Type of aquifers - Groundwater development and Potential in India - groundwater legislation, GEC norms.

UNIT 2 EVALUATION OF AQUIFER PROPERTIES 9

Darcy's equation - governing equation of ground water flow - steady and unsteady flow equations for confined and unconfined aquifer - water table aquifer - Dupit Forchheimer assumption - one dimensional flow - well hydraulics - hydrogeological boundaries - concept of image - image well - well theory - interference of wells - partial penetration of well

UNIT 3 GROUNDWATER HYDRAULICS AND EXPLORATION9

Geological methods - Geophysical - electrical resistivity - seismic refraction - water wells classification - drilling of deep wells - well design, construction and maintenance - well development. Pumping test analysis - well characteristics - draw down test - Tracer tests.

UNIT 4 GROUNDWATER QUALITY AND MOVEMENT9

Ground water chemistry - Origin, movement and quality - Water quality standards - Remediation of saline intrusion - Remediation schemes - Artificial recharge techniques - Ground water Pollution and legislation.

UNIT 5 GROUNDWATER MANAGEMENT **9**

Need for management model - database for groundwater management - protection zone delineation groundwater balance. Introduction to groundwater model - Types, model formulation, and boundary conditions - case study.

Total Hours: 45

OUTCOMES:

- Students will be able to understand aquifer properties and its dynamics after thecompletion of the course. It gives an exposure towards well design and practical problems of groundwater aquifers.
- Students will be able to understand the importance of artificial recharge and groundwater quality concepts.

TEXT / REFERENCE BOOKS

1. Todd D. K.," Ground water hydrology", John Wiley & Sons, 3rd Edition , 2005

2. Raghunath H.M., "Ground Water Hydrology", New Age International (P) Limited, New Delhi, 2010. 3. Bouwer H., "Groundwater Hydrology", Tata Mc Graw Hill, Company Ltd, Indian Edition 1978

4. Health R. C. and Trainer F.W., "Introduction of Ground water Hydrology", John Wiley and sons, 1985. 5. Fitts R. Charles, "Groundwater Science". Elsevier, Academic Press, 2002.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE –PRINCIPLES OF STRUCTURAL DYNAMICS AND SEISMIC DESIGN	**3**	**0**	**0**	**3**

AIM

To impart the knowledge about the fundamentals definitions of earthquake, their responses to earthquake, and their application to the design of earthquake resistant structures

OBJECTIVES:

- The main objective of the course is to introduce dynamic loading and the dynamic performance of the structures to the students.
- Different types of dynamic loading also to be discussed.
- The detailed study on the performance of structures under earthquake loading is also one of the focus of the course

UNIT I ELEMENTS OF SEISMOLOGY 9

Elements of Engineering Seismology - Causes of Earthquake – Plate Tectonic theory – Elastic rebound Theory – Characteristic of earthquake – Estimation of earthquake parameters - Magnitude and intensity of earthquakes – Spectral Acceleration.

UNIT II RESPONSE OF STRUCTURES TO EARTHQUAKE 9

Effect of earthquake on different type of structures – Behaviour of Reinforced Cement Concrete, Steel and Prestressed Concrete Structure under earthquake loading –Evaluation of earthquake forces as per IS:1893 – 2002 - Response Spectra – Lessons learnt from past earthquakes

UNIT III DESIGN METHODOLOGY 9

Causes of damage – Planning considerations / Architectural concepts – Guidelines for Earthquake resistant design – Earthquake resistant design for masonry and Reinforced Cement Concrete buildings – Design and detailing as per IS: 13920 – 1993.

UNIT IV SEISMIC HAZARD ANALYSIS **9**

Identification and Evaluation of Earthquake Sources – Geologic Evidence – Tectonic Evidence – Historical Seismicity – Instrumental Seismicity – Deterministic Seismic Hazard Analysis – Probabilistic Seismic Hazard Analysis.

UNIT V SPECIAL PROBLEMS AND CASE STUDIES **9**

Structural Configuration - Seismic performance - Irregular Buildings - Soil performance, Modern Concepts – Base Isolation - Adoptive system - Case studies.

