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

FACULTY OF ENGINEERING, TECHNOLOGY AND MANAGEMENT SCIENCES

V.M.K.V. ENGINEERING COLLEGE, SALEM

&

AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY PAIYANOOR,

CHENNAI

DEPARTMENT OF CIVIL ENGINEERING

B.E – FULL TIME – CIVIL ENGINEERING

CURRICULUM AND SYLLABUS

2012 onwards

INDEX

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.

DURATION OF THE COURSE

(FULL TIME)

4 YEARS

COURSE OF STUDY

B.E. - CIVIL ENGINEERING (FULL TIME) - REGULATIONS -2012

SEMESTER I

SL. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1		English for Effective Communication	3	0	0	3
2		Engineering Mathematics – I	3	1	0	4
3		Computer Foundation Programme	3	0	0	3
4		Environmental Science and Engineering	3	0	0	3
5		Engineering Physics	3	0	0	3
6		Engineering Mechanics - Statics	3	0	0	3
PRACTICAL						
7		Engineering Physics Lab	0	0	4	2
8		Workshop Practice	0	0	4	2
9		Computer Foundation Programme Lab	0	0	2	2
		TOTAL	**18**	**1**	**10**	**25**

SEMESTER II

SL.No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1		Business English	3	0	0	3
2		Engineering Mathematics – II	3	1	0	4
3		Engineering Chemistry	3	0	0	3
4		Programming in C	3	0	0	3
5		Basic Electrical and Electronics Engineering a) Electrical Engineering b) Electronics Engineering	3	0	0	3
PRACTICAL						
6		Engineering Graphics	2	0	3	3
7		Electrical and Electronics lab	0	0	3	2
8		Programming in C Lab	0	0	3	2
9		Engineering Chemistry Lab	0	0	2	2
		TOTAL	**18**	**1**	**11**	**25**

SEMESTER III

SL.No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1		Advanced Engineering Mathematics	3	1	0	4
2		Mechanics of Solids- I	3	1	0	4
3		Building Science - I	3	0	0	3
4		Mechanics of Fluids	3	1	0	4
5		Surveying I	3	1	0	4
6		Engineering Geology	3	0	0	3
PRACTICALS						
1		Strength of Materials lab	0	0	4	2
2		Survey Practical I Lab	0	0	4	2
		TOTAL	**18**	**4**	**8**	**26**

SEMESTER IV

SL.No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1		Numerical Methods	3	1	0	4
2		Construction Techniques, Equipment And Practices	3	0	0	3
3		Mechanics of Solids- II	3	1	0	4
4		Environmental Engineering I	3	0	0	3
5		Applied Hydraulic Engineering	3	1	0	4
6		Surveying II	3	1	0	4
PRACTICALS						
1		Hydraulic Engineering Lab	0	0	4	2
2		Survey Practical II Lab	0	0	4	2
		TOTAL	**18**	**4**	**8**	**26**

SEMESTER V

SL.No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1		Structural Analysis I	3	1	0	4
2		RCC Design I	3	1	0	4
3		Environmental Engineering II	3	0	0	3
4		Design of Steel Structures I	3	1	0	4
5		Soil Mechanics	3	1	0	4
6		Elective - I	3	0	0	3
PRACTICALS						
1		Computer Aided Building Drawing Lab	0	0	4	2
2		Soil Mechanics Lab	0	0	4	2
3.		Professional Communication and Personality development	0	0	4	2
		TOTAL	**18**	**4**	**8**	**28**

SEMESTER VI

SL.No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1		Structural Analysis II	3	1	0	4
2		RCC Design II	3	1	0	4
3		Transportation Engineering I	3	0	0	3
4		Design of Steel Structures II	3	1	0	4
5		Foundation Engineering	3	1	0	4
6		Elective II	3	0	0	3
PRACTICALS						
1		Computer Aided Design and Drawing Lab	0	0	4	2
2		Concrete and Construction Technology Lab	0	0	4	2
3		Survey Camp	-	-	-	2
		TOTAL	**18**	**4**	**8**	**28**

SEMESTER VII

SL.No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1		Estimating and Cost Engineering.	3	1	0	4
2		Irrigation Engineering	3	0	0	3
3		Construction Planning and Scheduling	3	1	0	4
4		Engineering Management and Ethics	3	0	0	3
5		Transportation Engineering II	3	0	0	3
6		Elective III	3	0	0	3
PRACTICALS						
1		Comprehension Lab	0	0	4	2
2		Environmental Engineering Lab	0	0	4	2
		TOTAL	**18**	**2**	**8**	**24**

SEMESTER VIII

SL.No.	COURSE CODE	COURSE TITLE	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	0	0	12	6
TOTAL			**9**	**0**	**12**	**15**

LIST OF ELECTIVES

Sl.No.	COURSE CODE	COURSE TITLE	L	T	P	C
1.		Hydrology	3	0	0	3
2.		Remote Sensing Techniques and Applications	3	0	0	3
3.		Housing Planning & Management	3	0	0	3
4.		Traffic Engineering Management	3	0	0	3
5.		Management of Irrigation Systems	3	0	0	3
6.		Prefabricated structures	3	0	0	3
7.		Ground Improvement Techniques	3	0	0	3
8.		Introduction to Soil Dynamics and Machine Foundations	3	0	0	3
9.		Geographical Information System	3	0	0	3
10.		Electronic Surveying	3	0	0	3
11.		Pre-stressed Concrete Structures	3	0	0	3
12.		Air Pollution Management	3	0	0	3
13.		Bridge Structures	3	0	0	3
14.		Storage Structures	3	0	0	3
15.		Tall Buildings	3	0	0	3
16.		Structural Dynamics	3	0	0	3
17.		Wind Engineering	3	0	0	3
18.		Total Quality Management	3	0	0	3

19.		Municipal Solid Waste and Management	3	0	0	3
20.		Computer Aided Design of Structure	3	0	0	3
21.		Industrial Waste Management	3	0	0	3
22.		Industrial Structures	3	0	0	3
23.		Smart Structures and smart Materials	3	0	0	3
24.		Finite Element Technique	3	0	0	3
25.		Design of Plate and Shell Structures	3	0	0	3
26.		Repair and Rehabilitation of Structures	3	0	0	3
27.		Cyber Security	3	0	0	3

FIRST YEAR B.E. / B.TECH

SEMESTER	CODE	SUBJECT	L	T	P	C
I		ENGLISH FOR EFFECTIVE COMMUNICATION	3	0	0	3

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

OBJECTIVES

- To make the students of Engineering courses learn English for Effective communication
- To make them competent enough in the use of English in todays Global scenerio
- To make our Engineering Graduates fit for any MNC today.

UNIT – I **9**

Word formation with prefixes and suffixes, Antonyms & Synonyms-Tense Forms - Different kinds of Nouns and Pronouns - Use of Verbs and Adverbs – Adjectives - Sentence Pattern (SVOCA) - Conditional Sentences - Auxiliary and Modal verbs – Articles.

UNIT – II **9**

Phonetics (Vowels, Consonants and Diphthongs) - Pronunciation Guidelines - Vocabulary (Homophones).

UNIT – III **9**

Principles of Communication - Defining and Describing Objects - Listening for Information and Making Inferences - Understanding Ideas and Making Inferences.

UNIT – IV **9**

How to write reports, report writing – Recommendations - Discussing data and coming to conclusions - Rearranging the jumbled sentences.

UNIT – V **9**

Skimming - Scanning – Flowcharts - Pie-charts - Formal and Informal letters - Resume Writing.

Total: 45 hours

OUTCOME:

1. It is hoped that the students who are taught the revised English for Effective communication syllabus will be able to communicate in English.
2. This syllabus will enable our U.G Engineering graduates to face any challenges with confidence and they will prove with their counter part any where in the globe.

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		ENGINEERING MATHEMATICS – I	3	1	0	4

(Common to the Branches MECH, ECE, CSE, CSSE, EEE, EIE, CIVIL, IT, MECHTRONICS, AERONAUCTICAL, ETC, AUTOMOBILE)

OBJECTIVES:

The syllabus for the Engineering Mathematics I have been framed catering to the needs of the Engineering students. It is purely applications oriented. To mention a few i) To utilize the powerful features of MATLAB one has to be an expert in Matrix theory (ii) The matrix theory plays an vital role in simplifying large arrays of equation and in determining their solution.(iii) Partial differential equation frequently occured in the theory of elasticity and Hydraulics.(iv) In circuit branches the current flow can be calculated by using Laplace transform when EMF,resistance and inductions are known.

