R.V.R. & J. C. COLLEGE OF ENGINEERING

(AUTONOMOUS)

CHOWDAVARAM, GUNTUR - 522 019

Regulations (R-12),

Scheme of Instruction, Examinations and Syllabi

For Four Year B.Tech. Degree Programme

[w.e.f. 2012-13]

CIVIL ENGINEERING

SCHEME OF INSTRUCTION AND EXAMINATION

I B.Tech. I Semester

Sl. No.	COURSE DETAILS		Scheme of Instruction		Scheme of Examination			
	Code No.	Subject Name	Periods per week		Maximum Marks		Total Marks	Credits
			Lecture*Tutorial	Drawing /Practical	Internals	Exam (Semister End)		
1	CE 111	Engineering Mathematics-I	4+1	-	40	60	100	4
2	CE 112	Engineering Physics - I	3+1	-	40	60	100	3
3	CE 113	Engineering Chemistry – I	3+1	-	40	60	100	3
4	CE 114	Technical English & Communication Skills	4+1	-	40	60	100	4
5	CE115	Engineering Mechanics - I	4+1					
6	CE 116	Engineering Graphics	2	4	40	60	100	4
7	CE 151	Physics Lab.	-	3	40	60	100	2
8	CE 152	English Language Lab	-	3	40	60	100	2
TOTAL			**20+5**	**10**	**320**	**480**	**800**	**26**

SECOND SEMESTER

1.	CE 121	Engineering Mathematics-II	4+1	-	40	60	100	4
2.	CE 122	Engineering Physics - II	3+1	-	40	60	100	3
3.	CE 123	Engineering Chemistry - II	3+1	-	40	60	100	3
4.	CE 124	C-Programming	4+1	-	40	60	100	4
5.	CE 125	Engineering Mechanics - II	4+1					
6.	CE 161	Chemistry Lab.	-	3	40	60	100	2
7.	CE 162	Workshop	-	3	40	60	100	2
8.	CE 163	C-Programming Lab.	-	3	40	60	100	2
		TOTAL	**18+5**	**9**	**320**	**480**	**800**	**24**

II B.Tech. III Semester

Sl. No.	COURSE DETAILS		Scheme of Instruction		Scheme of Examination			
	Code No.	Subject Name	Periods per week		Maximum Marks		Total Marks	Credits
			Lecture*Tutorial	Drawing /Practical	Internals	Exam Semis End ter		
1.	CE211	Engineering Mathematics -III	4	-	40	60	100	4
2.	CE212	Building Materials, Planning & Construction	4	-	40	60	100	4
3.	CE213	Surveying – I	4	-	40	60	100	4
4.	CE214	Solid Mechanics – I	4/1	-	40	60	100	4
5.	CE215	Fluid Mechanics	4/1	-	40	60	100	4
6.	CE216	Engineering Geology	4	-	40	60	100	4
7.	CE251	Engineering Geology Laboratory	-	3	40	60	100	2
8.	CE252	Surveying Field Work – I	-	3	40	60	100	2
9.	CE253	Building Drawing	-	3	40	60	100	2
TOTAL			**24/2**	**9**	**360**	**540**	**900**	**30**

II B.Tech. IV Semester

1.	CE221	Concrete Technology	4	-	40	60	100	4
2.	CE222	Environmental Studies	4	-	40	60	100	4
3.	CE223	Surveying - II	4	-	40	60	100	4
4.	CE224	Solid Mechanics -II	4/1	-	40	60	100	4
5.	CE225	Hydraulics & Hydraulic Machines	4/1	-	40	60	100	4
6.	CE226	Elements of Electrical and Mechanical Engineering	4	-	40	60	100	4
7.	CE261	Hydraulics and Hydraulics Machines Laboratory	-	3	40	60	100	2
8.	CE262	Material Testing Laboratory	-	3	40	60	100	2
9.	CE263	Communication Skills Laboratory	-	3	40	60	100	2
		TOTAL	**24/2**	**9**	**360**	**540**	**900**	**30**

III B.Tech. V Semester

Sl. No.	COURSE DETAILS		Scheme of Instruction		Scheme of Examination			Credits
	Code No.	Subject Name	Periods per week		Maximum Marks		Total Marks	
			I/T	D/P	Int.	Ext.		
1.	CE311	Environmental Engineering-I	4	-	40	60	100	4
2.	CE312	Structural Analysis - I	4/1	-	40	60	100	4
3.	CE313	Water Resources Engineering-I	4/1	-	40	60	100	4
4.	CE314	Design of Concrete Structures -I	4/1	-	40	60	100	4
5.	CE 315	Design of Steel Structures -I	4/1	-	40	60	100	4
6.	CE 316	Geo-technical Engineering -I	4	-	40	60	100	4
7.	CE351	Environmental Engineering Laboratory	-	3	40	60	100	2
8.	CE352	Geo-technical Engineering Laboratory	-	3	40	60	100	2
9.	CE353	Advanced Communication Skills Laboratory	-	3	40	60	100	2
TOTAL			**24/4**	**9**	**360**	**540**	**900**	**30**

III B.Tech. VI Semester

1.	CE321	Environmental Engineering-II	4	-	40	60	100	4
2.	CE322	Structural Analysis - II	4/1	-	40	60	100	4
3.	CE323	Water Resources Engineering - II	4/1	-	40	60	100	4
4.	CE324	Design of Concrete Structures - II	4/1	-	40	60	100	4
5.	CE 325	Design of Steel Structures -II	4/1	-	40	60	100	4
6.	CE 326	Geo-technical Engineering-II	4	-	40	60	100	4
7.	CE361	Surveying Field Work - II	-	3	40	60	100	2
8.	CE362	Computer Programming in Civil Engineering	-	3	40	60	100	2
		TOTAL	**24/4**	**6**	**320**	**480**	**800**	**28**

IV B.Tech. VII Semester

Sl. No.	COURSE DETAILS		Scheme of Instruction		Scheme of Examination			Credits
	Code No.	Subject Name	Periods per week		Maximum Marks		Marks Total	
			I/T	D/P	Int.	Ext.		
1.	CE411	Transportation Engineering-I	4	-	40	60	100	4
2.	CE412	Construction Technology and Management	4	-	40	60	100	4
3.	CE413	Quantity Surveying	4	-	40	60	100	4
4.	CE414	Elective - I	4	-	40	60	100	4
5.	CE415	Open Elective	4	-	40	60	100	3
6.	CE416	Elective - II	4	-	40	60	100	4
7.	CE451	Analysis, Design and Detailing of Structures	-	3	40	60	100	2
8.	CE452	Transportation Engineering Laboratory	-	3	40	60	100	2
9.	CE453	Project (Phase-I)	-	2	100	-	100	2
		TOTAL	**20**	**9**	**380**	**420**	**800**	**29**

CE414 ELECTIVE - I

A. Pre-stressed Concrete
B. Water Resources Systems Analysis
C. Green Buildings
D. Ground water development and Management

CE415 OPEN ELECTIVE:

CE 415/A Finite Element Method
CE 41/5B Remote Sensing and GIS
ME 415/A : Robotics
ME 415/B : Operations Research
BT 415/A : Bio Sensors & Bio Electronics
BT 415 /B : Biomedical Instrumentation
ChE 415/A : Energy Engineering
ChE 415/B : Bio-fuels
CS 415/A : Java Programming
CS 415/B : Database Management Systems
EC415/A : Applied Electronics
EC415/B : Basic Communication
IT 415/A : Web Technologies
IT 415/B : Software Engineering
EE415/A : Renewable Energy Sources
EE415/B : Utilization of Electrical Energy

CE 416 ELECTIVE - II:

A. Design and Drawing of Hydraulic Structures
B. Bridge Engineering
C. Advanced Reinforced Concrete Design
D. Retaining Structures

IV B.Tech. VIII Semester

1.	CE421	Transportation Engineering-II	4	-	40	60	100	4
2.	CE422	Remote Sensing and GIS	4	-	40	60	100	4
3.	CE423	Professional Ethics and Human Values	4	-	40	60	100	3
4.	CE424	Elective - III	4	-	40	60	100	4
6.	CE461	Quantity Estimation & Project Management	-	3	40	60	100	2
7.	CE462	Project (Phase-II)	-	6	80	120	200	10
		TOTAL	**16**	**9**	**250**	**450**	**800**	**27**

CE424 ELECTIVE - III

A. Repair and Rehabilitation of Structures B. Earthquake Resistant Design of Structures
C. Advanced Environmental Engineering D. Ground Improvement Techniques

I/IV Year B.Tech.- First Semester

BT/CE/ChE/CS/IT/EC/EE/ME - 111

ENGINEERING MATHEMATICS - I

Lectures	*: 4 periods / week*	*Internal Marks*	*: 40*
Tutorials	*: 1 period / week*	*Semester End Exam Marks*	*: 60*
Semester Exam	*: 3 hrs*	*Credits*	*: 4*

Course Objectives:

To provide knowledge on solving ordinary differential equations and applications of first order ordinary differential equations.

To give basic knowledge on evaluation of double, triple integrals, area and volume.

To provide knowledge and skills in writing a periodic function in its Fourier series form and on their applications.

To develop skills for applying them in future on various engineering applications

Course Outcomes:

Understand methods of solving First order and Higher order ordinary differential equations along with some physical applications.

Understand the relation between two variables by Curve fitting.

Able to evaluate double, triple integrals and the area, volume by double & triple integrals respectively.

Understand the concept of Fourier-series representation of periodic functions and their applications.

UNIT - I **(15)**

Ordinary Differential Equations: Introduction, Linear equation, Bernoulli's equation, Exact differential equations, Equations reducible to exact equations, Orthogonal trajectories, Newton's law of cooling. Linear differential equations with constant coefficients: Definition, Theorem, Operator D, Rules for finding the complementary function, Inverse operator, Rules for finding the particular integral, working procedure to solve the equation.

UNIT - II **(15)**

Method of variation of parameters, Equations reducible to linear equations with constant coefficients: Cauchy's homogeneous linear equation, Legendre's linear equation, Simultaneous linear equations with constant coefficients.

Statistics: Method of least squares, Correlation, Co-efficient of correlation (direct method), Lines of regression.

UNIT - III **(15)**

Fourier series: Introduction, Euler's formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, Change of interval, Even and Odd functions, half range series. Parseval's formula, Practical harmonic analysis.

UNIT - IV **(15)**

Multiple Integrals: Double integrals, Change of order of integration, Double integrals in polar coordinates, Area enclosed by plane curves, Triple integrals, Volume by triple integral, Change of variables in a double integral.

Beta, Gamma functions, Error function.

LEARNING RESOURCES

TEXT BOOK:

Higher Engineering Mathematics by Dr.B.S.Grewal, Khanna Publishers, 40th Edition, 2007.

REFERENCE BOOK:

Advanced Engineering Mathematics by Erwin Kreyszig, 8th edition, 2007.

WEB REFERENCES:

www.wikipedia.com

NPTEL Lectures (IIT M)

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I/IV Year B.Tech. - First Semester

BT/CE/ChE/CS/IT/EC/EE/ME - 112
ENGINEERING PHYSICS - I

Lectures	*: 3 periods / week*	*Internal Marks*	*: 40*
Tutorials	*: 1 period / week*	*Semester End Exam Marks*	*: 60*
Semester Exam	*: 3 hrs*	*Credits*	*: 3*

Course Objectives:

The production & detection of ultrasonics and its applications are presented to emphasize in understanding the medical ultrasound techniques. Superposition principle of light waves and its applications in thin films (wedge, convex shaped) are used to find the various parameters.

For the identification of various vibrational modes of atoms of molecules in materials by laser Raman spectroscopy and in the study of mechanical strains and in the studies of crystals, polarized light and diffraction phenomena can effectively be used.

The basics of laser light, its properties with applications in various fields and its important role played in the preparation of holograms, in analysing the optical spectra and in optical communication are presented.

An overview of Maxwell's E-M equations to understand all the problems encountered in Electromagnetism and the connection to the Optics. The free electron theory and its significance to characterize the electrical and thermal properties of solids and the concept of the Fermi-Dirac distribution function to explain the Fermi energy level in metals.

Course Outcomes: *The students will be able to understand:*

The ultrasonics in various fields of science, engineering & medicine, to recognize the experimental evidence for the wave nature of light and interference in thin films and its technological applications.

Diffraction spectra due to single slit on changing of wavelength and slit width. Concept and various types of polarization can be signified. Nicol prism as polarizer and analyser & its limitations.

Importance of the stimulated emission in producing the lasing beam and its dependence on resonating cavity and active medium. 3D image

production & construction and its application using highly monochromatic lasing beam. Guiding light through thin strands of dielectric material and classification.