Total Hours: 45

OUTCOMES:

- At the end of the course, student will have the knowledge to analyse structures subjected to dynamic loading and to design the structures for seismic loading as per code provisions.

TEXT BOOKS:

1. Chopra, A.K., "Dynamics of Structures – Theory and Applications to Earthquake Engineering", 4th Edition, Pearson Education, 2011.
2. Agarwal. P and Shrikhande. M., "Earthquake Resistant Design of Structures", Prentice Hall of India Pvt. Ltd. 2007

REFERENCES:

1. Biggs, J.M., "Introduction to Structural Dynamics", McGraw Hill Book Co., New York, 1964
2. Dowrick, D.J., "Earthquake Resistant Design", John Wiley & Sons, London, 2009
3. Paz, M. and Leigh.W. "Structural Dynamics – Theory & Computation", 4th Edition, CBS Publishers & Distributors, Shahdara, Delhi, 2006.

SEMESTER	CODE	SUBJECT	L	T	P	C
		ELECTIVE –ENVIRONMENTAL SCIENCE AND ENGINEERING	**3**	**0**	**0**	**3**

OBJECTIVE:

It is the branch of science which deals with the effects of human activities &modern technology on environment. It creates awareness among the engineering students about environmental pollution and the role of the engineers in conservation of environment.

UNIT – I - ENVIRONMENT AND NATURAL RESOURCES 9

Environment – Definition , scope & importance – Public awareness – Forest resources , mineral resources , water resources, food resources , energy resources (uses, over -exploitation & adverse effects in each case) – Scope & role of environmental engineers in conservation of natural resources – Sustainability development.

UNIT – II - ECOSYSTEMS AND BIO – DIVERSITY 9

Ecosystem – Definition, structure and function – Energy flow – Ecological succession – food chain, food web, ecological pyramids – Introduction, types, characteristics, structure and function of forest, grassland, desert and Aquatic ecosystems - Bio – Diversity : values and uses, hotspots, threats and conservation.

UNIT – III - ENVIRONMENTAL POLLUTION 9

Pollution – Definition , man made impacts and control measures of air, water and land pollution – Water quality standards & characterization – Importance of sanitation -Nuclear hazards – Hazardous waste management : Solid waste, waste water and biomedical waste – Prevention of pollution and role of individual – Disasters management : Floods, earthquake, cyclone and land slides – Clean technology options.

UNIT – IV - SOCIAL ISSUES AND ENVIRONMENT 9

Urban problems related to energy – Water conservation – Resettlement and rehabilitation of people – Environmental ethics – Climate change – Global warming – Acid rain – Ozone depletion- Waste land reclamation , Environment Protection Act for air, water , wild life and forests - Pollution Control Board.

UNIT – V - HUMAN POPULATION AND ENVIRONMENT 9

Population growth – Population explosion – Family welfare programme – Environment & human health – Human rights – Value education – Women and child welfare, Role of information technology in environment and human health.

Total: 45 hours

OUT COME:

The students will get the knowledge about environment and they will work their corresponding field with eco friendly. It will protect our environment from pollution

TEXT BOOKS:

1. Environmental Science and Engineering by Dr. J. Meenambal , MJP Publication , Chennai Gilbert M. Masters : Introduction to Environmental Engineering and Science , Pearson Education Pvt Ltd., II Edition, ISBN 81-297-0277-0, 2004
2. Miller T.G. Jr Environmental Science Wadsworth Publishing Co.
3. Townsend C. Harper J. and Michael Begon, Essentials of Ecology, Blackwell Science.

REFERENCES:

1 Wager K.D. "Environmental Management", W.B. Saunders Co. Philadelphia, USA, 1998.

2 Bharucha Erach "The Biodiversity of India" Mapin Publishing Pvt Ltd, Ahmedabad, India

3 Trivedi R.K. " Handbook of Environmental Laws", Rules, Guidelines, Compliances and Standards Vol I & II, Enviro media.

SEMESTER	CODE	SUBJECT	L	T	P	C
		ELECTIVE –TRANSPORT ECONOMICS	**3**	**0**	**0**	**3**

OBJECTIVE:

It is the branch of science which deals with the effects of human activities &modern technology on transport economics. It creates awareness among the engineering students about transport economics and the role of the engineers in conservation of environment.