UNIT I - MATRICES **9**

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 - DIFFERENTIAL CALCULUS **9**

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

UNIT III - FUNCTIONS OF SEVERAL VARIABLES **9**

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

UNIT IV - LAPLACE TRANSFORMS **9**

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 V - APPLICATIONS OF LAPLACE TRANSFORMS **9**

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.

Total hours : 60

Lecture Hours : 45

Tutorial Hours : 15

OUTCOME:

- At the end of this course the students will be in a position to apply the knowledge of Mathematics in the respective Engineering branches.

TEXT BOOKS

"Engineering Mathematics**"** by Department of Mathematics, VMUVeerarajan, T., "Engineering Mathematics", Tata McGraw Hill Publishing Co., NewDelhi, 2006.

1. Dr.A .Singaravelu , Engineering Mathematics Volume I & Volume II by Meenakshi Publications.

REFERENCE BOOKS

1. Grewal, B.S., "Higher Engineering Mathematics" (36^{th} Edition), Khanna Publishers, Delhi 2001.

2. Kreyszig, E., "Advanced Engineering Mathematics" (8^{th} Edition), John Wiley and Sons (Asia) Pvt Ltd., Singapore, 2001.

3. Kandasamy .P., Thilagavathy. K., and Gunavathy. K., "Engineering Mathematics", Volumes I & II (4^{th} edition), S.Chand & Co., New Delhi., 2001.

SEMESTER	CODE	SUBJECT	L	T	P	C
I		COMPUTER FOUNDATION PROGRAM	3	0	0	3

(Common to all Branches)

OBJECTIVE:

The proposed course exposes the students to IT Essentials. The Core Modules of this paper includes Programming, Database and Operating system and other related topics.

UNIT I - Basics of Computer and Information Technology 9

Digital computer fundamentals-Block diagram of a computer-component of a computer system Hardware and software definitions-Categories of software-Booting-Installing and Uninstalling Software-Software piracy-Software terminologies-Application of Computer-Role of Information Technology-History of Internet-Internet Services.

UNIT II - Problem Solving Methodologies and Techniques 9

Problems solving Techniques-Program development cycle-Algorithm-Design-Flow chart-Program control structures-Types and generation of programming languages-Development of algorithms for simple problems. Top down and Bottom up approaches of software development.

UNIT III - Basics of Computer Architecture and System Software 9

Fundamentals of Computer Architecture-Introduction-Organization of a small computer Central Processing Unit-Execution cycle-Instruction categories – measure of CPU performance Memory-Input/output devices-BUS-addressing modes.

System Software-Assemblers-Loaders and linkers-Compilers and interpreters.

UNIT IV - Basics of Operating System and DBMS 9

Introduction-Basics of memory management schemes-Scheduling-threads.

Introduction to File and Database systems- SQL-DDL statements-DML statements-DCL statements.

UNIT V - Software Applications **9**

Office Automation: Application Packages-word processing-Spread sheet Application and Basics of HTML.

Total: 45 hours

OUTCOMES:

At the end of this course, student shall be able to:

Do Problem Solving using Programming and algorithms, Describe working of Internet based applications, Document artifacts using common quality standards, Design simple data store using DBMS concepts and implement, Develop a working website with all above learning.

REFERENCES

1. Ashok N.Kamthane, programming with ANSI and TURBO C, Pearson Education (India) 2005.
2. V.Ramesh babu, fundamental of computing, VRB publisher, 2004.
3. Carl Hamacher, Zvonko Varnesie and Safwat Zaky, 5th Edition "Computer Organization", McGraw-Hill, 2002.
4. Leland L.Beck, "System Software- An Introduction to Systems Programming", 3rd Edition, Pearson Education Asia, 2000.
5. Abraham Silberschatz, Peter Baer Galvin and Greg Gange, "Operating System Concepts", Sixth Edition, John Wiley & Sons Pvt. Ltd,2003.
6. Abraham Silberschatz, Henry F.Korth and S.Sudarshan – "Database Systems Concepts", Fourth Edition, McGraw-Hill, 2002.

SEMESTER	CODE	SUBJECT	L	T	P	C
I		ENVIRONMENTAL SCIENCE AND ENGINEERING	3	0	0	3

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

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
I		ENGINEERING PHYSICS	3	0	0	3

(Common to all branches of B.E)

OBJECTIVE

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

UNIT – I LASERS **9**

Einstein coefficients (A&B), Nd – YAG laser, CO_2 laser, semiconductor laser (homojunction) – uses of lasers – Holography – construction and reconstruction of a hologram.

UNIT – II 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 (block diagram only) – fibre optic sensors (displacement sensor and pressure sensor).

UNIT – III CRYSTAL PHYSICS **9**

Lattice – unit cell – Bravais lattice – Lattice planes – Miller indices – 'd' spacing in cubic lattice – calculation of number of atoms per unit cell – atomic radius – coordination number – packing factor for SC, BCC, FCC, HCP structures.

UNIT – IV ACOUSTICS **9**

Classification of sound – characteristics of musical sound – loudness – Weber-Fechner law – decibel – absorption coefficient – experimental determination – reverberation – reverberation time – Sabine's formula (no derivation) – factors affecting acoustics of buildings (reverberation time, loudness, focusing, echo, echolen effect, resonance and noise) and their remedies.

UNIT- V NON – DESTRUCTIVE TESTING **9**

Liquid penetrant method – ultrasonic flaw detection – ultrasonic flaw detector (block diagram) – X-ray Radiography: displacement method – X-ray Fluoroscopy – merits and demerits of each method.

Total: 45 hours

OUTCOME:

Students will gain knowledge in the basic concepts of physics which can be applied in Engineering & Technology

TEXT BOOK

1. Gaur R. K. and Gupta S. L., "Engineering Physics", Dhanpat Rai publishers, New Delhi, 2001.
2. Rajendran. V, "Engineering Physics", Tata Mc Graw Hill Publication and Co New Delhi, 2009.

REFERENCE BOOKS

1. Pillai S.O "Solid Sate Physics", New Age International Publication, New Delhi, (2003).
2. Palanisamy P.K. "Physics for Engineers", Scitech publications (India) Pvt. Ltd., Chennai (2005).
3. Rajendran V and Marikani "Physics for Engineers", Tata McGraw Hill Publising Company Ltd, New Delhi (2004).
4. Arumugam M, "Engineering Physics", Anuradha Agencies, Kumbakonam, Second Edition (2005).

SEMESTER	CODE	SUBJECT	L	T	P	C
I		ENGINEERING MECHANICS – STATICS	3	0	0	3

(Common to Mech, Auto, Aero & Civil)

OBJECTIVE:

It is the branch of Engineering Mechanics, which deals with the forces and their effects, while acting upon the bodies at rest..

UNIT – I **9**

Fundamentals of Mechanics: Introduction, Basic Dimensions and units of mechanics, Secondary Dimensional Quantities, Law of Dimensional Homogeneity, Dimensional Relation Between Force and Mass, Unit of Mass, Idealizations of Mechanics, Vector and Scalar Quantities, Equality and Equivalence of Vectors, Law of Mechanics.

Element of Vector Algebra: Introduction, Magnitude and Multiplication of a Vector by a Scalar, Addition and Subtraction of Vectors, Resolution of Vectors: Scalar Components, Unit Vectors, Useful Ways of Representing Vectors, Scalar or Dot Product of Two Vectors, Cross product of Two Vectors, Scalar triple Product, Note on Vector Notation.

UNIT – II **9**

System of Forces: Position Vector, Moment of a Force About a Point and Axis, Couple and Couple moment, Couple Moment as a Free Vector, Addition and Subtraction of Couples, Moment of a Couple about a Line.

Equivalent Force System: Introduction - Translation of a Force to a Parallel position, Resultant of Special Force Systems, Distributed Force Systems.

UNIT – III **9**

Equations of Equilibrium: Introduction, Free Body Diagram, Free Bodies Involving Interior Sections, General Equations of Equilibrium, Problems in Equilibrium I and II, Two Point Equivalent Loading, Problems Arising From Structures, Static Indeterminacy.

UNIT-IV **9**

Friction Forces: Introduction, Laws of Coulomb Friction, Simple and Complex Contact Friction Problems, Transmission of Power Through - Belts, Screw Jack, Wedge, Belt Friction, Square Screw Thread.

UNIT-V **9**

Properties of Surfaces: Introduction, First Moment of an Area and the Centroid and Other Centers, Theorem of Pappus-Guldinus, Second Moments and the Product of an Area of a Plane Area, Transfer Theorems, Computations Involving Second Moments and Products of Area, Relation Between Second Moments and Products of Area, Polar Moment of Area, Principal Axes.**Moments and Product of Inertia:** Introduction, Definition of Inertia Quantities, Relation Between Mass-Inertia Terms and Area-inertia Terms, Translation of Coordinates Axes.