Propagation of electromagnetic waves through Maxwell's equations, Distinguishing the properties of electrons and Photons.

Unit -I (16)

Ultrasonics: Production of ultrasonics by magnestriction, piezo electric oscillator methods, detection by acoustic grating method, applications in engineering and medicine, ultrasonic testing methods (pulse echo technique, ultrasonic imaging).

Interference*:* Superposition principle, young's double slit experiment (qualitative treatment), stoke's principle (change of phase on reflection), interference in thin films due to reflected light (Cosine law), theory of air wedge (fringes produced by a wedge shaped thin film) and theory of newton's rings(reflected system), non-reflecting films.

Unit-II (15)

Diffraction: Fraunhofer diffraction due to a single slit(quantitative), theory of plane transmission diffraction grating, Rayleigh's criterion, resolving power & dispersive power of a grating.

Polarization: Introduction, double refraction, construction and working of a nicol prism, nicol prism as a polarizer and analyser, quarter wave plate, production and detection of circular and elliptical polarizations(qualitative), optical activity, specific rotation, kerr and faraday effects.

Unit-III (15)

Lasers: Laser characteristics, spontaneous and stimulated emissions, population inversion, pumping, active system, gas (He-Ne) laser, Nd: YAG laser and semiconductor (GaAs) laser, applications of lasers.

Holography: Basic principle, recording, reproduction and applications.

Fiber optics: Structure of optical fiber, light propagation through optical fiber-numerical aperture, acceptance angle and acceptance cone, types of optical fibers, fiber optics in communication system and applications of optical fibres.

Unit-IV (14)

Electromagnetism: Induced electric fields, displacement current and conduction current, Maxwell's equation - qualitative (differential & integral forms)-significance, LC oscillations (quantitative), velocity of electromagnetic wave equation in free space , poynting vector.

Statistical Physics : Phase space, Maxwell-Boltzmann, Fermi-Dirac & Bose-Einstein's distribution functions(qualitative), photon gas & electron gas.

LEARNING RESOURCES

TEXT BOOKS :

1. *Engineering Physics - R .K. Gaur & S. L. Gupta , Danpati Rai Publications, Delhi, 2001.*
2. Engineering Physics - Hitendra K. Malik & A.K.Singh, Tata MacGraw Hill, New Delhi,2009.

REFERENCE BOOKS:

1. *Fundamentals of Physics - Resnick & Halliday, John Wiley sons ,9th Edition.*
2. *Engineering Physics - M.N. Avadhanulu & P.G. Kshirasagar, S.Chand & Co.Ltd , 7th Edition.*
3. *Engineering Physics - M.Arumugam, Anuradha Publications, Chennai ,5th Edition , 2006.*
4. *Engineering Physics - B. K. Pandey & S. Chaturvedi, Cengage Learning India Pvt. Ltd., Delhi.*

WEB REFERENCES:

http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-%20Guwahati/engg_physics/index_cont.htm :

Course relevant website : www.rvrjcce.ac.in/moodle/first year/2011-12/engineeringphysics

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I/IV Year B.Tech.- First Semester

CE/CS/IT - 113
ENGINEERING CHEMISTRY - I

Lectures	:	*3 periods / week*	*Internal Marks*	:	*40*
Tutorials	:	*1 periods / week*	*Semester End Exam Marks*	:	*60*
Semester End Exam	:	*3 hrs*	*Credits*	:	*3*

Course Objectives :

To know the quality parameters of water used in industries and for drinking purpose.

To understand the methods of determining hardness, softening and desalination.

To define the terms associated with phase rule and batteries.

To acquire knowledge on advanced and latest material systems like liquid crystals, composites, etc.,

Course Outcomes:

Students acquire knowledge on quality and utility of water, useful in studying public health engineering.

Knowledge acquired on phase rule gives good foundation for engineering students. (Specifically to Mechanical Engineering)

Students know suitable replacements of metal after knowing about composite materials.

Able to understand functioning of electrochemical energy systems.

Would be capable of selecting appropriate lubricant for a given system.

UNIT-I: **(Text book-1)** *(16)*

Water Technology : various impurities of water, , hardness units and determination by EDTA method (simple problems), water technology for industrial purpose: boiler troubles- scales, sludges, caustic embrittlement, boiler corrosion, priming and foaming- causes and prevention. Internal conditioning -phosphate, calgon and carbonate treatment. External conditioning-lime soda process (simple problems), softening by ion exchange process. Desalination of brackish water by electro dialysis and reverse osmosis.

UNIT-II: (Textbook-1) (14)

Water treatment for drinking purpose- WHO guidelines ,sedimentation, coagulation, filtration (slow sand filter), various methods of chlorination, breakpoint chlorination.

Phase Rule: Statement and explanation of the terms involved, one component water system, condensed phase rule- construction of phase diagram by thermal analysis, simple eutectic system (Pb-Ag system only) ,applications eutectic compounds.

UNIT-III: (Text book-1) (15)

Electrochemistry: Electrode potential, electrochemical series and its significance, Nernst equation-related problems, Reference electrodes (SHE and Calomel electrode) Ion-selective electrode-glass electrode and measurement of pH.

Electrochemical Energy Systems: Types of electrochemical energy systems, electrochemistry of primary batteries (Lachlanche or dry cell), Secondary cells (Lead Acid cell, Ni-Cd cell), Lithium batteries (Li-MnO_2 Lithium organic electrolyte) and their advantages. Fuel cells(Oxygen-Hydrogen)

UNIT-IV: (Text book-1) (15)

Composites: Introduction, Constituents of Composites, Types -Fibre reinforced, Particulate and layered composites and their applications.

Liquid crystals: Structure of liquid crystal forming compounds, Classification and applications.

Lubricants: Classification ,liquid lubricants- viscosity,Viscosity index, Flash point, Fire point, Cloud point, Pour point, oilyness. Solid lubricants - Graphite and Molybdenum sulphide, Additives, Magnetic Particles.

LEARNING RESOURCES

TEXT BOOKS :

1. *Engineering Chemistry, P.C. Jain and Monika Jain, 15th Edition, 2008, Dhanpat Rai Publishing Company, New Delhi.*
2. *A Text Book of Engineering Chemistry, Shashi Chawla, 3rd Edition, 2009, Dhanpat Rai and Co.(P) Ltd., New Delhi.*

REFERENCE BOOK:

1. *A Text Book of Engineering Chemistry, S.S. Dara and S.S. Umare, 12th Edition, 2010, S.Chand and Co.Ltd.*

WEB REFERENCES:
http://www.wiziq.com/tutorial/

http://www.powerstream.com/BatteryFAQ.html#lec
http://www.cdeep.iitb.ac.in/nptel/Core%20Science

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I/IV Year B.Tech.- First Semester

BT/CHE/CE/CSE/IT - 114
TECHNICAL ENGLISH & COMMUNICATION SKILLS

Lectures	*: 4 periods / week*	*Internal Marks*	*: 40*
Tutorials	*: 1 period / week*	*Semester End Exam*	*Marks : 60*
Semester Exam	*: 3 hrs*	*Credits*	*: 4*

Course objectives:

To make the student have better awareness on interpersonal skills and case studies.

To establish the importance of the meaning of new vocabulary as well as the form and of showing how words are used in context.

To help the student to develop their overall knowledge and understanding of advanced grammar.

To develop their abilities of written communication related to office communication and also to use foreign expressions situationally.

Course Outcomes:

The student is able to have better inter and intra personal skills and also have good understanding on case studies.

Able to use vocabulary contextually.

Able to learn and applying the knowledge of advanced grammar in the day-to-day life.

Able to develop all kinds of written communication including office communication and also foreign expressions.

Unit - I

1. Kinesis.
2. Interpersonal Skills.
3. Intrapersonal Skills.
4. Case Studies.

Unit - II Lexis

1. Vocabulary.
2. Analogies.
3. Homonymys, Eponyms, Acronyms.
4. Confusable words.
5. One word substitute .

Unit - III Syntax And Advanced Grammar

1. Correction of sentences.
2. Advanced grammar.
    1. Parallelism.
    2. Dangling modifiers.
    3. Tantology.
    4. Ambiguity.
    5. Word order.
    6. Shift in tense, mood, voice.

Unit - IV Office Communication

1. Letter writing.
2. Memos.
3. E-mail.
4. Note taking, Note making.
5. Routing slips.
6. Foreign Expressions.
    a. French -20.
    b. Spanish - 10.
    c. Italian/Latin - 20.
    d Japanese - 10.
    e. German - 10.
    f. Russian - 10.
    g. Chinese - 10.

LEARNING RESOURCES

TEXT BOOK :

1. *Communication Skills - Sanjay Kumar & Pushpa Latha (OUP)- 2nd Impression, 2012*

REFERENCE BOOKS :

1. *Technical Communication - Meenakshi Raman & Sangeeta Sharma, Oxford Semester Press, 6th Impression, 2012.*
2. *Oxford Dictionary of English Idioms - John Ayto, OUP Oxford, 08-Jul-2010*
3. *Dictionary of word origins - John Ayto, Bloomsbury, 2001.*
4. *Harbrace Hand book of English.*
5. *Mc Graw Hill's Hand Book of English Grammar and Usage - Markm Lysstar, Larry Beason, 2005.*
6. *College Hand book.*

I/IV Year B.Tech.- First Semester

CE-115 ENGINEERING MECHANICS - I

Lectures/Tutorials : 4/1 Periods / week	*Sessional marks*	*: 40*
Semester End Exam. : 3 hours	*Semester end Exam. marks*	*: 60*
	Credits	: 4

Course Objectives :

- *To study Concurrent force systems in a plane*
- *To study Parallel force systems in a plane*
- *To study General case of force system in a plane*
- *To understand force systems in space*
- *To study Principle of virtual work*
- *To study friction*

Course Outcomes :

- *Solve problems involving concurrent forces in a plane*
- *Solve problems involving parallel forces in a plane*
- *Solve problems involving general case of forces in a plane*
- *Solve problems involving force systems in space*
- *Apply Principle of virtual work to static problems*
- *Solve problems involving friction*

UNIT - I

Concurrent Forces in a Plane : Principles of statics, Rectangular components of a force, Resultant and equilibrium of concurrent forces in a plane, Method of projections.

UNIT - II

Parallel Forces in a Plane : Moment of a force about a point, Couple, Resultant and equilibrium of parallel forces in a plane, Centre of parallel forces and centre of gravity, Centroids of composite plane figures and curves

UNIT - III

General Case of Forces in a Plane : Resultant and equilibrium of general case of parallel forces in a plane, Statically determinate plane trusses-Method of joints and Method of *sections*

Friction : Types of friction, Dry friction - Mechanism of friction , Types of friction problems

UNIT - IV

Principle of virtual work : Equilibrium of ideal systems, Stable and Unstable equilibrium

Force Systems in Space (using vector notation) : Position vector, Unit vector, Force vector , Component of a force about an axis, Moment of a force about a point, Moment of a force about an axis, Couple, Resultant and equilibrium of concurrent forces in space, Resultant and equilibrium of parallel forces in space, Centre of parallel forces and centre of gravity

LEARNING RESOURCES

TEXT BOOK:

1. *Engineering mechanics by S. Timoshenko , D. H. Young and J. Rao , Tata McGraw Hill Publishing Company Ltd.,2007.*

REFERENCE BOOK:

1. *Engineering mechanics by J. L. Meriam and L. Kraige , 6th Edition, John Wiley & Sons,2010.*

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I/IV Year B.Tech. - First Semester

ME - 116 ENGINEERING GRAPHICS

Lectures	*: 2 periods / week*	*Sessional Marks*	*: 40*
Drawing	*: 4 periods /week*	*Semester End Exam Marks*	*: 60*
Semester End Exam :	*3 hrs*	*Credits*	*: 4*

Course Objectives:

The primary objective of this course is

To develop the students to visualize and communicate all engineering elements

To understand the fundamentals of geometry like engineering curves To visualize the different positions of planes and solids

To evident the features when solids cut into sections

To know the various developments & isometric views and its applications in the daily life.

Learning Outcomes:

On completion of this course

The Student gets thorough knowledge of various Geometrical Elements used in Engineering Practice.

He gets the insight into the Concepts of all 2 D elements like Conic Sections and 3 D Objects like various Prisms, Cylinders, Pyramids and Cones.

He also understands the Projections of various objects and their representation and dimensioning.

The Concept of Isometric Projections is thoroughly taught which will be useful for the visualiasation of any objects. This subject also paves the way for learing Auto Cad, CAD / CAM, CATIA and Pro E which are advanced software packages needed for every mechanical engineer (To be taught & examined in First angle projection)

UNIT - I

General : Use of Drawing instruments, Lettering .-Single stroke letters, Dimensioning- Representation of various type lines. Geometrical Constructions. Representative fraction.