UNIT 1 INTRODUCTION **9**

Introduction to Transportation Economics - Purpose and major considerations in Transport economics Transportation Demand and Supply - Transport Costing: Types of cost and their behavior: direct and indirect; fixed and variable, Treatment of assets and capital depreciation - infrastructure, vehicle/carrying unit and others, Transport costs: Internal and External.

UNIT 2 PRICING OF TRANSPORT SERVICES **9**

Vehicle operations cost - running cost - pollution cost - value of travel time - road damage cost - congestion cost - accident cost.

UNIT 3 ECONOMIC EVALUATION **9**

Economic Evaluation of Highway schemes - Need and Methods of Economic Evaluation - Economic Analysis economic evaluation, economic studies -Transportation plans - Benefit cost method, Net present value method, and internal rate of return method and comparison of various methods.

UNIT 4 TRANSPORT FINANCING **9**

Revenue Sources, Expenditure Sources, Traditional Project Delivery Methods , Innovative Financing , Credit financing, Private financing, BOT, BOOT, dedicated road funds, road pricing, tolls, Private provisions, advantages & limitations - Methods for raising funds for maintenance, improvement and expansion of transportation networks: Taxation and user fee, Financing through loans, bonds, PPPs and concessions.

UNIT 5 TRANSPORT ECONOMICS **9**

Transport Coordination policies - Objectives and method to achieve coordination among different modes and between private and public undertakings - Case Studies.

Total: 45 hours

OUTCOME:

At the end of the course the students will get

- Complex knowledge including interrelations between different stakeholders
- Representation of transport in economic perspective, stressing importance of cost and effectiveness.

TEXT BOOKS:

1. Kadiyali L.R, "Traffic Engineering and Transport Planning", 6th Edition, Khanna Technical Publications, 2005.

2. Patrick Mccarthy, Transportation Economics, Blackwell Publishing, 2000.

REFERENCES:

1. Wohl and Martin, "Traffic System Analysis for Engineering and Planners", Tata McGraw Hill, 1983.

2. Emile Quinet and Roger Vickerman, Principles of Transportation Economics, Edward Elgar Publishing, 2004

3. Button,K.J. Transport economics, Edward Elgar, Aldershot, England, 2003. 6. IRC SP 30: 2009, Manual on Economic Evaluation of Highway Projects.

SEMESTER	CODE	SUBJECT	L	T	P	C
		ELECTIVE –MASS TRANSPORT MANAGEMENT	**3**	**0**	**0**	**3**

OBJECTIVE

To develop and systematize the basic concepts and technical aspects of mass transport management.

UNIT 1INTRODUCTION9

History and Role of Transit - Recent Trends in Mass Transportation Characteristics - Different Mass Transportation Systems - Demand Characteristics - Spatial, Temporal and Behavioral Characteristics of Transportation Demand - Structures of Urban Areas - Provisions of Transport Facilities - Basic Management Issues Ridership prediction and routing

UNIT 2 FARE STRUCTURE 9

Methods of Financing - Budgeting and Recounting - Fare Structures - Replacement Programs - Fare Collected System – Incentives.

UNIT 3 SCHEDULING9 Preparation of Schedules and Duty Roasters - Earning of Occupancy - Cost of operation - Capital Cost Accident cost

UNIT 4 TERMINALS9

Utility Designs - Fleet Location and Maintenance - Depot Localities - Bus Terminals - Case studies.

UNIT 5 EVALUATION9

Evaluation of Mass transport system - BRTS, MRTS, LRTS, Metro rail and Mono rail.

Total: 45 hours

OUTCOME:

At the end of the course the basic concepts and technical aspects of mass transport management.