Total: 45 Hours

OUTCOME:

The students would have learned the fundamental of Mechanics systems of forces which are very essential for engineering students to further build up his studies in the mechanical engineering branch.

TEXT BOOK

1 Engineering Mechanics: Statics and Dynamics, Shames Irving H and G.Krishna Mohana Rao., Pearson Education, 2006

2 Engineering Mechanics: Statics and Dynamics, S.Rajasekaran and G.Sankara Subramaniam, Vikas Publishing House Pvt Ltd.,

REFERENCE

1 Engineering Mechanics, Dr. R.K.Bansal, Lakshmi Publications.

2 Engineering Mechanics, R.S.Khurmi, S.Chand Company Ltd.,

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

AIM

To gain the knowledge of taking precise readings from equipments

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		WORKSHOP PRACTICE	0	0	4	2

(Common to all departments - Except Bio-Tech & Bio info)

OBJECTIVE:

To learn the experience of practice in basic sections of the workshop namely fitting, Carpentry and welding in order to know the various methods involved in making parts of the various machines.

FITTING

1. Vee Joint
2. Square Joint
3. Dove Tail Joint

CARPENTRY

1. Planning
2. Half lab
3. Dove Tail Joint

WELDING

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

DEMONSTRATION

1. Sheet Metal – Fabrication of tray and cone
2. Black Smithy – Round to square rod.
3. Foundry – Mould Preparation using single piece and split pattern

OUTCOME:

The students would have been completely exposed to the various basic methods that are going to play in the manufacture of even very heavy machines.

REFERENCE

1. "Basic Workshop Practice ", Department of Mechanical Engineering, VMKV Engineering College, 2008

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

(Common to all Branches)

AIM:

To understand the Basics of Computer and Information Technology skills and Problem Solving Techniques

OBJECTIVE:

The proposed course exposes the students to IT Essentials. The Core Modules of this paper includes Programming, Database and Operating system and other related topics.

UNIT I - Basics of Computer and Information Technology 9

Digital computer fundamentals-Block diagram of a computer-component of a computer system Hardware and software definitions-Categories of software-Booting-Installing and Uninstalling Software-Software piracy-Software terminologies-Application of Computer-Role of Information Technology-History of Internet-Internet Services.

UNIT II - Problem Solving Methodologies and Techniques 9

Problems solving Techniques-Program development cycle-Algorithm-Design-Flow chart-Program control structures-Types and generation of programming languages-Development of algorithms for simple problems. Top down and Bottom up approaches of software development.

UNIT III - Basics of Computer Architecture and System Software 9

Fundamentals of Computer Architecture-Introduction-Organization of a small computer Central Processing Unit-Execution cycle-Instruction categories – measure of CPU performance Memory-Input/output devices-BUS-addressing modes.

System Software-Assemblers-Loaders and linkers-Compilers and interpreters.

UNIT IV - Basics of Operating System and DBMS 9

Introduction-Basics of memory management schemes-Scheduling-threads.

Introduction to File and Database systems- SQL-DDL statements-DML statements-DCL statements.

UNIT V - Software Applications **9**

Office Automation: Application Packages-word processing-Spread sheet Application and Basics of HTML.

Total: 45 hours

OUTCOME:

At the end of this course, student shall be able to:

Do Problem Solving using Programming and algorithms, Describe working of Internet based applications, Document artifacts using common quality standards, Design simple data store using DBMS concepts and implement, Develop a working website with all above learning

TEXT BOOK

1. Faculties, School of Computer Science, "Computer Foundation Program", Anuradha Publication, 2012.

REFERENCES

1. Ashok N.Kamthane, programming with ANSI and TURBO C, Pearson Education (India) 2005.
2. V.Ramesh babu, fundamental of computing, VRB publisher, 2004.
3. Carl Hamacher, Zvonko Varnesie and Safwat Zaky, 5th Edition "Computer Organization", McGraw-Hill, 2002.
4. Leland L.Beck, "System Software- An Introduction to Systems Programming", 3rd Edition, Pearson Education Asia, 2000.
5. Abraham Silberschatz, Peter Baer Galvin and Greg Gange, "Operating System Concepts", Sixth Edition, John Wiley & Sons Pvt. Ltd,2003.
6. Abraham Silberschatz, Henry F.Korth and S.Sudarshan – "Database Systems Concepts", Fourth Edition, McGraw-Hill, 2002.

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

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

OBJECTIVES:

- To make the students understand the principles of basic English Grammar and use it in their day to day life
- To make the Engineering Graduates Employable and Industry ready
- To make our students that they are second to none in the best use of the English language

UNIT – I **9**

Subject and Verb Agreement (Concord) - Active and Passive Voice, Impersonal Passive Voice – Preposition - Common Errors - Direct Speech and Indirect Speech - Cause and Effect - Phrasal Verbs and Idioms and Phrases - Question Tags – Vocabulary.

UNIT – II **9**

Stress (Word Stress and Sentence Stress) – Intonation - Differences in British and American English – Indianism.

UNIT – III **9**

Role Play - Telephonic Etiquettes - Interview Questions (Direct, Open-ended and Closed Questions) - E-mail Netiquette, Sample E-mails.

UNIT – IV **9**

Instruction - Check-list - Minutes of the Meeting and Writing Agenda - Note making.

UNIT – V **9**

Reading Comprehension - Interpreting Tables - Bar charts - Business Letters (Calling for Quotation, Placing Orders and Complaint Letters) - Essay Writing and Developing Hints.

Total: 45 hours

OUTCOME:

1. By teaching this syllabus, it is believed that the UG Engineering graduates will develop their fluency level of using English.
2. Students, who undergo this syllabus, will fulfill the expectations of the industries and find themselves employable in any field.

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.

SEMESTER	CODE	SUBJECT	L	T	P	C
II		ENGINEERING MATHEMATICS – II	3	1	0	4

(COMMON TO THE BRANCHES MECH,ECE,CSE,CSSE,EEE,EIE,CIVIL,IT,MECHTRONICS,AERONAUCTICAL ,ETC,AUTOMOBILE)

OBJECTIVES:

The syllabus for the Engineering Mathematics II have been framed catering to the needs of the Engineering students. It is purely applications oriented. To mention a few (i) Differential equation plays a vital role in finding the solutions of problems related to oscillations of Mechanical and Electrical systems, bending of beam, conduction of heat, velocity of chemical reaction etc.,and as such play an very important role in all modern scientific and engineering studies.(ii) The complex functions are useful in the study of Fluid mechanics, Thermodynamics and electric fields

UNIT I - ORDINARY DIFFERENTIAL EQUATIONS 9

Solutions of third and higher order linear ordinary differential equation with constant coefficients – Method of variation of parameters – Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constant coefficients.

UNIT II - MULTIPLE INTEGRALS **9**

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

UNIT III - VECTOR CALCULUS **9**

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).

UNIT IV - ANALYTIC FUNCTIONS **9**

Function of a complex variable – Analytic function – Necessary conditions - Cauchy Riemann equations – Sufficient conditions (excluding proof) – Harmonic conjugate–Constructions of analytic functions-conformal mapping($w=z+c, w=z^2, w=1/z$)-bilinear transformation

UNIT V - COMPLEX ANALYSIS **9**

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

OUTCOME:

At the end of this course the students will be in a position to apply the knowledge of Mathematics in the respective Engineering branches

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.

REFERENCE BOOKS

1. Grewal, B.S., "Higher Engineering Mathematics" (36^{th} Edition), Khanna Publishers,Delhi 2001.

2. Kreyszig, E., "Advanced Engineering Mathematics" (8^{th} Edition), John Wiley and Sons (Asia) Pvt Ltd., Singapore, 2001.

3. Kandasamy .P., Thilagavathy. K., and Gunavathy. K., "Engineering Mathematics", Volumes I & II (4^{th} edition), S.Chand & Co., New Delhi., 2001

SEMESTER	CODE	SUBJECT	L	T	P	C
II		ENGINEERING CHEMISTRY	3	0	0	3

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

OBJECTIVE

With a solid foundation in basic scientific and engineering principles, while allowing specialization in Engineering chemistry and ability to assess the impact of engineering solutions in a global and societal context.

UNIT I - WATER TECHNOLOGY & CORROSION 9

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 (Sacrificial and Impressed current method).

UNIT II - ELECTROCHEMISTRY, BATTERIES AND FUEL CELLS 9

Ostwald Law and Debye Huckle's law - Cells – Electrode (SHE, Calomel and Glass) - Electrode potential – Nernst equation – EMF series.