Conic sections : general construction , Oblong and Concentric circle method for ellipse, Tangent and Rectangular methods for parabola. **Curves :** cycloidal curves - cycloid, epicycloid and hypocycloid; involute of circe.

UNIT - II

Method of Projections: Principles of projection - First angle and third angle projection of points. Projection of straight lines. Traces of lines.

Projections of Planes : Projections of planes, projections on auxiliary planes.

UNIT - III

Projections of Solids : Projections of Cubes, Prisms, Pyramids, Cylinders and Cones with varying positions.

Sections Of Solids: Sections of Cubes, Prisms, Pyramids, cylinders and Cones.true shapes of sections. (Limited to the Section Planes perpendicular to one of the Principal Planes).

UNIT IV

Development of Surfaces: Lateral development of cut sections of Cubes, Prisms, Pyramids, Cylinders and Cones.

Interpenetration Of Solids : Interpenetration of Prism in prism, (Treatment is limited to triangular & square prisms) and Cylinder in Cylinder with their axes perpendicular without offsets.

UNIT - V

Isometric Projections : Isometric Projection and conversion of Orthographic Projections into isometric views. (Treatment is limited to simple objects only).

Orthographic Projections: Conversion of pictorial views into Orthographic views. (Treatment is limited to simple castings).

LEARNING RESOURCES

Text Book:

1. *Engineering Drawing by N.D. Bhatt & V.M. Panchal. (Charotar Publishing House, Anand), Charotar publishing house , 50th Edition,2010.*

Reference Book:

1. *Engineering Drawing by Prof.K.L.Narayana & Prof. R.K.Kannaiah, Scitech Publications , 2010.*
2. *Engineering Graphics with AutoCAD 2002 by James D. Bethune, PHI, 2011.*

I/IV Year B.Tech.- First Semester

BT/CHE/CE/CS/IT - 151 Physics Lab

Practicals	*: 3 periods / week*	*Internal Marks*	*: 40*
Tutorials	*: --*	*Semester End Exam Marks*	*: 60*
Semester End Exam: 3 hrs		*Credits*	*: 2*

Course Objectives:

To give students a background in experimental techniques and to reinforce instruction in physical principles

Experiments are designed to incorporate lessons on measurement, data, error, or graphical analysis in addition to illustrating a physical principle.

Give skills that can transfer critical thinking into problem solving methods. How to identify what data is important, how to collect that data, and then draw conclusions from it.

Course Outcomes:

After going through lab manual and experiments, the students will be able to understand:

Know, understand, and use a broad range of basic physical principles.

A working capability with mathematics, numerical methods, and application of solutions.

Will have a wide idea on various components & instruments.

Additional problem -solving skills and practical experience are through design projects and laboratory assignments, which also provide opportunities for developing team- building and technical communication skills.

Have an ability to learn independently.

LIST OF EXPERIMENTS

(Any 10 out of the following experiments)

1. Interference fringes - measurement of thickness of a foil using wedge method.
2. Newton's rings - measurement of radius of curvature of Plano-convex lens.

3. Lissajous' figures - calibration of an audio oscillator.
4. Photo cell - characteristic curves and determination of stopping potential.
5. Diffrraction grating - measurement of wavelengths.
6. Torsional pendulum - determination of Rigidity modulus of a wire.
7. Photo-Voltaic cell - determination of fill factor.
8. Series LCR resonance circuit -determination of Q factor.
9. Sonometer - determination of A.C. frequency.
10. Laser - determination of single slit diffraction.
11. B - H Curve
12. Optical Fiber - Determination of Numerical Aperture and Acceptance Angle

REFERENCE BOOK :

Physics Lab Manual , R.V.R. & J.C. College of Engineering , Guntur.

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I/IV Year B.Tech.- First Semester

BT/CHE/CE/CS/IT - 152 English Language Lab

Practicals	*: 3 periods / week*	*Internal Marks*	*: 40*
Tutorials	*: --*	*Semester End Exam Marks*	*: 60*
Semester Exam	*: 3 hrs*	*Credits*	*: 2*

Course Objectives:

To identify various reasons for incorrect pronunciation and make the student understand and learn Standard Pronunciation, i.e., R.P.

To develop skills to describe something, participate and present various presentations interesting and captivating.

To provide sufficient understanding on the importance of reading and get to know the basic hurdles in efficient reading.

To give a comprehensive understanding of having good vocabulary and learn large number of words.

To make the student learn within a context by working out some situations using phrasal verbs and idioms.

Course Outcomes:

The student is able to speak with Standard Pronunciation.

Able to participate in activities and make better presentations.

Able to develop good and efficient reading skills.

Able to acquire sufficient knowledge on vocabulary and also use them in day-to-day life.

Able to use phrasal verbs and idiomatic expressions situationally.

Phonetics : Introduction - Reasons for Incorrect Pronunciation - Received Pronunciation - Misconception about sounds. Sounds - Vowels - Consonants - Transcription - Problems of Indian English - Syllable - Word Stress - Weak Forms - Intonation.

Interactions : Dynamics of Professional Presentations - Individual & Group Presentations - Delivering Just-a-minute (JAM) Sessions - Body Language - Group Discussions - Job Interviews- Public Speaking - Making Speeches Interesting - Delivering Different types of Speeches -

Conversations, Dialogues and Debates - Features of a Good Conversation - Short Conversations - Telephonic Skills - Debate - Situational Dialogues.

Reading comprehension : The Art of Effective Reading - Benefits of Effective Reading - Types - Methods of Reading - Different Passages for Reading Comprehension - Reading Comprehension - Identifying the Central Idea - Inferring Lexical and Contextual Meaning.

Word origins : Introduction - Word Formation - Synonyms- Antonyms - Learning words through Situations - Substitution - Idioms - Phrasal Verbs - Developing Technical Vocabulary.

Idioms and phrases : What are phrasal verbs? What they mean? Particles in phrasal verbs - Nouns and Adjectives based on Phrasal Verbs. Types of Idioms - Idioms for Situations - Idioms that comment on People, Stories & Reports.

LEARNING RESOURCES

TEXT BOOKS :

1. *Keep talking- Communicative fluency activities for language teaching, - Fiederike Klippelr, Cambridge Semester Press.*
2. *At the chalk face- Practical Techniques in Language Teaching - Alan Matthews,Mary spratt, Les Dangerfield, ELBS.*
3. *Games for Language Learning - Andrew Wright, David Betteridge, Miclael Buckby, Cambridge Semester Press.*
4. *Interactive classroom activities. (10 titles - Cambridge Publication)*
5. *Better English Pronunciation - J.D.O' Connor, Second Edition, 2009, Cambridge Semester Press.*

SOFTWARE :

1. *Author plus - clarity.*
2. *Call centre communication - clarity.*

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I/IV Year B.Tech.-Second Semester

BT/CE/ChE/CS/IT/EC/EE/ME - 121
ENGINEERING MATHEMATICS - II

Lectures	*: 4 periods / week*	*Internal Marks*	*: 40*
Tutorials	*: 1 period / week*	*Semester End Exam Marks*	*: 60*
Semester End Exam	*: 3 hrs*	*Credits*	*: 4*

Course Objectives:

To apply rank concept of matrices in solving linear system of equations, finding the eigen values and eigen vectors and inverse of a matrix and getting familiarity with diagonalization and quadratic forms.

To get knowledge of mean value theorems, writing series expansion of functions and finding extreme values or stationary values of functions of two (or) three variables.

To provide sufficient theoretical and analytical background of differentiation and integration of vector functions.

To make the student to learn Laplace and inverse transforms of a function and able to solve differential equation using Laplace transforms.

Course Outcomes:

Understand the basic linear algebraic concepts.

Assess the importance of derivative in mean value theorems and extreme values.

Able to solve gradient, divergence, curl and integration of vector function problems.

Obtain the solution of differential equation using Laplace transform.

Ability of applying mathematical concepts in relevant engineering applications.

UNIT - I **(15)**

Matrices: Rank of a matrix, vectors, Consistency of linear system of equations, Linear transformations, Characteristic equation, Properties of Eigen values (without proofs), Cayley-Hamilton theorem (without proof), Reduction to diagonal form.

UNIT- II (15)

Reduction of quadratic form to canonical form, Nature of a quadratic form, Complex matrices.

Differential Calculus: Rolle's Theorem (without proof), Lagrange's Mean value Theorem (without proof), Taylor's and Maclaurin's Series for single variable (without proof). Maxima and minima of two variables, Lagrange's method of undetermined multipliers.

UNIT-III (15)

Vector Calculus: Scalar and vector point functions, Del applied to scalar point functions, Gradient, Del applied to vector point functions, Physical interpretation of divergence and curl, Del applied twice to point functions, Del applied to products of point functions. Integration of vectors, Line integral, Surface integral, Green's theorem in the plane (without proof), Stoke's theorem (without proof), Volume integral, Gauss divergence theorem (without proof).

UNIT-IV (15)

Laplace Transforms: Introduction, Transforms of elementary functions, properties of Laplace Transforms, Existence conditions, Transforms of derivatives, Transforms of integrals, multiplication by tn, division by t. Evaluation of integrals by Laplace Transforms, Periodic function, Inverse Transforms, Convolution theorem(without proof), Application to Differential equations with constant coefficients.

LEARNING RESOURCES

TEXT BOOK:

Higher Engineering Mathematics by B.S. Grewal, Khanna publishers, 40th edition, 2007.

REFERENCE BOOK:

Advanced Engineering Mathematics by Kreyszig, 8th edition, 2007.

WEB REFERENCES :

www.wikipedia.com

NPTEL Lectures (IIT M)

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I/IV Year B.Tech. - Second Semester

BT/CE/ChE/CS/IT/EC/EE/ME - 122
ENGINEERING PHYSICS - II

Lectures	*: 3 periods / week*	*Internal Marks*	*: 40*
Tutorials	*: 1 period / week*	*Semester End Exam*	*Marks : 60*
Semester End Exam	*: 3 hrs*	*Credits*	*: 3*

Course Objectives:

To explain the microscopic phenomena occurred in nature through quantum physics and the formation of the band structure and distinction of solids was explained by introducing the famous Kronig-penny model its salient features.

Semiconductor concepts such as Energy band formation and classification of solids, intrinsic & extrinsic semiconductors, Hall effect & photo diode, LED and LCD are presented.

Various magnetic materials and their characterization are presented to enable the student with materials science and to acquaint the student with the super conductivity property etc.

Understanding of dielectric properties and the usage of materials in engineering applications. Introduced the basics of nano world and the various applications that are presently marketed are discussed with XRD and Transmission electron microscope (TEM).

Course Outcomes: *After going through these units, the students will be able to understand:*

The principles of quantum mechanics and the electron theory of metals and their band theory.

Energy band formation and classification of solids & devices based on interaction of light junction diodes.

Classification of Magnetic materials, characterization and their properties. Critical parameters of superconducting materials and applications.

Various types of polarizations; Nano scale materials, properties & applications.

Unit-I (16)

Principles of Quantum Mechanics: De Broglie's concept of matter waves, Davisson and Germer experiment, Heisenberg's uncertainty principle-experimental verification, time independent Schrodinger's wave equation, physical significance of the wave function, particle in a box (one dimensional).

Electron Theory of metals: Failures of Classical free electron theory and quantum free electron theory(qualitative).

Band theory of Solids: Bloch theorem (Qualitative), Kronig-Penney model (Qualitative treatment), effective mass of electron.

Unit-II (14)

Semiconductor Physics: Energy band formation in solids, Classification of solids into metals, semiconductors and insulators, intrinsic & extrinsic semiconductors, density of states, intrinsic semiconductor carrier concentration, Hall effect and its uses.

Optoelectronic devices: Photo diode, LED,LCD and solar cell (qualitative treatment).

Unit -III (15)

Magnetic Materials: Introduction, orbital magnetic moment of an electron, Bohr magneton, classification of dia, para and ferro magnetic materials on the basis of magnetic moment, Hysteresis curve, soft and hard magnetic materials, Ferrites and their applications.

Superconductivity: Introduction, critical parameters (Tc, Hc, Ic), Meissner effect, types of superconductors, entropy, specific heat, energy gap and isotope effect, BCS Theory(in brief), applications of superconductors, high Tc superconductors(qualitative).

Unit -IV (15)

Dielectric Materials: Fundamental definitions: Electric dipole moment, polarization vector, polarizability, electric displacement, dielectric constant and electric susceptibility. Types of polarizations - Electric and ionic polarizations, internal fields in solids(Lorentz method), Clausius-Mossotti equation, Frequency dependence of polarization, Ferroelectrics and their applications.