TEXT BOOKS

1. Hutchinson, Urban Transport Planning, John Wiley, 2006

2. Hay, W.W., An Introduction to Transportation Engineering, 2nd Ed., John Wiley & Sons, 2001

REFERENCES:

1. Agarwal M.K., “Urban Transportation in India”, INAE, Allied Publishers Ltd., 1996.

2. Vuchic V.R., “Urban Public Transportation System and Technology”, Prentice Hall, Inc. Englewood Cliffs, 1991.

3. Stubbs P.C et al, “Transport Economics”, George Allen and Ubwin, Boston, 1984. 6. Stephen Gelaster, “Fundmental of Transport Economics”, Basil Black Well, Oxford, 1981.

4. http://www.advancedtransit.org/

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE -ENGINEERING MANAGEMENT AND ETHICS	**3**	**0**	**0**	**3**

OBJECTIVE:

To impart the basic concepts of Management to Engineering Students for bring out an effective administrative talent in their workplace.

UNIT – I: BASICS OF MANAGEMENT 8

Management: Nature & Scope – Significance – Functions of Management – Levels of Management - Management Process – Roles and styles of Manager – Managerial skills – Evolution of Management thoughts: Scientific Theory of Management - Administrative Theory of Management - Hawthorne Experiment - Modern Approach – Management vs. Administration – Managers vs. Entrepreneurs – case studies.

UNIT – II: PLANNING & ORGANIZING 8

Planning – Nature, importance and Principles – Planning Process – Advantages and limitations – Essentials of sound planning – Planning Premises – Types of plans – MBO – Decision Making. Organizing – Principles, Process and Structure - Types of organization – Departmentation – Delegation of Authority and Decentralisation – Authority vs. Power – Span of Management – case studies.

UNIT – III: STAFFING, DIRECTING & CONTROLLING 12

Human Resource Planning – Recruitment – Selection process – Training Methods – Methods of Performances appraisal - Motivational techniques – Leadership – Communication – Controlling: Process – Need – Types – Techniques – Essentials of effective Control system – case studies.

UNIT – IV: ENGINEERING ETHICS 9

Profession – Understanding of Ethics – Reasons for Studying Ethics - Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - Safety and risk – Assessment of safety and risk – Risk benefit analysis – Engineering Ethics – Variety of moral issues – Types of inquiry – Moral autonomy – Kohlberg's theory –

Gilligan's theory – Consensus and Controversy – Models of Professional Roles – Theories about right action – Self-interest - Uses of ethical theories.

UNIT V: RESPONSIBILITIES AND RIGHTS 8

Collegiality and loyalty – Respect for authority – Collective Bargaining – Confidentiality – occupational crime – Professional rights – Employee rights – Intellectual Property Rights (IPR) – Moral leadership – Sample code of conduct.

Total hours = 45

OUTCOME:

- Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

TEXT BOOKS

1. Harld Kooritz & Heinz Weihrich "Essentials of management", Tata McGraw –Hill, 1998.
2. Joseph L Massie, "Essentials of management", prentice hall of india, (Pearson) Fourth Edition, 2003.
3. Mike martin and Ronald Schinzinger, "Ethics in Eingineering", McGraw Hill, New york, 1996.

REFERENCES

1. Tripathy PC and reddy PN, " Principles of Management", Tata Mcgraw Hill, 1999.
2. Decenzo David, Robin Stephen A, "Personnel and Human Reasons Management ", Prentice hall of India, 1996.
3. JAF Stomer, Freeman R.E and Daniel R Gilbert Management, Pearson Education, Sixth Edition, 2004.
4. Fraidoon Mazda, "Engineering Management", Addison Wesley, 2000.
5. Charles D Fleddermann,"Engineering Ethics", Prentice Hall, New Mexico, 1999.
6. Laura Schlesinger, "How Could You Do That: the Abdication of Character, Courage,and Conscience", Harper Collins, New York, 1996.
7. Stephen Carter, "Integrity", Basic Books, New York, 1996.

8. Tom Rusk, “The Power of Ethical Persuasion: From Conflict to Partnership at Work and in Private Life”, Viking, New York, 1993.