Primary cells – secondary batteries – charging and discharging.

UNIT III - CHEMISTRY OF ADVANCED MATERIALS 9

Portland cement –setting and hardening – RCC – Special cements.

Organic electronic material, solid oxide materials, shape memory alloys, nanomaterials, polymers, fullerenes, ceramics, fibers, lubricants, refractories & composites (definition, classific ation and applications)

UNIT IV - PHASE EQUILIBRIA & NUCLEAR CHEMISTRY 9

Phase rule: statement and explanation of terms involved – One component system – Condensed phase rule – Two component system.

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

UNIT V - CHROMATOGRAPHY AND SPECTROSCOPY 9

Chromatography — classification & principles (Paper, column, thin layer, gas, HPLC). Spectroscopy – Electromagnetic radiation – Beer Lambert's law – UV – Visible – IR (Principle and Instrumentation, block diagram) – Atomic absorption spectroscopy.

Total: 45 hours

OUTCOME:

The student will come out with the ability to assess the impact of engineering solutions.

REFERENCES:

1. Engineering Chemistry by S.S. Dara
2. Engineering Chemistry by Jain & Jain.

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

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

OBJECTIVES :

To enable the student to learn programming knowledge in C.

UNIT I **9**

Introduction: Algorithms & flowcharts-Overview of C-Features of C-IDE of C Structure of C program-Compilation & execution of C program-Identifiers, variables, expression, keywords, data types, constants, scope and life of variables, local and global variables. Operators: arithmetic, logical, relational, conditional and bitwise operators- Special operators: size of () & comma (,) operator-Precedence and associativity of operators & Type conversion in expressions.

Basic input/output and library functions: Single character input/output i.e. getch(), getchar(), getche() & putchar()-Formatted input/output: printf() and scanf()-Library Functions: concepts, mathematical and character functions.

UNIT II **9**

Control structures: Conditional control-Loop control and Unconditional control structures.

Functions: The Need of a function-User defined and library function- Prototype of a function-Calling of a function-Function argument-Passing arguments to function- Return values-Nesting of function- main()-Command line arguments and recursion. Storage class specifier – auto, extern, static, & register.

UNIT III **9**

Arrays: Single and multidimensional arrays-Array declaration and initialization of arrays-Array as function arguments.

Strings: Declaration-Initialization and string handling functions.

Structure and Union: Defining structure-Declaration of structure variable-Accessing structure members-Nested structures-Array of structures-Structure assignment-Structure as function argument-Function that returns structure- Union.

UNIT IV **9**

Pointers: The '&' and * operators-Pointers expressions-Pointers vs arrays-Pointer to functions-Function returning pointers-Static and dynamic memory allocation in C.

DMA functions: malloc(), calloc(), sizeof(), free() and realloc()-Preprocessor directives.

UNIT V **9**

File management: Defining, opening & closing a file, text file and binary file- Functions for file handling: 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.

Total: 45 hours

OUTCOMES:

Do develop the skill of the student to develop the programming in C language.

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. Stevens , 'Graphics programming in C', BPB publication, 2006
5. Subbura.R , 'Programming in C', Vikas publishing, 1st Edition, 2000

SEMESTER	CODE	SUBJECT	L	T	P	C
II		BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	0	3

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

A) ELECTRICAL ENGINEERING

UNIT I **8**

Electrical Circuits & Meters

Definition of electromotive force, current, power and energy-International System 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 AC circuits.

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

UNIT II **8**

DC Machines (Qualitative Treatment Only)

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

UNIT III **7**

AC Machines (Qualitative Treatment Only)

Construction & principle of operation of transformers-Single phase & Three phase transformers-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 AND APPLICATIONS **8**

Passive and Active Components – Resistors, Inductors, Capacitors, Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation.

Bipolar Junction Transistor – CB, CE, CC Configuration and Characteristics.

UNIT II: FUNDAMENTALS OF COMMUNICATION ENGINEERING 8

Types of Signals: Analog and Digital Signals – Modulation and Demodulation: Principles of Amplitude Modulation, Angle Modulation, Pulse Amplitude Modulation, Pulse Width Modulation and Pulse Code Modulation

Communication Systems: Radio, High DefinitionTV, MODEM, Fax, Microwave, Radar, Satellite and Optical Fibre, Mobile-Cellphones (block diagram description only).

UNIT III: STUDY OF ADVANCED ELECTRONIC GADGETS 7

High Definition Camera, High Definition Video Camera, Tablet PC, Android Phones, i pods, Video Game Consoles

Total: 46 hours

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.

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. Anokh Singh, Principles of Communication Engineering, S.Chand & Co, 1994.
5. John Kennedy "Electronics Communication System" Tata McGraw Hill.
6. Millman and Halkias, "Electronic Devices and Circuits", Tata McGraw hill.
7. V.K.Mehta,"Principles of Electronics"S.Chand&Co,2002
8. http://en.wikipedia.org/wiki/cell-phone
9. http://en.wikipedia.org/wiki/high-definition-video
10. http://en.wikipedia.org/wiki/tablet-components

11. http://en.wikipedia.org/wiki/cell-phone
12. http://en.wikipedia.org/wiki/android-operating -system
13. http://www.apple.com/pad/
14. http://en.wikipedia.org/wiki/ipad
15. http://en.wikipedia.org/wiki/video-game-console

SEMESTER	CODE	SUBJECT	L	T	P	C
II		ENGINEERING GRAPHICS	2	0	3	3

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

OBJECTIVES:

To develop in student's graphic skill for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

UNIT I - PLANE CURVES AND FREE HAND SKETCHING 9

Curves used in engineering practices:

Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of squad and circle – Drawing of tangents and normal to the above curves.

UNIT II - PROJECTION OF POINTS, LINES AND PLANE SURFACES 9

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.

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 – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

UNIT V - ISOMETRIC AND PERSPECTIVE PROJECTIONS 9

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of prisms, pyramids and cylinders by visual ray method.

Total: 45 hours

OUTCOME:

The students would have learned the engineering graphics which is the basic language for an engineer to communicate is idea in manufacturing the various items.

TEXT BOOKS

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

REFERENCES BOOKS

1. K. V. Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2006).
2. M.S. Kumar, "Engineering Graphics", D.D. Publications, (2007).
3. K. Venugopal & V. Prabhu Raja, "Engineering Graphics", New Age International (P) Limited (2008).
4. M.B. Shah and B.C. Rana, "Engineering Drawing", Pearson Education (2005).
5. K. R. Gopalakrishnana, "Engineering Drawing" (Vol.I&II), Subhas Publications (1998).
6. Dhananjay A.Jolhe, "Engineering Drawing with an introduction to AutoCAD"Tata McGraw Hill Publishing Company Limited (2008).
7. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, (2008).

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

SEMESTER	CODE	SUBJECT	L	T	P	C
II		ELECTRICAL AND ELECTRONICS LAB	0	0	3	2

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

a) ELECTRICAL ENGINEERING LAB

LIST OF EXPERIMENTS

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. Familiarization with Electronic Components like R, L, C and active devices.
2. Familiarization with Bread board, CRO, Power supply (RPS, FPS) and Soldering Practice.
3. Generation of lissajous patterns using CRO.
4. Measurement of amplitude and time period using CRO.
5. Study of the Characteristic of PN-Junction diode with its applications.
6. Study of the Characteristic of Zener diode with its applications
7. Study of the rectifier circuits (Half wave and Full Wave) with its applications.
8. Study of BJT Characteristics with its applications.
9. Study of AM/FM Receiver.
10. Study of advanced electronic gadgets.

SEMESTER	CODE	SUBJECT	L	T	P	C
II		PROGRAMMING IN C LAB	0	0	3	2

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

AIM

To practice and develop applications using C Programming languages.

OBJECTIVE

To make the students to develop program in C languages.

1. Implementation of Sine and cosine series.
2. Generation of Fibonacci series.
3. To find the i) Factorial number.
   ii) Sum of n natural numbers.
4. Reversing the digits of an integer
5. Conversion of decimal number to octal number
6. Conversion of character integer to decimal number
7. Finding the square root of a given number by applying algorithm
8. (a) Find GCD of two numbers
   (b) Generate Prime numbers between 1 and n.
9. Greatest of three numbers using if statement and conditional operator.
10. Read two numbers and swap those two numbers using temporary variable and without using temporary variable.
11. Quadratic equation for different sets of inputs.
12. Use of switch….Case statements.
13. Matrix operations
    a. Addition
    b. Transpose
    c. Multiplication
14. Ascending and Descending order.
15. Given a set of n numbers, find the length of the longest monotone increasing subsequence.