Nano Technology : Basic Concepts of Nanotechnology, nano scale, introduction to nano materials, surface to volume ratio, fabrication of nano materials (sol-gel and chemical vapour deposition methods), applications of nano materials. XRD, Transmission Electron Microscope(TEM).

LEARNING RESOURCES

TEXT BOOKS :

1. *Applied Physics- P. K. Palanisamy, Scitech Publications.*
2. *Materials Science - M.Arumugam, Anuradha Publications, Chennai, 5th Edition , 2006.*

REFERENCE BOOKS :

1. *Materials science - M. Vijaya and G. Rangarajan, TMH, New Delhi.*
2. *Solid state physics by A. J. Dekkar.*
3. *Physics of atom - Wehr and Richards.*
4. *Engineering Physics - B. K. Pandey & S. Chaturvedi, Cengage Learning India Pvt. Ltd., Delhi.*

WEB REFERENCES:

http://nptel.iitm.ac.in/courses/115104043/1

http://people.seas.harvard.edu/~jones/ap216/lectures/lectures.html
http://galileo.phys.virginia.edu/classes/252/home.html

Course relevant website : www.rvrjcce.ac.in/moodle/first year / 2011-12/ engineeringphysics

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I/IV Year B.Tech.- Second Semester

CE/CS/IT - 123

ENGINEERING CHEMISTRY - II

Lectures	*: 3 periods / week*	*Internal Marks*	*: 40*
Tutorials	*: 1 period / week*	*Semester End Exam*	*Marks : 60*
Semester End Exam : 3 hrs		*Credits*	*: 3*

Course Objectives:

To acquire knowledge on various polymers and their mechanisms.

To study the mechanisms, different types and factors influencing corrosion.

To acquire knowledge on latest analytical techniques.

To know the importance of green chemistry related to environmental management.

Course Outcomes:

Students know the utility of plastics in automobile, electronics, electrical and other fields.

Students can relate corrosion and environment and suggest methods to prevent corrosion.

Knowledge acquired on fuels gives good foundation for engineering students.

Can analyse substances using techniques like Spectrophotometry, Colorimetry, Conductometry and Potentiometry.

Able to design new techniques based on green chemistry principles.

UNIT-I: (Text book-1 & 2) (18)

Polymers: Monomer functionality, degree of polymerization, Tacticity, classification of polymerization- addition, condensation and co-polymerization, mechanism of free radical polymerization.

Plastics- Thermoplastic and thermosetting resins, preparation, properties and uses of Bakelite, polyesters, Teflon and PVC. Compounding of plastics.

Conducting polymers: Introduction, examples and applications, Polyacetylene- mechanism of conduction .

Rubber- Processing of latex, Drawbacks of natural rubber- Vulcanization, Synthetic rubbers- Buna-S and Buna-N, polyurethane rubber and silicone rubber.

UNIT-II: (Textbook-1) (13)

Corrosion and its control: Introduction, dry corrosion, electrochemical theory of corrosion, Types of corrosion- differential aeration, galvanic (galvanic series), Intergranular and Stress Factors affecting corrosion-oxidizers, pH, over voltage and temperature.

Protection methods: Cathodic protection, (Impressed current and sacrificial anode) corrosion inhibitors- types and mechanism of inhibition, metallic coatings-Galvanization, Tinning, Electroplating (Cu) and electro less plating (Ni)

UNIT-III: (Text book-1) (14)

Fuels: Classification of fuels, calorific value, LCV and HCV-units and determination (Bomb calorimeter), Coal- Ranking, proximate and ultimate analysis, carbonization of coal-types (using Beehive oven), Metallurgical coke-properties and uses.

Petroleum based: Fractional distillation, cracking-fixed bed, reforming, composition and uses of petrol, diesel, CNG and LPG.

UNIT-IV: (Text book-1 & 2) (15)

Analytical Techniques: Spectroscopy- Beer-Lambert's law, UV and IR-principles, Instrumentation (block diagram), Colorimetry- estimation of Iron, Conductometric (HCl vs NaOH) and potentiometric titrations (Fe(II)vs $K_2Cr_2O_7$)

Green Chemistry: Introduction, Principles and applications.

LEARNING RESOURCES:

TEXT BOOKS:

1. *Engineering Chemistry, P.C. Jain and Monika Jain, 15th Edition, 2008, Dhanpat Rai Publishing Company, New Delhi.*
2. *A Text Book of Engineering Chemistry, Shashi Chawla, 3rd Edition, 2009, Dhanpat Rai and Co.(P) Ltd., New Delhi.*

REFERENCE BOOKS:

1. *A Text Book of Engineering Chemistry, S.S. Dara and S.S. Umare, 12th Edition, 2010, S.Chand and Co.Ltd.*
2. *Principles of Polymer Science, P.Bahadur and N.V. Sastry, Narora Publishing House*

WEB REFERENCES:

http://www.wiziq.com/tutorial/

http://www.chem1.com/acad/webtext/states/polymers.html

http://freevideolectures.com/Course/3029/Modern-Instrumental-Methods-of-Analysis http://www.cdeep.iitb.ac.in/nptel/Core%20Science/

I/IV Year B.Tech.-Second Semester

BT/CHE/CE/CS/IT- 124 C - PROGRAMMING

Lectures	*: 4 periods / week*	*Internal Marks*	*: 40*
Tutorials	*: 1 period / week*	*Semester End Exam Marks*	*: 60*
Semester End Exam :	*3 hrs*	*Credits*	*: 4*

Course Objectives:

Be familiar with computer software and hardware components, how they interact and its block diagram. Understand the basic problem-solving process using algorithm, Flow Charts and pseudo-code development.

Understand the phases of compilation, from preprocessing through linking and loading. Learn how to customize compilation to produce intermediate files, etc.

Able to recognize the need for arrays and develop thorough knowledge on the concept of numerical and character arrays and get a better handle on multi- dimensional arrays, pointers, Learn to effectively use pointers for Dynamic memory allocation.

Learn to use structures and unions to create custom data types in C. Have basics in File Operations. Have sound theoretical and practical knowledge in C .

Course Outcomes:

Thorough understanding of basic components of a computer and their operations.

Thorough knowledge about various phases of compilation, from preprocessing through linking and loading. Learn how to customize compilation to produce intermediate files, etc.

The ability to use the control structures effectively to write efficient programs.

Skills to control program's memory consumption by dynamically allocating and freeing memory as needed.

Have sound theoretical and practical knowledge in C and could effectively use their skills to develop programs for complex applications.

UNIT - I (15)

Introduction: Computer Fundamentals: Computer & it's Components, Hardware / Software, Algorithm, Characterstics of algorithm, Flowchart, Symbols are used in flowchart, history of C, Basic structure of C, C language features.

C Tokens: Character set, Variables, Keywords, Data types and sizes, Type qualifiers, Numeric Constants and their forms of representation, Character Constants, String Constants, Declarations and Initialization of variables.

Operators & Expressions: Arithmetic operators, and expressions, Type-conversion rules, Coercion, Assignment operators and expressions, Increment and decrement operator, Conditional operator, Statements, Preprocessor directives, Input/ Output functions and other library functions. Relational operators and expressions. Boolean operators and expressions.

Programming Exercises for Unit I : C-Expressions for algebraic expressions, Evaluation of arithmetic and boolean expressions. Syntactic errors in a given program, Output of a given program, Values of variables at the end of execution of a program fragment, Filling the blanks in a given program, Computation of values using scientific and Engineering formulae, Finding the largest of three given numbers.

UNIT - II (15)

Conditional Statements: Blocks, If-Else statement, Else-If statement and Switch statement.

Iterative Statements: While loop, For loop, Do-While loop, Break, and continue.

Arrays: One - dimensional and character arrays, Two-dimensional numeric arrays.

Programming Exercises for Unit - II: Computation of discount on different types of products with different ranges of discount Finding the type of triangle formed by the given sides, Computation of income-tax, Computation of Electricity bill, Conversion of lower case character to its upper case, Finding the class of an input character; Sum of the digits of

a given number, Image of a given number, To find whether a given number is-prime; Fibonacci; abundant; perfect, Strong, Amstrong; deficient, Prime factors of a given number, Merging of lists, Transpose of a matrix, Product and sum of matrices, String processing-length of a string; comparison of strings; reversing a string; copying a string, Sorting of names using arrays, Graphics patterns, To print prime numbers and Fibonacci numbers in a given range, and Amicable numbers.

UNIT - III (15)

Functions: Function Definition, types of User Defined Functions, Parameter passing mechanisms, and simple recursion.

Scope & extent: Scope rules, Storage Classes, Multi-file compilation.

Pointers: Pointers Arithmetic, Character array of pointers, Dynamic memory allocation, array of Pointer, Pointer to arrays.

Programming Exercises for Unit - III : Factorial, GCD(Greatest Common Divisior),Fibonacci; To evaluate the pointer arithmetic expressions; An interactive program to perform Pointers & Functions - Insertion sort, Bubble sort, Linear search Binary search, Computation of Statistical parameters of a given list of numbers, Counting the number of characters, words and lines in a given text, Table of values of f (x,y) varying x and y; Using Storage Classes to implement the multifile compilation; implement the string operations using Dynamic memory allocation functions;

UNIT - IV (15)

Structures: Structures, Array of structures, structures within structures, Pointer to structures, self referential structures, Unions.

Files: File Handling functions, File error handling functions, Command-line arguments.

Programming Exercises for Unit - IV: Operations on complex numbers, operations on rational number (p/q form), Matrix operations with size of the matrix as a structure; Frequency count of keywords in an input program, Sorting a list of birth records on name and date of birth using File handling functions, Student marks processing, Library records processing - sorting on name, author, Copy one file to another.

LEARNING RESOURCES

TEXT BOOKS:

1. *Programming with C (Schaum's Outlines) by Byron Gottfried, Tata Mcgraw-Hill, 2010.*
2. *Programming with C by K R Venugopal & Sudeep R Prasad, TMH., 1997*

REFERENCE BOOKS:

1. *Programming in C by Pradip Dey and Manas Ghosh ,Second Edition,OXFORD.*
2. *'C' Programming by K.Balaguruswamy, BPB.*
3. *C Complete Reference, Herbert Sheildt, TMH., 2000.*

WEB REFERENCES:

http://cprogramminglanguage.net/
http://lectures-c.blogspot.com/
http://www.coronadoenterprises.com/tutorials/c/c_intro.htm
http://vfu.bg/en/e-Learning/Computer-Basics--computer_basics2.pdf

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I/IV Year B.Tech.-Second Semester

CE - 125 ENGINEERING MECHANICS - II

Lectures/Tutorials:	*4/1 Periods / week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3 hours*	*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- To study rectilinear translation
- To study curvilinear translation
- To understand rotation of rotation of a rigid body
- To determine moments of inertia of material bodies and plane figures

Course Outcomes:

- Solve problems involving rectilinear translation
- Solve problems involving curvilinear translation
- Understands rotation of a rigid body
- Calculates moments of inertia of material bodies and plane figures

UNIT-I

Rectilinear Translation : Kinematics of rectilinear motion ; Principles of dynamics ; Differential equation of rectilinear motion ; Motion of a particle acted upon by a constant force ; D'Alemberts principle ; Momentum and impulse ; Work and energy ; Ideal systems - conservation of energy ; direct central impact

UNIT-II

Curvilinear Translation : Kinematics of curvilinear motion ; Differential equations of curvilinear motion ; D'Alembert's principle in curvilinear motion ; Work and Energy.

UNIT-III

Moments of Inertia of Material Bodies : Moment of inertia of a rigid body; Moment of inertia of a lamina; Moments of inertia of three-dimensional bodies.

Rotation of a Rigid Body about a Fixed Axis : Kinematics of rotation ; Equation of motion for a rigid body rotating about a fixed axis; Rotation under the action of constant moment, D'Alembert's principle, Work and energy

Unit-IV

Moments of Inertia of Plane Figures : Moment of inertia of a plane figure with respect to an axis in its plane ; Moment of Inertia with respect to an axis perpendicular to the plane of the figure ; Parallel axis theorem.

LEARNING RESOURCES

TEXT BOOK:

1 *Engineering mechanics by S. Timoshenko , D. H. Young and J. Rao , Tata McGraw Hill Publishing Company Ltd., 2007.*

REFERENCE BOOK:

1. *Engineering mechanics by J. L. Meriam and L. Kraige ,6 th Edition, John Wiley & Sons,2010.*

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I/IV Year B.Tech.-Second Semester

BT/CHE/CE/CS/IT- 161 CHEMISTRY LAB

Practicals	*: 3 periods / week*	*Internal Marks*	*: 40*
Tutorials	*: --*	*Semester End Exam Marks*	*: 60*
Semester Exam	*: 3 hrs*	*Credits*	*: 2*

Course Objectives :

To learn the concepts of equivalent weight, molecular weight, normality, molarity, weight percent, volume percent.