16. Sort by exchange, selection and partitioning method

17. Use of pointers and array of pointers

18. Linear search.

19. Binary search.

20. Files operations.

OUTCOME:

At the end of the course, the students will be able to develop applications using C Programming languages.

SEMESTER	CODE	SUBJECT	L	T	P	C
II		ENGINEERING CHEMISTRY LAB	0	0	3	2

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

OBJECTIVE

To learn the relevant experience using laboratory experiments

1. Estimation of total hardness of water sample by EDTA method.
2. Determination of alkalinity by indicator method.
3. Estimation of ferrous ion by Potentiometry.
4. Titration of strong acid with strong base 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.

OUTCOME

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

SEMESTER	CODE	SUBJECT	L	T	P	C
III		ADVANCED ENGINEERING MATHEMATICS	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.
- Transform techniques are very useful in the field of signal and system analysis.
- Z - transform plays an important role in analysis of Discrete signals. This is a prelude to learn higher semester courses.

1. PARTIAL DIFFERENTIAL EQUATIONS 9

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.

2. FOURIER SERIES 9

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

3. BOUNDARY VALUE PROBLEMS 9

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.

4. FOURIER TRANSFORMS 9

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

5. Z - TRANSFORM 9

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

Tutorial : 15

Total hours: 60

Credits : 04

OUTCOME:

To impart analytical ability in solving Mathematical problems as applied as the respective branches of Engineering.

- Analyze real world scenarios to recognize when partial differential equations or systems of PDEs are appropriate, formulate problems and in order to solve the problems using multiple approaches.
- Analyze the spectral characteristics of continuous time periodic and periodic signals using Fourier series.
- Relate the properties of Fourier series with their engineering subjects during their course of study
- Apply the knowledge gathered in the subject to Signal processing
- Gain the knowledge in vibrations of stretched strings.
- Develop the fundamental ideas of D Alembert's solution of the wave equation
- Understand the concepts of Steady state conditions

TEXT BOOK:

A.Singaravelu,"Transforms and Partial Differential Equations", Meenakshi Agencies,Chennai

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), Khanna Publishers,Delhi 2000.

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

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

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 - Design of buffer 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.

SEMESTER	CODE	SUBJECT	L	T	P	C
III		BUILDING SCIENCE I	3	0	0	3

OBJECTIVE

- At the end of this course the student should have learnt about the various materials, both conventional and modern, that are commonly used in civil engineering construction.
- He should be able to appreciate the criteria for choice of the appropriate material and the various tests for quality control

UNIT -1 STONES – BRICKS – CONCRETE BLOCKS 9

Classification - Selection - Application of stone in buildings - Requirement and testing of stones – Deterioration and preservation of stone work - Artificial stones. Manufacture of bricks - classification - Qualities - Test on Bricks - Fire bricks - building blocks types and uses - joist and filter blocks - Curved shell units - 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 – Code of Practices.

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 – Code Practices.

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 – Code Practices.

UNIT -5 SPECIAL MATERIALS **9**

Glass - Ceramics - Sealants for joints - Sheets for pitched roof coverings - Fibre glass reinforced plastic – Clay products - Refractories - Composite materials - Types - Applications of laminar composites - Fibre textiles – mats and pads for earth reinforcement - Recycling of Industrial waste as building material - Polymers in Civil Engineering.

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

REFERENCES:

1. P.C.Varghese,”Building Materials,”PHI learningPvt,ltd,2005
2. National Building Code of India, “Building Materials ", Part V,2005

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

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 SIMILITUDE AND MODEL STUDY 9

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

Tutorial : 15 hours

Total Hours: 60 hours

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.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
III		SURVEYING I	3	1	0	4

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 trainagles - 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 - Curve ranging - Horizontal and vertical curves - Simple Curves - setting with chain and tapes, tangential angles by theodolite, double theodolite - Compound and reverse curves - Transistion curves - Functions and requirements - Setting out by offsets and angles - Vertical curves - Sight distances - Mine Surveying - Instruments - Tunnels - Correlation of underground and surface surveys - Shafts - Audits.

Tutorial : 15 hours

Total Hours : 60 hours

OUTCOMES:

- Students are expected to use all surveying equipments, prepare LS & CS, contour maps and 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.

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 points - 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 -5 GEOLOGICAL INVESTIGATIONS IN CIVIL ENGINEERING 9

Projects - Geological conditions necessary for construction of Dams, Tunnels, Buildings, Road cuttings, Lad slides - causes and preventions. Sea erosion and coastal Protection.

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

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.

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 Rockwell Vicker's (any 2) Brinnel	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 I	0	0	4	2

OBJECTIVE

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

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.

OUTCOMES:

- 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

SEMESTER	CODE	COURSE TITLE	L	T	P	C
IV		NUMERICAL METHODS	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**.**

1. SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS 9

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.

2. INTERPOLATION AND APPROXIMATION 9

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

3. NUMERICAL DIFFERENTIATION AND INTEGRATION 9

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.

4. INITIAL VALUE PROBLEMS OF ODE 9

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.

5. BOUNDARY VALUE PROBLEMS FOR ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS **9**

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.

Practical: 30

Total hours: 60

Credits: 04

OUTCOME:

The students will be able to

- Relate their subject knowledge with their experiments during their course of study.
- Understand the use of numerical methods in modern scientific computing with finite precision computation.
- Solve an algebraic or transcendental equation using an appropriate numerical method.
- Solve their engineering problems using interpolation techniques.
- Understand the calculation and interpretation of errors in numerical methods.
- Identify the numerical techniques for their engineering problem.

TEXT BOOK

1. A. Singaravelu ,"Numerical Methods" , Meenakshi Agency, Chennai
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. N.Subramanian,Numerical Methods,SCM Publishers,Erode.

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

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 CONSTRUCTION PRACTICES: 9

Specifications, Details and sequences of activities and construction Coordination Site Clearance – Marking – Earthwork – Masonry – Stone masonry – concrete hollow block masonry – flooring – damp proof courses – construction joints – movement and expansion joints- precast pavements – building foundations , basements – temporary shed – centering and shuttering sheet piles – slip forms – scaffoldings – deshuttering forms – fabrication and erection of steel trusses – frames – braced domes – laying brick weather and water proof – roof finishes- air conditioning – acoustic and fire protection.

UNIT – II SUBSTRUCTURE CONSTRUCTION 9

Techniques of box jack – pipe jacking under water construction of diaphragm walls and basement. Tunneling techniques – piling techniques – driving well and caisson – sinking coffer dams – Cable anchoring and grouting driving diaphragm walls, sheet piles – shoring for deep cutting – large reservoir construction with membrane and Earth systems – well points – Deshuttering and stand by plant equipment for underground open excavation.

UNIT – III SUPER STRUCTURE CONSTRUCTION 9

Launching girders, bridge decks, off shore platforms – special forms for shell – techniques for heavy decks and insitu precasting in high rise structures , aerial transporting handling – erecting light weight components on tall structures – erection of transmission line towers – construction sequences in cooling towers, silos, chimneys, sky scrapers, bow string bridges, cable stayed bridges – support structure for heavy equipment and conveyors – erection of articulated structures braced domes and space decks.

UNIT – IV REPAIR AND REHABILITATION **9**

Study on causes of building damage and deterioration – assessment of materials and methods of repair and restoration.

UNIT –V CONSTRUCTION EQUIPMENT **9**

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

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. Punmia B.C., Ashok Kumar Jain, Arun Kumar Jain, "Building Construction ", Laxmi Publications Pvt Ltd,NewDelhi,2005

REFERENCES:

1. Roy Chudley. "Construction Technology ", Vol.1, 2, 3,4. ELBS Publisher, 2005.

2. " National Building Code of India ", Parts III, IV,VII and IX, 1983.

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

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-Williot Mohr Diagram

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

Spherical and deviatric components of stress tensor - Determination of Principal stresses and principlal planes - Volumetric strains - Dilatation and distortion - theories of failure - Principal stress, principal strain, shear stress, strain energy and distortion energy theories - application in analysis of stress, load carrying capacity and design of members - Interaction problems and interaction curves.

UNIT - 5 ADVANCED TOPICS IN BENDING OF BEAMS 9

Unsymmetrical bending of beams of symmetrical and unsymmetrical sections - curved beams - Winkler Bach Formula –Shear centre- 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 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. 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.

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

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 of water treatment
- 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.

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

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

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 addressing problems in open channels.
- They will possess the skills to solve problems in uniform, gradually and rapidly varied flows in 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.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
IV		SURVEYING II	3	1	0	4

OBJECTIVE

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

- Tachometric surveying,
- Control surveying,
- Survey adjustments,
- Astronomical surveying
- 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 ASTRONOMICAL SURVEYING 9

Celestial sphere - Astronomical terms and definitions - Motion of sun and stars - Apparent altitude and corrections - Celestial co-ordinate systems - Different time systems -

Nautical almanac - Star constellations - Practical astronomy - Field observations and calculations for azimuth.

UNIT -5 OTHER TOPICS **9**

Photogrammetry - Introduction - Terrestrial and aerial Photographs - Stereoscopy - Parallax - Electromagnetic distance measurement - Carrier waves - Principles - Instruments - Trilateration - Hydrographic Surveying – Tides - MSL - Sounding and methods - Location of soundings and methods - Three point problem - Strength of fix - Sextants and station pointer - River surveys - Measurement of current and discharge -Cartography - Cartographic concepts and techniques - Cadastral surveying - Definition - Uses - Legal values -Scales and accuracies.

Tutorial : 15 hours

Total Hours : 60 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 error sources
- 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 Hill Book Company, 1985.

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

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.

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	0	0	4	2

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)

OUTCOMES:

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

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 -I	3	1	0	4

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. "Comprehensive Structural Analysis – Vol. 1 & Vol. 2", Vaidyanadhan. R and Perumal. P, Laxmi Publications, New Delhi, 2003
2. Jain A.K. and Arya A.S., Structural Analysis, Vol.II, Nemchand Publishers, Roorkee, 1996

REFERENCES:

1. Manicka Selvam V.K.,Elementary Matrix Analysis of Structures, Khanna Publishers, Delhi,1994
2. D. Menon," Structural Analysis",Alpha Science International, Limited, 2008

SEMESTER	CODE	COURSE TITLE	L	T	P	C
V		R.C.C. DESIGN – I	3	1	0	4

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- design of flexural members and slabs by working stress method and ultimate load method- moment of resistance (limited stress approach)

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 and crack width control

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 FOOTINGS AND MASONRY STRUCTURES 9

Design of wall footing-design of axially and eccentrically loaded rectangular footing-design of combined rectangular footing for two columns only- design of masonry walls, pillars and footings as per IS codes and NBC

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. Design Aids to IS 456-1978 (SP-16)
3. Code of Practice for Plain and Reinforced Concrete – IS456-2000

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

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 pumping stations
- required understanding on the characteristics and composition of sewage, self purification of 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.

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

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 also know to determine engineering properties through standard tests and empirical correction with 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		DESIGN OF STEEL STRUCTURES I	3	1	0	4

OBJECTIVE

This course covers

- Properties of steel sections
- The design of structural steel members subjected to compressive, tensile and bending loads, as per current codal (IS 800 -2007) provisions including connections.
- Design of lacing and battening type columns
- Design of Built up beams
- Design of structural systems such as roof trusses.

UNIT 1 INTRODUCTION **9**

Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures – Metal joining methods using welding, bolting – Design of bolted, and welded joints – Eccentric connections - Efficiency of joints – High Tension bolts

UNIT 2 TENSION MEMBERS **9**

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 3 COMPRESSION MEMBERS **9**

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 lacing and battening type columns

UNIT 4 BEAMS **9**

Design of laterally supported and unsupported beams – Built up beams-Beams subjected to bi-axial bending.

UNIT 5 ROOF TRUSSES AND INDUSTRIAL STRUCTURES 9

Roof trusses – Roof and side coverings – Design loads, design of purlin and elements of truss; end bearing

Tutorial=15

Total Hours = 60

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. N. Subramanian,"Design of Steel Structures: Theory and Practice,Oxford University Press, Incorporated, Mar-2011

2. S.K.Duggal,"Design of steel Structures",Mc Graw hill Publishers,2009

REFERENCES:

1. L S Negi, Design of Steel structures, Tata McGraw Hill, 1995

2. Ram K.S.Sai,"Design of Steel Structures,Pearson Publications,2010

3. P Dayaratnam, Design of Steel Structures, A H Wheeler & Co., 1999

ELECTIVE I

SEMESTER	CODE	COURSE TITLE	L	T	P	C
V		PROFESSIONAL COMMUNICATION AND PERSONALITY DEVELOPMENT	0	0	4	2

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, Short Communications, Proposals, Briefs, Reports, etc.

- Final Evaluation will be based on a Real-time research article based on current research carried out in the Institution or by any Faculty of the Institution (Good articles can be submitted to Journals co-authored by the Student and Faculty, with affiliation to the Institution)

UNIT I – COMMUNICATION AND SELF DEVELOPMENT

Basic Concepts of Communication; Process of Communication; Types of Formal communication; The Media of Communication; Channels of Communication; Barriers in Communication; How to Overcome Barriers to Communication.

UNIT II - GRAMMAR & SYNTAX

Synonyms; Antonyms; Words used as different parts of speech; Spotting errors; Concord; Principle of proximity between subject and verb.

Sentence Structure; Combination and Transformation of sentences; Verb Patterns in English.

UNIT III - READING AND WRITING SKILLS

Purpose and Process of Reading; Reading Tactics; Reading Strategies; Reading Comprehension; Paraphrase; Preparing outlines of paragraph/text.

Elements of Effective Writing; Job Application, Bio-data, Personal Resume and Curriculum Vitae;

Preparing Agenda and Minutes of a Meeting; Back office job for organizing a conference/seminar; Writing

Styles; Scientific and Technical Writing; Summary Writing; Writing paragraphs; Writing Essays.

UNIT IV – LISTENING AND SPEAKING SKILLS

Process of listening; Hard and Soft Skills; Feedback Skills; Essentials of Good Communications; Types of Listening; Barriers to Listening; Note taking and Note making.

Skills of Effective Speaking; Component of an Effective Talk; Tone of Voice; Accent, Body Language;

Timing and Duration of Speech; Audio-Visual Aids in Speech.

UNIT V – TECHNICAL REPORT, RESEARCH CASE STUDY & REPORTING

Main considerations in writing a good report; Types and Structure of Reports; Collecting Data; Technical Proposals; Visual Aids; General Tips for Writing Reports.

Research Case Study and Reporting

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
V		COMPUTER AIDED BUILDING DRAWING	0	0	4	2

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

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 ENGINEERING LABORATORY	0	0	4	2

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)

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.

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

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 1 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 2 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		RCC DESIGN - II	3	1	0	4

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 prestrerssing and post tensioning- Uniform and nonuniform pre – stressing – 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. Mac ginely, T.J. Reinforced Concrete Design, Theory and Examples – E and N Spon Limited London 1978.
2. Park R. and Paulay T., Reinforced Concrete Structures – John Wiley and Sons, 1975.
3. A.M. Neville, Properties of Concrete Structures, 4^{th} Edn., - Longman (Perason Education).

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

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VI		TRANSPORTATION ENGINEERING – I	3	0	0	3

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 civil Engineering 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		DESIGN OF STEEL STRUCTURES II	3	1	0	4

OBJECTIVES

This course covers the design of

- Plate girder
- Gantry girder
- Columns
- Light gauge steel sections
- Design of beams using plastic theory.

UNIT I PLATE GIRDER 9

Design of plate girders – web and flange design – curtailment of flange plates – Design of stiffeners and splices.

UNIT I I GANTRY GIRDERS 9

Introduction - Loading Considerations – Maximum Loads Effects – Fatigue Effects – Selection of Gantry Girder – Design of Gantry Girder.

UNIT III COLUMNS SUBJECTED TO COMBINED BENDING AND AXIAL LOADS 9

Design of simple and built up columns subject to combined bending and axial loads – design of column base and connection to foundation.

UNIT IVLIGHT GAUGE STEEL SECTIONS 9

Behaviour – Design of flexural and compression members

UNIT V PLASTIC THEORY 9

Shape factor – plastic hinge – plastic moment – plastic analysis of beams – design of beams.

Tutorial = 15

Total Hours = 60

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 designstructural systems such as roof trusses and gantry girders.