To prepare molar solutions of different compounds.

To know the methods of determining alkalinity, hardness and chloride ion content of water sample.

To know the methods to determining purity of washing soda, percentage of available chlorine in bleaching powder.

To learn the redox methods to determine Fe2+ ions present in solution.

To know principles and methods involved in using instruments like conductivity bridge, spectrophotometer, pH meter and potentiometer

Course Outcomes:

Students acquire knowledge on normality, molarity, molecular weight, equivalent weight, oxidizing agent, reducing agent.

Students can prepare solutions with different concentrations.

Students can analyze water for its hardness, alkalinity, chloride ion content, iron content.

Students understand the principles behind the development of instruments suitable for chemical analysis. Later he can use the knowledge in modifying instruments.

(Any 10 out of the following experiments)

01. Determination of total alkalinity of water sample
    a. Standardization of HCl solution
    b. Determination of alkalinity of water
2. Determination of purity of washing soda
    a. Standardization of HCl solution
    b. Determination of percentage purity of washing soda

03. Estimation of Chlorides in water sample
    a. Standardization of $AgNO_3$ solution
    b. Estimation of Chlorides in water
4. Determination of Total Hardness of water sample
    a. Standardization of EDTA solution
    b. Determination of Total Hardness of water
5. Estimation of Mohr's salt-Permanganometry
    a. Standardization of $KMnO_4$ solution
    b. Estimation of Mohr's salt
06. Estimation of Mohr's salt -Dichrometry
    a. Standardization of $K_2Cr_2O_7$ solution
    b. Estimation of Mohr's salt
7. Determination of available chlorine in bleaching powder-Iodometry
    a. Standardization of Hypo
    b. Determination of available chlorine in bleaching powder
08. Estimation of Magnesium
    a. Standardization of EDTA solution
    b. Estimation of Magnesium
9. Conductometric titration of an acid vs base
10. Potentiometric titrations: Ferrous Salt vs Dichromate

Demonstration Experiments:

11. pH metric titrations of an acid vs base
12. Spectrophotometry: Estimation of Mn/Fe

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I/IV Year B.Tech.-Second Semester

BT/CHE/CE/CS/IT - 162 WORKSHOP

Practicals	*: 3 periods / week*	*Internal Marks*	*: 40*
Tutorials	*: --*	*Semester End Exam Marks*	*: 60*
Semester Exam	*: 3 hrs*	*Credits*	*: 2*

Course Objectives:

To provide the students hands on experience to make different joints in carpentry with hand tools like jack plane, various chisels & hand saws

To provide the students hands on experience to make different joints in welding with tools & equipment like electric arc welding machine, TIG Welding Machine, MIG Welding Machine, hack saws, chipping tools etc.

To provide the students hands on experience to make different joints in Sheet metal work with hand tools like snips, stacks, nylon mallets etc.

To provide the students hands on experience to make different connections in house wiring with hand tools like cutting pliers ,tester ,lamps& lamp holders etc .

Course Outcomes:

To familiarize with

The Basics of tools and equipment used in Carpentry, Tin Smithy, Welding and House Wiring.

The production of simple models in the above four trades

LIST OF EXPERIMENTS:

Minimum three experiments should be conducted from each trade

1. CARPENTRY

To make the following jobs with hand tools

a) Lap joint

b) Lap Tee joint

c) Dove tail joint

d) Mortise & Tenon joint

e) Cross-Lap joint

2. **WELDING USING ELECTRIC ARC WELDING PROCESS / GAS WELDING.**

The following joints to be welded.

a) Lap joint

b) Tee joint

c) Edge joint

d) Butt joint

e) Corner joint

3. **SHEET METAL OPERATIONS WITH HAND TOOLS.**

a) Rectangular Tray

b) Triangular Tray

c) Pipe Joint

d) Funnel

e) Rectangular Scoop

4. **HOUSE WIRING**

a) To connect one lamp with one switch

b) To connect two lamps with one switch

c) To connect a fluorescent tube

d) Stair case wiring

e) Go down wiring

REFERENCE BOOKS:

1. *Kannaiah P. & Narayana K. C., "Manual on Work Shop Practice", Scitech Publications, Chennai, 1999.*
2. *Workshop Lab Manual , R.V.R. & J.C. College of Engineering , Guntur*

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I/IV Year B.Tech.-Second Semester

BT/CHE/CE/CS/IT - 163 C - PROGRAMMING LAB

Practicals	*: 3 periods / week*	*Internal Marks*	*: 40*
Tutorials	*: --*	*Semester End Exam Marks*	*: 60*
Semester Exam	*: 3 hrs*	*Credits*	*: 2*

Course Objectives:

Understand the ANSI C/Turbo C compilers.

Be able to develop various menu driven programs using conditional and control flow statements.

Develop programs using structures, unions and files. Develop 'C' programs for various applications.

Be able to participate and succeed in competitive examinations.

Course Outcomes:

The ability to develop various menu driven programs like generation of electricity bill, evaluation of series etc.

The practical knowledge to write C programs using 1D, 2D and Multi Dimensional arrays.

Able to write C programs to develop various applications using structures, unions and Files.

Thorough practical knowledge to develop 'C' programs for various applications.

List of programs (to be recorded)

1. A program for electricity bill taking different categories of users, different slabs in each category. (Using nested if else statement or Switch statement).

Domestic level Consumption As follows:	
Consumption Units	**Rate of Charges(Rs.)**
0 - 200	0.50 per unit
201 - 400	100 plus 0.65 per unit
401 - 600	230 plus 0.80 per unit
601 and above	390 plus 1.00 per unit
Street level Consumption As follows:	
Consumption Units	**Rate of Charges(Rs.)**
0 - 50	0.50 per unit
100 - 200	50 plus 0.6 per unit
201 - 300	100 plus 0.70 per unit
301 and above	200 plus 1.00 per unit

2. Write a C program to evaluate the following (using loops):
   a. $1 + x^2/2! + x^4 / 4!+$ upto ten terms
   b. $x + x^3/3! + x^5/5!+$ upto 7 digit accuracy
   c. $1+x+x^2/2! +x^3/3!+$……upto n terms
   d. Sum of 1 + 2+ 3 +……..+n
3. A menu driven program to check the number is (using Loops):
   O Prime or not
   O Perfect or Abundant or deficient
   O Armstrong or not
   iv) Strong or not
4. A menu driven program to display statistical parameters (using one - dimensional array)
   i) Mean ii) Median iii) Variance iv) Standard deviation
5. A menu driven program with options (using one -Dimensional array)
   (i) To insert an element into array
   (ii) To delete an element
   (iii) To print elements
   (iv) To remove duplicates
6. A menu driven program with options (using two dimensional array)
   (i) To compute A+B
   (ii) To compute A x B
   (iii) To find transpose of matrix A
   Where A and B are matrices. Conditions related to size to be tested
7. A menu driven program with options (using Two-dimensional Character arrays)
   (i) To insert a student name
   (ii) To delete a name
   (iii) To sort names in alphabetical order
   (iv) To print list of names
8. A menu driven program (using pointers)
   a. Linear search b. Binary search

9. A menu driven program with options (using Dynamic memory allocation)
   a. Bubble sort b. Insertion sort
10. A menu driven program with options (using Character array of pointers)
   (i) To insert a student name (ii) To delete a name
   (iii) To sort names in alphabetical order
   (iv) To print list of names
11. Write a program to perform the following operations on Complex numbers (using Structures & pointers):
   i) Read a Complex number
   ii) Addition of two Rational numbers
   iii) Subtraction of two Complex numbers
   iv) Multiplication of two Complex numbers
   v) Display a Complex number
12. a) Write a C program To copy the one file contents to the another file (using command line arguments).
   b) Write a C Program to count the frequencies of words in a given file.

TEXT BOOK:

1. *Programming with C (Schaum's Outlines) by Byron Gottfried, Tata Mcgraw-Hill, 2010.*
2. *Programming with C by K R Venugopal & Sudeep R Prasad, TMH., 1997*

REFERENCE BOOKS:

1. *Programming in C by Pradip Dey and Manas Ghosh ,Second Edition,OXFORD*
2. *'C' Programming by K.Balaguruswamy, BPB.*
3. *C Complete Reference, Herbert Sheildt, TMH., 2000*

WEB REFERENCES:

http://cprogramminglanguage.net/
http://lectures-c.blogspot.com/

http://www.coronadoenterprises.com/tutorials/c/c_intro.htm
http://www.cprogramming.com/tutorial/c/lesson1.html

http://vfu.bg/en/e-Learning/Computer-Basics--computer_basics2.pdf

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II/IV Year B.Tech.- Third Semester

CE-211 ENGINEERING MATHEMATICS - III

Lectures	*: 4 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3 Hours*	*Semester End Exam. Marks*	*: 60*
		Credits	*: 4*

Course objectives :

- To study the formation of partial differential equations
- To study numerical integration and numerical solution of first-order ordinary differential equations
- To study probability concept and distributions
- To study complex variable functions, analyticity of complex functions and complex integration

Course outcomes :

- Learn formation of partial differential equations and solution of partial differential equations
- Solve algebraic and transcedental equations numerically
- Solve one dimensional heat, wave and Laplace equations
- Determine analytic functions and non analytic functions and evaluate real definite integrals by complex integration

UNIT- I

Partial Differential equations : Partial differential equations - Introduc-tion, Formation ; Solution of partial differential equations - Linear equa-tions of first order , Non-linear equations of first order (standard type); Method of separation of variables - Solution of one dimensional heat, wave equations and Laplace equations

UNIT- II

Numerical Methods: Solution of algebraic and transcendental equations - Introduction, Bisection method, Method of false position, Iteration method, Newton's Raphson method; Numerical Integration - Trapezoi-

dal rule, , Simpson's 1/3 rule, 3/8 rule ; Numerical solution of first-order ordinary differential equations - Picard's method, Taylor's series method, Euler's method (simple) , R-K method of 4th order

UNIT- III

Probability and Distributions: Definition of probability and conditional probability ; Addition theorem , Multiplication theorem , Baye's theorem, ; Random variables - Binomial , Poisson and Normal distributions

Complex variables: Introduction -Limit, derivative of a functions of com-plex variable; Analytic functions; Harmonic functions.

UNIT - IV

Complex variables (Continued) :Complex integration -Cauchy's theo-rem , Cauchy's integral formula; Taylor's series and Laurent's series (with-out proof) ; Zeroes and singularities; Residues -Residue theorem , Cal-culation of residues .

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS

1. *Higher Engineering Mathematics by B S Grewal,40th Edition, Khanna Publishers*

REFERENCE BOOK

1. *Advanced Engineering Mathematics by Erwin Kreyszig, 8th Edition,John Wiley & Sons*

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II/IV Year B.Tech.- Third Semester

CE - 212 BUILDING MATERIALS, PLANNING & CONSTRUCTION

Lectures	*: 4 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3 Hours*	*Semester End Exam. Marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- *To teach the basics involved in selection of good quality building ma-terials for construction.*
- *To demonstrate various types of masonry works including types of bonds and their finishing.*
- *To give knowledge about various building elements and their specifi-cations.*
- *Effectively deals with the types of form work and rehabilitation work of building.*
- *Presents the basics of planning strategies, building bye laws and acoustics of building.*

Course Outcomes:

- *Students will be able to get knowledge about various building materi-als.*
- *Students can select required masonry work and bond for the con-struction.*
- *Students will gain knowledge regarding acoustics of building.*
- *Students can understand how to plan a building following building rules and bye laws aesthetically.*
- *Students are able to know how to use the form work, scaffolding and shoring before and after construction.*

UNIT - I

Clay bricks : Brick clay, Preparation of bricks, Types of bricks, Dimen-sions of bricks, Weight of bricks, Storing of bricks, Brick substitutes, Clas-sification of bricks, Tests for bricks.