TEXT BOOKS

1. N. Subramanian,"Design of Steel Structures: Theory and Practice,Oxford University Press, Incorporated, Mar-2011

2. S.K.Duggal,"Design of steel Structures",Mc Graw hill Publishers,2009

REFERENCES:

1. L S Negi, Design of Steel structures, Tata McGraw Hill, 1995

2. Ram K.S.Sai,"Design of Steel Structures,Pearson Publications,2010

3. P Dayaratnam, Design of Steel Structures, A H Wheeler & Co., 1999

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

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 VI

ELECTIVE II

The Elective Subject Can be Selected from Elective List

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

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 –riveted joints 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 COME:

- 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

REFERENCES:

1. Krishnamurthy, D, Structural Design and Drawing Vol.II, CBS, Publishers & Distributors, Delhi, 1990
2. Krishnamurthy, D, Structural Design and Drawing Vol.III (Steel Structures), CBS, Publishers & Distributors, Delhi, 1990

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

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
6. Compaction Factor test on Concrete

Cycle -II

7. Crushing Strength Test on Aggregates
8. Impact Resistance Test on Aggregates
9. Slump cone on concrete
10. Flow table test on concrete
11. Cube and Cylinder strength on concrete

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

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		ESTIMATING AND COST ENGINEERING	3	1	0	4

OBJECTIVE

- This subject covers the various aspects of estimating of quantities of items of works involved in buildings, water supply and sanitary works, road works and irrigation works.
- This also 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, tower head, surplus weir, earthen dam.

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 CASH FLOW AND COST CONTROL **9**

Cash flow –cash inflow – outflow – cost control-tools and techniques – cost control in construction projects – Exercise on cash flow in Civil Engineering projects-report Preparation

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. Fixation of fair rent - Mr. B.Kanagasabapathy, M/s. Ehilalarasi Kanagasabapathy, Thiruchirappalli.

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

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 and management 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 & SCHEDULING	3	1	0	4

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		ENGINEERING MANAGEMENT & ETHICS	3	1	0	4

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.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VII		TRANSPORTATION ENGINEERING – II	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 VII

ELECTIVE III

The Elective Subject Can be Selected from Elective List

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

OBJECTIVE:

The main objective of the subject is to prepare the students for attending interviews and competitive exams.

During the lab hours the basics in all subjects will be taught followed by Objective type test

Unit – I

Strength of Materials

Mechanics of Solids

Mechanics of Fluids

Environmental Engineering

Unit – II

Applied Hydraulic Engineering

Design of R.C.Structures

Design of steel Structures

Transportation Engineering

Unit - III

Surveying

Concrete and Construction Technology

Soil Mechanics

Engineering Geology

Unit – IV

Architecture

Structural Analysis

Foundation Engineering

Irrigation Engineering

Unit – V

Estimating and Cost Engineering

Basics of Remote Sensing and GIS

Building Science

Hydrology

TOTALHOURS: 45

OUTCOME:

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

REFERENCES:

1. National Building Code of India, "Building Materials ", Part V,2005
2. Er.R.K.Rajput,"Strength of Materials"S.Chand Publications,New Delhi,2006
3. Dr.R.K.Bansal," A Textbook of Strength of Materials"Laxmi Publications,2010
4. Rangwala, S.C., "Engineering Materials ", Charotar Publishing House, Anand, 2008
5. Dr.R.K.Bansal,"FluidMechanics", LakshmiPublications, 2008
6. Punmia B.C., " Surveying ", Vols. I , II and III, Laxmi Publications, 2005.
7. Parbin Singh, "Engineering and General Geology ", Katson Publication House, 2009
8. Garg, S.K., "Environmental Engineering I" , Khanna Publishers, New Delhi, 2005
9. Jain A.K., " Fluid Mechanics (including Hydraulic Machines) ", Khanna Publishers, 8th edition, 1995.
10. "Comprehensive Structural Analysis – Vol. 1 & Vol. 2", Vaidyanadhan. R and Perumal. P, Laxmi Publications, New Delhi, 2003
11. Vargheese P C," Limit State Design of Reinforced Concrete", Prentice Hall of India, Private, Limited New Delhi, 2004
12. Khanna K and Justo C E G, "Highway Engineering", Khanna Publishers, Roorkee, 2001
13. Punmia P.C., Ashok Kumar Jain,Arun Kumar Jain, " Soil Mechanics and Foundations ", Laximi Publications Pvt.Ltd,New Delhi,2005
14. N. Subramanian,"Design of Steel Structures: Theory and Practice,Oxford University Press, Incorporated, Mar-2011

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

16. S. P. Bindra," A Course in Docks and Harbour Engineering",Dhanput Rai, 1992

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)

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 VIII

ELECTIVE IV

The Elective Subject Can be Selected from Elective List

SEMESTER VIII

ELECTIVE V

The Elective Subject Can be Selected from Elective List

SEMESTER VIII

ELECTIVE VI

The Elective Subject Can be Selected from Elective List

SEMESTER	CODE	COURSE TITLE	L	T	P	C
VIII		PROJECT WORK	0	0	12	6

OBJECTIVE

The objective of the project work is to enable the students to work in convenient groups of not more than four members in a group on a project involving theoretical and experimental studies related to Civil Engineering. Every Project Work shall have a Guide who is a member of the faculty of Civil Engineering of the college where the student is registered. The hours allotted for this course shall be utilized by the students to receive directions from the Guide, on library reading, laboratory work, computer analysis or field work and also to present in periodical seminars the progress made in the project.

Each student shall finally produce a comprehensive report covering background information, literature Survey, problem statement, Project work details and conclusions.

This experience of project work shall help the student in expanding his / her knowledge base and also provide opportunity to utilise the creative ability and inference capability.

Total Hours: 45

OUTCOME:

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

EVALUATION PROCEDURE

The method of evaluation will be as follows:

1. Internal Marks : 20 marks

(Decided by conducting 3 reviews by the guide appointed by the Institution)

2. Evaluation of Project Report : 30 marks

(Evaluated by the external examiner appointed the University).

Every student belonging to the same group gets the same mark

3**. 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

LIST OF ELECTIVES

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

OBJECTIVE

- At the end of the semester, the student shall be having a good understanding of all the components of the hydrological cycle.
- 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.,

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

OBJECTIVE

- At the end of the course the student will posses knowledge of Remote Sensing Techniques and its application in natural resource management.
- 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

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. Steven, M.D, and Cllark, J.A. Application of Remote sensing in Agriculture, Butterworths, London, 1990.
2. 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.
3. Sabins, F.F.Jr. Remote sensing principles and interpretation, W.H.Freeman & Co., 1978.
4. 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

OBJECTIVE

- The objective of the course is to train the students to have a comprehensive knowledge of planning, design, evaluation.
- 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. UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS (Habitat), Nairobi, 1994.
3. National Housing Policy, 1994, Government of India.

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

OBJECTIVE

- The students acquire comprehensive knowledge of traffic surveys and studies such as 'Volume Count', 'Speed and delay', 'Origin and destination', 'Parking', 'Pedestrian' and 'Accident surveys'.
- 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.

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

OBJECTIVE

- At the end of the semester, the student shall have a clear concept of irrigation water management practices of the past, present and future.
- He/she shall also be able to appreciate the importance due and duly given to stake holders.
- 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**

OBJECTIVE

- To learn the design prefabricated structures
- 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**

OBJECTIVE

- After this course, the student is expected to identify basic deficiencies of various soil deposits
- 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 of a project area and capable of providing alternate methods to improve its character suitable to 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", McGraw Hill, 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**

OBJECTIVE

- At the end of this program the, student is expected to assess the dynamic properties of soil
- 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.

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

OBJECTIVE

- At the end of the course the student will posses knowledge about GIS Techniques and its application in the field of Civil Engineering
- 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**

OBJECTIVES

- At the end of the course the student will posses knowledge about Electronic surveying
- To understand the working of EDM equipment and solve the surveying problems with an EDM equipment
- 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: 45 PERIODS

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- PRE-STRESSED CONCRETE STRUCTURES	3	0	0	3

OBJECTIVES:

- At the end of this course the student shall have a knowledge of methods of prestressing, advantages of prestressing concrete, the losses involved and the design methods for prestressed concrete elements under codal provisions.
- To understand the behaviour and performance of prestressed concrete structures.
- Compare the behaviour of prestressed concrete members with that of the normal reinforced concrete structures.
- Understand the performance of composite members.
- Finally to learn the design of prestressed concrete structures.

UNIT –1INTRODUCTION – THEORY AND BEHAVIOUR 9

Basic concepts – Advantages – Materials required – Systems and methods of prestressing – Analysis of sections – Stress concept – Strength concept – Load balancing concept – Effect of loading on the tensile stresses in tendons – Effect of tendon profile on deflections – Factors influencing deflections – Calculation of deflections – Short term and long term deflections - Losses of prestress – Estimation of crack width

UNIT –2 DESIGN 9

Flexural strength – Simplified procedures as per codes – strain compatibility method – Basic concepts in selection of cross section for bending – stress distribution in end block, Design of anchorage zone reinforcement – Limit state design criteria – Partial prestressing – Applications.