Timber : Classification of trees, Structure of wood, seasoning and con-version of timber, Market forms of timber, Defects of timber, Treatment of timber, Classification of timber

Glass : Manufacture and Classification, Treatment of glass, Uses of glass, testing for quality, Characteristics and Performance of glass, Glass fibre

Plastics : Classification of plastics, Properties of plastics, Fabrication of plastic articles, some plastics in common use, Reinforced plastics

UNIT -II

Paints : Types of paints, Composition of paints, Considerations in choos-ing paints, Paints commonly used in buildings

Brick Masonry: Terms used in brickwork, Mortars to be used, bonding of bricks, Method of laying bricks

Plastering: Specifications for cement plastering, plastering method, Specifications for plastering with cement mortar

UNIT -III

Stairs and lifts: Terminology used in stairs, Types of stairs, Reinforced concrete stairs, lifts

Acoustics : Basic theory, Reverberation and echos, Sound isolation, Acoustical materials, Recommendations for different types of buildings

Shoring, Underpinning, Scaffolding and Formwork : Shoring, Types of shores; Underpinning - Pit method, Pile method; Scaffolding -Types of scaffolding; Formwork for columns, beams, slabs

UNIT -IV

An Approach to Planning : Site planning; Space requirement-Estab-lishing areas for different units, Furniture requirements, Roominess, Flex-ibility, Sanitation, Lighting, Ventilation, Space for equipment for air-condi-tioning, Space for machinery etc.; Flow diagram and line plan-Grouping, Circulation, Orientation, Aspect and prospect, Privacy, Elegance and economy; Climatic considerations; Architectural composition-Unity, Mass composition, Contrast, Proportion, Scale, Accentuation and rhythm, Ma-terials for the exterior and Expression; Colour.

Building Rules and Bye-Laws : Zoning regulations; Regulations regarding layouts or sub-divisions; Building regulations; Rules for special type of buildings; Calculation of plinth, floor and carpet area; Floor space index.

Building Elements : Conventional signs; Guidelines for staircase plan-ning; Guidelines for selecting doors and windows; Terms used in the construction of door and window; Specifications for the drawing of door and window

NOTE:

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS:

1. *Building Materials by P.C. Vergese, 1st Edition,PHI,2009.*
2. *Building construction by P.C. Vergese, 1st Edition ,PHI,2009.*
3. *Building planning, designing and scheduling by Gurucharan Singh, Standard book House, 2006.*

REFERENCE BOOKS

1. *Building Materials by ML Gambhir and N Jamwal, 1st Edition, Tata McGraw-Hill,2011.*
2. *Building construction by BC Punmia et al., 10th Edition,Laxmi Publications, 2008.*
3. *Building Drawing by M.G. Shah, C.M. Kale and S.Y. Patki, Tata McGrqw-Hill, New Delhi, 2009.*
4. *Planning and Designing Buildings by Yashwant S. Sane, Allied Book Stall,Pune.*

WEB REFERENCES:

http://nptel.iitm.ac.in/courses.php

http://freevideolectures.com/Course/86/Building-Materials-and-Construction

http://www.learnerstv.com/Free-Engineering-Video-lectures-ltv053-Page1.htm

http://bookmoving.com/register.php?ref=Building%20materials%20rangwala

http://bookmoving.com/book/building-materials_654.html

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II/IV Year B.Tech.- Third Semester

CE - 213 SURVEYING - I

Lectures / Tutorials : 4 Periods/Week	*Sessional marks*	*: 40*
Semester End Exam. : 3 Hours	*Semester End Exam. marks*	*: 60*
	Credits	*: 4*

Course Objectives:

- *To take measurements to determine the relative positions of the ex-isting features on the ground.*
- *To train various theoretical aspects of the surveying principles.*
- *To familiarize the simple surveying techniques.*
- *To give adequate knowledge on chain surveying, compass survey-ing.*
- *To acquaint with procedures of leveling by dump level & auto level.*
- *To layout or to mark the positions of the proposed structures on the ground.*

Course Outcomes:

By the end of the course surveying-I, the students will be able to

- *To know the relative positions of the existing ground by conducting the survey.*
- *To know the how to take the levels of existing ground.*
- *To layout the existing structures on the ground.*

UNIT - I

Surveying & Measurements : Definitions; Classification; Principles of Surveying; Plan and map; Scales used for Maps and plans. Phases of survey work and Duties of a surveyor; Precision in surveying work.

Errors : Reliability of measurements - Accuracy, Precision, Significant figures, rounding of Numbers; Sources and types of errors; Probability in Survey measurements; Normal distribution; weights of measurements.

UNIT - II

Measurement of horizontal distance : Methods of distance measure-ments; Equipment for distance measurement; Procedures for distance measurement - Ranging, Chaining/taping a line; Errors in chaining and taping, and their corrections.

Measurement of angles and directions : Angles and Bearings; Instru-ments used to measure angles and directions; Vernier Theodolite; Basic definitions; Fundamental lines and desired relations; Temporary and per-manent adjustments; Field operations - Measurement of - a horizontal angle: Repetition and Reiteration methods, a vertical angle, bearings; Lining-in, Balancing- in, Double sight, Random line method of running a line, Prolonging a straight line and location of intersection of two straight lines, to lay off a horizontal angle and Traversing; Sources of errors in Theodolite survey.

UNIT - III

Chain and Compass Surveying : Basic definitions; chain survey of an area - Principle, selection of scale of the map, Selection of stations, Off-sets and Booking the survey; Accuracy of measurements; Office work; Problems encountered in chain survey; Chain and Compass Traversing; Field work; Plotting of a compass traverse.

Traversing - Uses of traversing surveying : Types of traverses - Open and closed traverse, Traverse procedure - Selection of traverse stations; Marking of stations, linear and angular (both bearings and angles) measurements; Compatibility of linear and angular measurements; Sources of errors in traversing; Checks in traversing; Traverse Compu-tations - Gale's traverse table; Methods of adjustments; Omitted mea-surements.

UNIT - IV

Simple Leveling : Basic definitions; Curvature and Refraction; Different methods of leveling; Levels - Dumpy level, Tilting level, Auto level; Sen-sitivity of a Level tube; Leveling staff; Level field book; Booking and re-ducing levels; Classification of direct differential leveling methods -Fly leveling, Check leveling, Profile leveling and Cross sectioning, Recip-rocal leveling and Precise leveling; Sources of errors in leveling; Degree of Precision; Difficulties in leveling.

Contouring

Methods of representing Relief; Contouring; contour interval; Characteristics of contours; Methods of locating contours; Direct and indirect methods of contouring; Interpolation and sketching of contours; Location of a contour gradient on map and ground; Uses of contour maps;

NOTE : Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK :

1. *Surveying Vol. 1 & II by Dr. K. R. Arora,11th Edition, Standard Book House,2012.*

REFERENCE TEXT BOOKS :

2. *Plane Surveying by AM Chandra, 2nd Edition,New Age International (P) Ltd.,2006.*
3. *Fundamentals of Surveying by S K Roy, 2nd Edition,Prentice- Hall of India Private Ltd.,2010.*
4. *Surveying Vol-I&II by B.C. Punmia ,Laxmi Publications,2005.*

WEB REFERENCES :

http://nptel.iitm.ac.in/video.php?subjectId=105104101

http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-ROORKEE/SURVEYING/home.htm

http://www.engineeringcivil.com/theory/surveying/

http://www.engineeringcivil.com/theory/civil-engineering-notes-from-universities/

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II/IV Year B.Tech.- Third Semester

CE214 SOLID MECHANICS - I

Lectures / Tutorials :	*4 / 1 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3 Hours*	*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course objectives:

- *To understand the internal resistances against the applied loads on different shaped materials.*
- *To know the stress, strains and different engineering properties of materials.*
- *To introduce concept of shear force and bending moment.*
- *To introduce concept of torsion and design for torsion for materials.*

Course outcomes:

- *Able to understand the engineering properties of materials.*
- *Able to draw bending moment and shearing force diagrams for beams.*
- *Able to know and design for torsion problems.*

UNIT-I

Stress : Introduction; Method of sections; Definition of stress; Normal stresses in axially loaded bars; Shear stresses ; Analysis for normal and shear stresses; Stresses on inclined sections in axially loaded bars; Al-lowable stress and factor of safety.

Strain : Introduction; Normal strain; Stress-strain diagrams; Hooke's law; Deformation of axially loaded bars; Thermal strain and deformation; stati-cally indeterminate axially loaded bars; Shear strain; Hooke's law for shear stress and shear strain.

Generalized Hooke's law and Pressure vessels: Poisson's ratio; Generalized Hooke's law for isotropic materials; Relationship between Modulus of elasticity and Modulus of rigidity; Dilatation and Bulk modulus; Thin-walled pressure vessels - Cylindrical and spherical vessels.

UNIT-II

Internal forces in beams : Introduction; Diagrammatic conventions for supports and loads; Calculation of beam reactions; Application of method of sections; Shear force in beams; Bending moment in beams; Shear force and bending moment diagrams; Differential equations of equilib-rium for a beam element.

UNIT-III

Normal stresses in beams : Introduction; Basic assumptions; The elastic flexure formula ; application of flexure formula; Unsymmetric bending - Bending about both principal axes of a beam with symmetric cross sec-tion.

UNIT-IV

Shear stresses in beams : Introduction; Shear flow; The shear stress formula for beams; Shear stress in beam flanges; Shear centre

Torsion : Introduction; Application of the method of sections; Torsion of circular elastic bars - Basic assumptions, the torsion formula ; Power transmission by circular shafts

NOTE : Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK

1. Mechanics of Materials by Pytel and Kiusalaas , Cengage Learning, 2003.

REFERENCES

1. *Mechanics of materials by E.P. Popov , Prentice Hall of India ,1986.*
2. *Elements of strength of materials by S.P.Timoshenko and D.H.Young, Affiliated East-West Press Pvt.Ltd.,2005.*

WEB REFERENCES:

http://nptel.iitm.ac.in/video.php?subjectId=105101084

http://www.engineeringcivil.com/theory/civil-engineering-notes-from-universities/

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II/IV Year B.Tech.- Third Semester

CE - 215 FLUID MECHANICS

Lectures / Tutorials :	*4 / 1 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3 Hours*	*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course objectives:

- *To explain the units of measurement, properties of fluids and types of fluids.*
- *To introduce concepts, principles, laws, observations, and models of fluids at rest and in motion.*
- *To determine the pressure variation in static fluid on different surfaces.*
- *To understand the stability criteria of submerged and floating bodies.*
- *To derive basic equations and their applications.*
- *To analyze flow rates, velocities, energy losses, and momentum fluxes for fluid systems.*
- *To learn methods for computing head losses and flows in simple pipes.*
- *To estimate the efficiency of power transmission by pipe line.*
- *To estimate the friction factor for smooth and rough pipes.*

Course objectives:

By the end of the course fluid mechanics, the students will be able to:

- *To understand the basic principles governing the dynamics of non-viscous fluids*
- *To be able solve kinematics problems such as finding particle paths and stream lines.*
- *To be able to apply B*ernoulli's theorem and the momentum integral to simple problems.
- *To provide capabilities in estimating discharge and to find forces for design of hydraulic structures.*

UNIT - I

Introduction : Dimensions and units - Physical properties of fluids-spe-cific gravity, viscosity, surface tension, vapour pressure and their influ-ences on fluid motion

Fluid Statics : Variation of static pressure; Absolute and gauge pressure; Pressure measurement by manometers; Pressure on plane surfaces and curved surfaces.

Buoyancy : Buoyancy; Stability of submerged bodies and floating bod-ies; Metacentre and metacentric height.

UNIT - II

Fluid Kinematics : Methods of describing fluid motion; Classification of flows; Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; One, two and three dimensional flows; Irrotational and rotational flows; Streamline; Path line; Streak line; Equation for accelera-tion; Convective acceleration; Local acceleration; Continuity equation; Velocity potential and stream function; Flow net; Vortex flow - free vortex and forced vortex flow.

Fluid Dynamics : Euler's equation of motion; Bernoulli's equation; En-ergy correction factor; Momentum principle; Applications of momentum equation- Force exerted on a pipe bend.

UNIT - III

Flow Measurement In Pipes : Discharge through venturi meter; Discharge through orifice meter; Discharge through flow nozzle; Measure-ment of velocity by pitot tube.

Flow Through Orifices And Mouthpieces : Flow through orifices; Determination of coefficients for an orifice; Flow through large rectangular orifice; Flow through submerged orifice; Classification of mouthpieces; Flow through external and internal cylindrical mouthpiece.

Flow Over Notches And Weirs : Flow through rectangular, triangular and trapezoidal notches and weirs; End contractions; Velocity of approach; Broad crested weir.

UNIT - IV

Analysis of Pipe Flow : Laws of Fluid friction - Darcy's equation, Minor losses - pipes in series - pipes in parallel - branched pipes; Total energy line and hydraulic gradient line, Hydraulic power transmission through a pipe; Siphon; Water hammer.

Laminar Flow : Reynold's experiment; Characteristics of laminar flow; Steady laminar flow through a circular pipe (Hagen Poiseuille equation).