UNIT –3 CIRCULAR PRESTRESSING 9

Design of prestressed concrete tanks – Poles and sleepers

UNIT –4 COMPOSITE CONSTRUCTION 9

Analysis for stresses – Estimate for deflections – Flexural and shear strength of composite members

UNIT –5 PRE-STRESSED CONCRETE BRIDGES 9

General aspects – pretensioned prestressed bridge decks – Post tensioned prestressed bridge decks – Principles of design only.

Total Hours: 45

OUTCOMES:

- Student shall have a knowledge on methods of prestressing and able to design various prestressed concrete structural elements.

TEXT BOOKS

1. Krishna Raju N., Prestressed concrete, Tata McGraw Hill Company, New Delhi 2006
2. Mallic S.K. and Gupta A.P., Prestressed concrete, Oxford and IBH publishing Co. Pvt. Ltd. 1997.

REFERENCES

1. Ramaswamy G.S., Modern prestressed concrete design, Arnold Heinimen, New Delhi, 1990
2. Lin T.Y. Design of prestressed concrete structures, Asia Publishing House, Bombay 1995.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- AIR POLLUTION MANAGEMENT	**3**	**0**	**0**	**3**

OBJECTIVES:

This subject covers the sources, characteristics and effects of air

- 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**

OBJECTIVES

At the end of this course the student shall be able to choose appropriate bridge structure and design it for given site conditions.

- To impart exposure on various aspects of structural design of common types of steel and concrete bridges
- Compare the behaviour 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 and design 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- STORAGE STRUCTURES	**3**	**0**	**0**	**3**

OBJECTIVES:

The main objective of this course is to impart the principles involved in designing structures which have to store different types of materials**.**

- The student at the end of the course shall be able to design concrete and steel material retaining structures.
- The student at the end of the course shall be able to design water tanks and steel silos
- The student at the end of the course shall be able to design prestressed water tanks
- The student at the end of the course shall be able to design steel bunkers

UNIT -1 STEEL WATER TANKS 9

Design of rectangular riveted steel water tank – Tee covers – Plates – Stays –Longitudinal and transverse beams – Design of staging – Base plates – Foundation and anchor bolts – Design of pressed steel water tank – Design of stays – Joints – Design of hemispherical bottom water tank – side plates – Bottom plates – joints – Ring girder – Design of staging and foundation.

UNIT -2 CONCRETE WATER TANKS 9

Design of Circular tanks – Hinged and fixed at the base – IS method of calculating shear forces and moments – Hoop tension – Design of intze tank – Dome – Ring girders – Conical dome – Staging – Bracings – Raft foundation – Design of rectangular tanks – Approximate methods and IS methods – Design of underground tanks – Design of base slab and side wall – Check for uplift.

UNIT -3 STEEL BUNKERS AND SILOS 9

Design of square bunker – Jansen's and Airy's theories – IS Codal provisions – Design of side plates – Stiffeners – Hooper – Longitudinal beams – Design of cylindrical silo – Side plates – Ring girder – stiffeners.

UNIT -4 CONCRETE BUNKERS AND SILOS 9

Design of square bunker – Side Walls – Hopper bottom – Top and bottom edge beams – Design of cylindrical silo – Wall portion – Design of conical hopper – Ring beam at junction.

UNIT -5 PRESTRESSED CONCRETE WATER TANKS 9

Principles of circular prestressing – Design of prestressed concrete circular water tanks.

Total Hours : 45

OUTCOMES:

- At the end of the course the student shall be able to design concrete and steel material storage structures.

TEXT BOOKS

1. Rajagopalan K., Storage Structures, Tata McGraw-Hill, New Delhi, 1998.

2. Krishna Raju N., Advanced Reinforced Concrete Design, CBS Publishers and Distributors, New Delhi, 1998.

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

OBJECTIVES:

At the end of this course the student should have understood the problems associated with large heights of structures with respect to loads (wind and earthquake and deflections of the structure).

- 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 tall buildings subjected to lateral building. The students should have knowledge about the rudimentary 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

OBJECTIVES:

- At the end of this course the student is expected to know how to arrive at the dynamic forces and structures
- 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's principles – Examples of SDOF modeling.

UNIT – 2 SINGLE 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 – 3 MULTIDEGREE 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**

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 analyse the dynamic effects created by these wind forces.
- He should also be able to analyse the dynamic effects produced due to chimney, tower and silos
- He should also be able to analyse 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**

OBJECTIVE ***(Common to all branches)***

To understand the Total Quality Management concept and principles

- 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- MUNICIPAL SOLID WASTE MANAGEMENT	**3**	**0**	**0**	**3**

OBJECTIVES:

This subject covers the various sources and characterization of municipal solid wastes

- The on-site/off-site processing of the same and the disposal methods.
- The student is expected to know about the various effects and disposal options for the municipal solid waste.
- The collection and supply of water
- The offsite processing involved in site

UNIT -1 SOURCES AND TYPES OF MUNICIPAL SOLID WASTES 9

Sources and types of solid wastes - Quantity – factors affecting generation of solid wastes; characteristics – methods of sampling and characterization; Effects of improper disposal of solid wastes – public health effects. Principle of solid waste management – social & economic aspects; Public awareness; Role of NGOs; Legislation.

UNIT -2 ON-SITE STORAGE & PROCESSING 9

On-site storage methods – materials used for containers – on-site segregation of solid wastes – public health & economic aspects of storage – options under Indian conditions – Critical Evaluation of Options.

UNIT -3 COLLECTION AND TRANSFER 9

Methods of Collection – types of vehicles – Manpower requirement – collection routes; transfer stations – selection of location, operation & maintenance; options under Indian conditions.

UNIT -4 OFF-SITE PROCESSING 9

Processing techniques and Equipment; Resource recovery from solid wastes – composting, incineration, Pyrolysis - options under Indian conditions.

UNIT -5 DISPOSAL 9

Dumping of solid waste; sanitary landfills – site selection, design and operation of sanitary landfills – Leachate collection & treatment

Total Hours : 45

OUTCOMES:

The students completing the course will have

- an understanding of the nature and characteristics of municipal solid wastes and the regulatory requirements regarding municipal solid waste management
- ability to plan waste minimisation and design storage, collection, transport, processing and disposal of municipal solid waste

TEXT BOOKS

1. George Tchobanoglous et.al., "Integrated Solid Waste Management", McGraw-Hill Publishers, 2002.
2. B.Bilitewski, G.HardHe, K.Marek, A.Weissbach, and H.Boeddicker, "Waste Management", Springer, 1994.

REFERENCES

1. Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000
2. R.E.Landreth and P.A.Rebers, "Municipal Solid Wastes – problems and Solutions", Lewis Publishers, 1997.
3. Bhide A.D. and Sundaresan, B.B., "Solid Waste Management in Developing Countries", INSDOC, 1993.

SEMESTER	CODE	COURSE TITLE	L	T	P	C
		ELECTIVE- COMPUTER AIDED DESIGN OF STRUCTURES	3	0	0	3

OBJECTIVES:

- The main objective of this programme is to train the student in the use of computers
- 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 WASTE MANAGEMENT	3	0	0	3

OBJECTIVES:

This subject deals with the pollution from major industries and methods of controlling the same.

- The student is expected to know about the polluting potential of major industries in the country and the 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- INDUSTRIAL STRUCTURES	**3**	**0**	**0**	**3**

OBJECTIVES:

- This course deals with some of the special aspects with respect to Civil Engineering structures in industries.
- 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

OBJECTIVES:

- This course is designed to give an insight into the latest developments regarding smart materials and their use in structures.
- 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

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 using FE 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**

OBJECTIVES:

- At the end of this course the student shall understand the rudimentary principles involved in the analysis
- 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-REPAIR AND REHABILITATION OF STRUCTURES	**3**	**0**	**0**	**3**

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
		ELECTIVE- CYBER SECURITY	**3**	**0**	**0**	**3**

OBJECTIVE:

To give a multi-disciplinary overview of cyber security, emphasizing the importance of considering not only technical measures and defences, but also the other subject areas that apply, including legal, management, crime, risk, social and human factors

UNIT I CYBER SECURITY FUNDAMENTALS 9

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 9

Antiforensics – Tunneling techniques – Fraud Techniques - Threat Infrastructure.

UNIT III EXPLOITATION 9

Techniques to gain a foot hold – Misdirection, Reconnaissance, and disruption methods.

UNIT IV MALICIOUS CODE 9

Self Replication Malicious code – Evading Detection and Elevating privileges – Stealing Information and Exploitation.

UNIT V DEFENSE AND ANALYSIS TECHNIQUES 9

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.