Turbulent Flow in Pipes : Characteristics of turbulent flow, Hydro dynamically smooth and rough boundaries, Velocity distribution, Friction factor for pipe flow, Variation of friction factor with Reynolds number-Moody's chart.

NOTE:

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK:

1. Hydraulics and Fluid Mechanics including Hydraulic Machines by P. N. Modi and S. M. Seth; Standard book house; New Delhi, 2009.

REFERENCE BOOKS:

1. Fluid Mechanics by A. K Jain, Khanna Publishers, 2008.

2. Fluid Mechanics and Hydraulic Machines by R. K. Bansal; 9th Edition,Laxmi Publications,2011.

3. Fluid Mechanics by Streeter and Wyile, 9th Edition,Tata McGraw-Hill, 2010.

WEB REFERENCES: _

www.nptel.iitm.ac.in

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II/IV Year B.Tech.- Third Semester

CE - 216 ENGINEERING GEOLOGY

Lecturer	*: 4 Periods/Week*	*Sessional Marks*	*: 40*
Semester Exam.	*: 3 Hrs*	*Semester End. Exam Marks*	*: 60*
		Credits	*: 4*

Course objectives:

- *To develop the ability to understand the importance of geology in civil engineering.*
- *To develop the ability to analyze the natural geological process such as weathering and erosion of the region before planning a civil engineering project.*
- *To provide knowledge to evaluate the formation and engineering properties and strength of the minerals, rocks and soil and associated structural elements.*
- *To teach the geological problems in seismic areas.*
- *To give an idea to create suitable geological and geo physical investigation methods to solve foundation problems.*

Course Outcomes:

Student will be able to:

- *Understand the importance of geology in civil engineering*
- *Become familiar with identifying the geological process of the region related to the civil engineering works*
- *Able to evaluate the formation and properties of the minerals, rocks and soil*
- *Develops the ability to analyze the rock deformation process and associated structural elements.*

UNIT-I

Introduction : Branches of geology; Importance of geology in Civil engineering.

Physical Geology : Geological processes; Weathering, Erosion, and Civil engineering importance of weathering and Erosion

Mineralogy : Definition of mineral; Importance of study of minerals; Significance of different physical

Properties in mineral identification; Study of physical properties, structure and chemical composition of the following common rock forming and economic minerals:

Feldspar, Quartz, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Apatite , Kyanite, Garnet, Beryl, Talc, Calcite, Dolomite, Pyrite, Hematite, Magnetite, Galena, Graphite, Magnesite , Bauxite and Clay minerals.

UNIT- II

Petrology : Introduction; Definition of Rock, Civil engineering importance of petrology; Rock cycle,

Geological Classification of rocks: Igneous Rocks Forms, Structures and textures of igneous rocks. Megascopic description and uses of Granite, Basalt, Dolerite, Diorite, Syenite Pegmatite and Charnockite:

Sedimentary Rocks : Formation; Structures and textures of sedimentary rocks. Megascopic description and uses of Laterite, Conglomerate, Sand stone, Lime stone and Shale:

Metamorphic Rocks : Types of metamorphism; Structures and textures of metamorphic rocks. Megascopic Description and uses of Gneiss, Schist, Quartzite, Marble and Slate

UNIT-III

Structural Geology : Introduction; Out crop, Strike and dip, Causes for development of secondary structures; Classification of Secondary structures like Folds, Faults, Joints, Unconformities and their Civil engineering importance

Earthquakes : Classification and causes; Intensity and magnitude and their measuring scales; Effects of earthquakes; Seismic belts and shields; Civil Engineering considerations in seismic areas; Seismic zones of India

Land Slides : Classification; Causes and effects; Preventive measures of landslides:

UNIT- IV

Geophysical Investigations : Geophysical methods of investigation - Over view; Electrical resistivity method; Seismic refraction method:

Dams : Types of Dams; Geological considerations for the selection of dam sites; Stages of investigation; Case histories of some dam failures; Geology of some Indian dam sites:

Tunnels : Purpose of Tunneling; Geological considerations for tunneling; Effects of tunneling; Over break.

Improvement in the Properties of Rock Mass : Materials and Methods of Grouting, Principles and mechanism of Rock bolting:

NOTE:

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK:

1. A text Book of Engineering Geology by N. Chennakesavulu, 2nd Edition, Macmillan India Ltd., Delhi,2009.

REFERENCE BOOKS:

1. *Principles of Engineering Geology- KVGK Gokhale , B S Publications,2010.*
2. *Fundamentals of Engineering Geology, FG Bell,BS Publications,2005.*
3. *Principles of Engineering Geology and Geotechnics- CBS Publishers & Distribution.*
4. *Engineering Geology for Civil Engineers by PC Verghese,PHI Learning, 2012.*
5. *Engineering and General Geology by Parbin Singh; S. K. Kataria & Sons,2010.*
6. *Rock Mechanics for Engineers by Dr.B.P.Varma, Khana Publishers.*
7. *Principles of Engineering Geology by K M Bangar, Standard Book House,2012.*

WEB REFERENCES:

NPTEL COURSE- Developed by Prof. Debasis Roy, IIT, Kharagpur - 721302

http://www.eos.ubc.ca/academic/undergraduate/appsci.html

http://web.mst.edu/~rogersda/umrcourses/ge341/

http://web.env.auckland.ac.nz/course_pages/geology771/

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II/IV Year B.Tech.- Third Semester

CE - 251 LABORATORY

ENGINEERING GEOLOGY LABORATORY

Practicals	*: 3 Periods/Week*	*Sessional Marks*	*: 40*
Semester Exam.	*: 3 Hrs.*	*Semester End Exam. Marks*	*: 60*
		Credits	*: 2*

Course Objectives:

- Develops the ability to understand the importance of geology in civil engineering
- Develops the ability to identifying the various rock forming group of minerals and rocks and analyze the attitude of rock formations.
- Develops the knowledge in interpreting the topographic geological maps and satellite Imageries.

Course Outcomes:

- Students able to understand the importance of geology in civil engineering
- Students will be familiar with identifying the geological process of the region related to the civil engineering works
- Students are able to evaluate the formation and properties of the minerals, rocks and soil
- Develops the ability to prepare the geological section and maps and interpret the site conditions

Note: A minimum of twelve (12No) shall be done and recorded:

1. Study of Survey of India Topographical Maps
2. Study of Satellite Imageries through appraisal cards
3. Study of Physical Properties and identification Minerals (2 experiments)
   I. Silicate minerals
   ii. Non silicate minerals

4. Megascopic description and identification of Rocks (3 experiments)
   I. Igneous rocks.
   ii. Sedimentary rocks.
   iii. Metamorphic rocks.
5. Joint Data Analysis.
6. Simple Structural geology Problems.
7. Study of Geological Maps and their Cross-section.
8. Electrical Resistivity Method (demo).
9. Seismic Hammer Sounding Method (demo).
10. Study of Structural Models.
11. Study of Tunnel Models.

LEARNING RESOURCES

WEB REFERENCES:

NPTEL COURSE- Developed by Prof. Debasis Roy, IIT, Kharagpur - 721302
http://web.mst.edu/~rogersda/umrcourses/ge341/

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II/IV Year B.Tech.- Third Semester

CE252 LABORATORY

SURVEYING FIELD WORK - I

Practical	*: 3 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam: 3 Hrs.		*Semester End Exam. marks*	*: 60*
		Credits	*: 2*

Course objectives:

- *To chaining of a line using tape and chain and recording of details along the chain line.*
- *To measure the area of irregular boundaries.*
- *To prepare a plan of residential building by making use of a chain.*
- *To find the included angles and local attraction of traverse by using compass surveying.*
- *To determine the distance between two inaccessible points by using different surveying instruments.*
- *To measure the elevation difference between Points at short measured intervals along a fixed line.*
- *To determine the elevation difference between two points-based by reciprocal leveling method.*
- *To prepare a contouring of a small area by method of blocks*
- *To plotting of a building by using plane table surveying*
- *To measure the horizontal and vertical angles of various points by theodolite.*

Course Outcomes:

By the end of the course the students will be able to

- *To prepare the plan or map showing the ground features from the data obtained by surveying.*
- *To analyze and compute traverse adjustment and section break downs.*
- *To perform basic field surveys.*
- *To convert field data to record data in the form of drawings, sketches and field book files.*
- To know about the how to take the levels of existing ground.

Any 10 of the following:

I. Chain & Compass Survey

1. Measurement of area - Cross staff survey
2. Traversing by compass and graphical adjustment.
3. Plotting of an area using Chain/Compass. II. Simple Leveling
4. Measurement of elevation difference between two points using any leveling Instrument (Fly Leveling)
5. Elevation difference between two points by Reciprocal leveling method.
6. Profile Leveling - Plotting of Profile.
7. Contouring of a small area by method of Blocks/Tacheometric Sur-vey.

III. Plane Table Survey

8. Determination of the distance between two inaccessible points.
9. Plotting of a building by plane table Traversing
10. Resection methods.

IV. Theodolite

11. Measurement of horizontal and vertical angles.
12. Determination of distance between two inaccessible points

LEARNING RESOURCES

WEB REFERENCES:

http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-ROORKEE/SURVEYING/home.htm

http://www.engineeringcivil.com/theory/surveying/

http://www.engineeringcivil.com/theory/civil-engineering-notes-from-universities/

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II/IV Year B.Tech.- Third Semester

CE253 LABORATORY

BUILDING DRAWING

Practicals	*: 3 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3 Hrs.*	*Semester End Exam. marks*	*: 60*
		Credits	*: 2*

Course Objectives:

- *To learn basic commands of Auto CAD software.*
- *To draw conventional signs, symbols of materials and building services.*
- *To draw plan, section and elevations of buildings and various building components.*
- *To create 3D building model and rendering the model.*

Course Outcomes:

By the end of this course students will have the capability/knowledge of

- *basic Auto CAD commands.*
- *various conventional signs, symbols of materials and building services.*
- *drawing plan, section and elevations of buildings and various building components.*
- *basics of creating 3D building model and rendering the model.*

Note: Any ten of the following shall be done using AutoCAD /3D MAX software.

1. Learning basic commands of CAD software & drawing various geometrical Shapes using

   a) Draw commands b) Editing commands

   c) Creating text d) Dimensioning

2. Draw Conventional signs for building materials and symbols for sanitary installations and fittings
3. Draw symbols for Doors & Windows and Electrical Installations

4. Draw Elevation and Sections of Door & Window.
5. Draw Cross section of load bearing wall over spread footing.
6. Draw plan & sectional elevation of Dog-Legged staircase.
7. Draw Pitched roof (King post truss).
8. Draw plan of a single storied residential building showing furniture & cub-boards using layers and blocks in CAD software.
9. Draw plan of a single storied residential building showing Electrical and Sanitary features using layers and blocks in CAD software.
10. Draw Plan, Section & Elevation of single storied residential building
11. Learning basic commands in 3-D, creating pre-defined solid primitives and applying Boolean operations.
12. Create a two roomed ground floor building in 3-D and render the model.

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II/IV Year B.Tech.- Fourth Semester

CE - 221 CONCRETE TECHNOLOGY

Lectures	*: 4 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam.	*: 3 Hours*	*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- *To know about the composition, manufacturing process, types and testing of cement*
- *To know the properties of materials used for making concrete i.e cement, Fine aggregate, coarse aggregate and water etc.*
- *To study the properties and behaviour of concrete during fresh state and hardened state by various theories, concepts and tests.*
- *To understand the composition and effects of admixtures and construction chemicals used to improve the properties of concrete.*
- *To know about special concretes and concreting methods.*
- *To know about the advantage of ready mix concrete.*
- *Studying the design mix procedure using different codes.*
- *To Know future trends in concrete technology.*

Course Outcomes:

- *The materials used for the concrete and manufacturing procedure.*
- *The chemistry involved and behaviour of the concrete during fresh and hardened state.*
- *using the concrete effectively in the field.*
- *handling the ready mix concrete in field.*
- *Designing the concrete mix as per IS 10262 code.*
- *special concretes and concreting methods.*
- *Using different admixtures and construction chemicals in t*he concrete.
- Durability aspects like corrosion of reinforcement in concrete, sulphate attack etc.

UNIT-I

Cement : General, Manufacture of Portland cement by dry process, Approximate oxide composition limits of OPC, Bogue's compounds, Hydration of cement, heat of hydration, structure of hydrated cement.

Types Of Cements and testing of cement : Ordinary Portland cement, low alkali cement, Rapid hardening cement, Sulphate resisting cement, Portland blast furnace slag cement, Portland pozzolana cement, air entraining cement, white cement, hydro phobic cement, oil well cement, low heat Portland cement.

Soundness test, Setting times test, Compressive strength test and Fineness test by air permeability apparatus.

Aggregates and Testing Of Aggregates

Classification of aggregates according to size and shape. Characteristics of aggregates-shape and texture, cleanliness, toughness, hardness.

Tests for bulking of fine aggregate, Fineness modulus and Zoning of fine aggregate, Fineness modulus of coarse aggregate.

UNIT-II

Water : Tolerable concentrations of impurities in mixing water, Use of sea water for mixing concrete.

Fresh Concrete : Workability, factors affecting workability, Segregation and Bleeding in concrete, measurement of workability using slump cone test, Kelly ball test, Vee-Bee test, compaction factor test.

Hardened Concrete : Factors affecting compressive strength of concrete, Cube compression test, split tensile strength test, flexural strength of concrete. Durability of concrete, factors affecting durability of concrete. Non-destructive testing : Rebound hammer test, Ultrasonic pulse velocity test

UNIT-III

Production of Concrete : Batching of materials, mixing, transportation, placing, compaction and finishing of concrete. Curing of concrete and methods of curing.

Concrete Mix Design : Basic considerations for concrete mix design, factors influencing the choice of mix proportions, Indian standard method of concrete mix design.

Ready Mixed Concrete (RMC) : Advantages of RMC, components of RMC plant, distribution and transportation, handling and placing, specifications for ready mix concrete as per IS:4926-2003.

UNIT-IV

Chemical and Mineral Admixtures : Functions of admixtures, accelerators, retarders, air entraining admixtures, plasticizers and super plasticizers, water proofers, fly ash, silica fume, ground granulated blast furnace slag.

Special Materials in Construction And Concreting Techniques :

Ferro-cement, self-compacting concrete, fibre reinforced concrete, high strength concrete

High performance concrete

Future Trends in Concrete Technology

Sustainability of concrete industry - Recycled aggregate concrete, Green buildings, Use of supplementary materials

NOTE:

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS:

1. *Concrete technology by A.R.Santha kumar, Ist Edition, Oxford University Press,2006.*
2. *Concrete technology by M.S.Shetty, S.Chand & Company Pvt. Ltd., New Delhi,2005*

REFERENCE BOOKS :

1. *Properties of concrete by A.M.Neville, Pearson Education, 2007.*
2. *Concrete technology by M.L.Gambhir, Tata McGraw-Hill, 2009.*

WEB REFERENCES:

http://nptel.iitm.ac.in/video.php?subjectId=105102088
http://www.engineeringcivil.com/theory/concrete-engineering/

II/IV Year B.Tech.- Fourth Semester

CE-222 ENVIRONMENTAL STUDIES

Lectures / Tutorials : 4 Periods/Week	*Sessional marks*	*: 40*
Semester End Exam. : 3 Hours	*Semester End Exam. marks*	*: 60*
	Credits	*: 4*

Course Objectives :

- To create an awareness on the various environmental pollution aspects and issues.
- To give a comprehensive insight into natural resources, ecosystem and biodiversity.
- To educate the ways and means to protect the environment from various types of pollution.
- To impart some fundamental knowledge on human welfare measures and environmental acts.
- Demonstrate the environmental problems like global warming. Ozone layer depletion and acid rains.

Course Outcomes :

Student will be able to

- Define and explain the basic issues concerning the ability of the human community to interact in a sustainable way with the environment.
- Describe and discuss the environmental implications of the cycles of biologically important materials through the ecosystem.
- Explain why the size of the human population presents an environmental problem. Discuss the factors for the rise of population worldwide.
- Discuss the benefits of sustaining each of the following types of resources; food, health, habitats, energy, water, air, soil and minerals
- Understand the causes, effects and controlling measures of different types of environmental pollutions with some case studies.
- Demonstrate environmental problems like global warming, ozone layer depletion and acid rains.

UNIT-I

Introduction: Definition, Scope and Importance.

Natural Resources: Forest Resources - Use and over-exploitation, Deforestation, Mining, dams and their effects on forests and tribal people; Water Resources - Use and over-utilization of surface and ground water, floods and droughts, Water logging and salinity, Dams - benefits and problems, Conflicts over water; Energy resources - Energy needs, Renewable and non-renewable energy sources;

Land resources - Land as a resource, land degradation, soil erosion & desertification, effects of modern agriculture on land resources.

Ecosystems: Definition, Structure and functions of an Ecosystems, Biogeochemical cycles-water, carbon, nitrogen and water cycles, Types-Forest, Greenland, Desert, Aquatic ecosystem.

UNIT-II

Biodiversity and its Conservation: Definition, Value of biodiversity. Bio-geographical classification of India, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to bio-diversity, Endemic and endangered species of India, Conservation of biodiversity.

Environmental Pollution: Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear pollution, Solid waste management.

UNIT-III

Social Issues and Environment: From unsustainable to sustainable development, Population growth and environment, Green revolution, Rain water harvesting, watershed management, cloud seeding, Resettlement and rehabilitation of people - problems and concerns, Environmental

Impact Assessment.

Climate Changes: Global warming & Green house effect, Acid rain, Ozone layer depletion.

UNIT-IV

Environmental acts: Prevention and Control of Water pollution & Air Pollution act, Environmental protection act, Wildlife protection act, Forest Conservation act.

International Conventions: Stockholm Conference 1972, Earth Summit 1992. Copenhagen Summit 2009.

Case Studies: Chipko movement, Narmada Bachao Andolan, Silent Valley Project, Madhura Refinery and Taj Mahal, Chernobyl Nuclear Disaster, Ralegaon Siddhi, Florosis and Bhopal Tragedy.

Field work: Visit to a local area to document environmental assets - river/ forest/ grassland / hill / mountain. Study of local environment-common plants, insects, birds. Study of simple ecosystems - pond, river, hill, slopes etc. Visits to industries, water treatment plants, and effluent treatment plants.

NOTE:

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS

1. *Environmental Studies, by Dr. Suresh K. Dhameja, Published by S.K. Kataria & Sons, 2010.*

REFERENCE BOOKS

1. *Environmental studies by Anubha Kaushik and C.P.Kaushik., New Age International Publishers, 2008.*
2. *T Benny Joseph, Environmental Studies, the Tata McGraw-Hill,2008.?*

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II/IV Year B.Tech.- Fourth Semester

CE-223 SURVEYING - II

Lectures / Tutorials :	*4 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3 Hours*	*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course objectives:

- To introduce the EDM methods and to study about total station and working
- To deal with various methods employed for the measurement of areas and volumes.
- To determine distances and relative positions using tachometric sur-veying and trigonometric leveling.
- To study different methods of setting out simple, compound and reverse curves.
- To study the design of simple circular curves.
- To study the positioning of structure, setting out foundation, setting out a sewer and setting out culvert.
- To study different methods of measurement and necessary corrections to be made for base line

Course Outcomes:

- The students will be able to:
- To know about the total station.
- He gains enough knowledge about theodolite traverse & tachometric survey.
- To find out the reduced level of different structures base is inaccessible and accessible.
- To know about how to provide the curves for a roads.
- To know about the positioning of structure from plan to the ground.

UNIT - 1

Modern Systems in Surveying : Digital theodolite; Electronic Total Sta-tion; Digital Level; Global Positioning System; Electronic Distance Mea-surements - Basic concepts, Instrumental errors in EDM

Computation of Areas : Introduction; Simpson's rule; Boundaries with offsets at irregular intervals; Meridian methods; Coordinate method; Planimeter - Area of Zero circle. Area of cross sections - two level sec-tion only

UNIT - II

Computation of volumes : Trapezoidal rule; Prismoidal formula; Vol-ume from spot levels; volume from contour plan; Capacity of a reservoir

Trigonometric Leveling : Introduction; Plane trigonometric leveling meth-ods - When base of the vertical or inclined object accessible and when base of the object is not accessible; Axis signal correction; Difference in elevation by single observation and reciprocal observations.

UNIT - III

Tacheometric Surveying : Advantages of tachometric surveying; Basic systems of tachometric measurements; Principle of stadia measurements, Determination of constants K and C; Inclined sight with staff vertical; Inclined sight with staff normal to the line of sight.

Construction Surveying : Horizontal Control - Reference grid; Vertical Control; Control stations; Positioning of a structure; setting out a building - reference pillars and Batter boards; setting out a culvert; Grade stakes; Boning rods or travelers; Sight rails; Slope rails; Profile boards or batter boards; Setting out grades for sewers and pipe lines; setting out slopes in embankment and cutting;

UNIT - IV

Curves Ranging : Circular curves - Basic definitions; Designation of a curve; Relationship between radius and degree of curve; Elements of a simple circular curve; Location of the tangent points; selection of peg interval; Methods of setting out; Problems in setting out curves; Com-pound and Reverse curves;

NOTE :

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS

1. Surveying Vol I & II by K R Arora,11th Edition, Standard Book house, 2012.

REFERENCE TEXT BOOKS

1. *Plane Surveying by AM Chandra, 2nd Edition,New Age International (P) Ltd.,2006.*
2. *Fundamentals of Surveying by S K Roy, 2nd Edition,Prentice- Hall of India Private Ltd.,2010.*
3. *Surveying Vol-I&II by B.C. Punmia ,Laxmi Publications,2005.*

WEB REFERENCES:

http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-ROORKEE/SURVEYING/home.htm

http://www.engineeringcivil.com/theory/surveying/

http://www.engineeringcivil.com/theory/civil-engineering-notes-from-universities/

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II/IV Year B.Tech.- Fourth Semester

CE-224 SOLID MECHANICS - II

Lectures / Tutorials :	*4 / 1 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3 Hours*	*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course objectives:

- *To develop equations for transformation of plane stress.*
- *To study strain energy concept in uni-axial, pure bending and shear.*
- *To study the behaviour of columns subjected to different end conditions for different loadings.*
- *To know deflection of statically determinate beams by using relation of moment curvature, moment of area and conjugate beam method*

Course Outcomes:

- *Able to understand and application to several number of stresses on a plane.*
- *Able to understand problems on columns.*
- *Becoming strong in applying mathematics to deflection of beams along with other methods of finding the deflections of beams.*

UNIT-I

Compound stresses : Introduction; Superposition and its limitation; Superposition of normal stresses; Stresses in a dam-middle-third rule; Eccentrically loaded short columns; Core or kernel of a section; Superposition of shear stresses; Stresses in closely coiled helical springs; Deflection of closely coiled helical springs

UNIT -II

Analysis of Plane-Stress : Introduction; The basic problem; Equations for transformation of plane-stress; Principal planes and Principal stresses ; Maximum shear stresses ; Mohr's circle of stress ; Construction of Mohr's circle

Work and Strain Energy : Introduction; Elastic strain energy for uni-axial stress; elastic strain energy in pure bending; Strain energy of beams

in shear; Strain energy of circular shafts in torsion; Work and strain energy method; Determination of displacements by work and strain energy method

UNIT-III

Failure Theories : Introduction; maximum normal stress theory; maximum shearing stress theory; maximum strain energy theory; maximum distortion energy theory; comparison of theories.

Buckling of Columns :

Introduction; Examples of instability; Criteria for stable equilibrium; Euler load for column with pinned ends; Euler loads for columns with different end restraints; Limitations of the Euler's formulae; Generalized Euler buckling load formulae; Eccentric loads and the secant formula

UNIT -IV

Deflection of statically determinate beams :

Introduction; strain-curvature and Moment-Curvature relation; Governing differential equation for deflection of elastic beams; Solution of beam deflection problem by Direct integration; Introduction to moment area method; Derivation of Moment area theorems; conjugate-beam method; slope and deflection of beams using moment area method.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK

1. Mechanics of Materials by Pytel and Kiusalaas, Cengage Learning, 2003.

REFERENCES

1. *Mechanics of materials by E.P. Popov, Prentice Hall of India, 1986.*
2. *Elements of strength of materials by S.P.Timoshenko and D.H.Young, Affiliated East-West Press Pvt.Ltd.,2005.*

WEB REFERENCES:

http://nptel.iitm.ac.in/video.php?subjectId=105101084
http://www.engineeringcivil.com/theory/civil-engineering-notes-from-universities/

II/IV Year B.Tech.- Fourth Semester

CE - 225 HYDRAULICS AND HYDRAULIC MACHINES

Lectures / Tutorials :	*4 / 1 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3 Hours*	*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course objectives:

- *To introduce the importance of study of open channel flow, to give brief description on different types of flows and channels and hydrau-lic design principles of channels.*
- *To learn the fundamentals of Uniform and Non-Uniform flow in open channels.*
- *To understand about the concepts of specific energy, critical flow and their applications.*
- *To give an idea about the gradually varied flow and rapidly varied flow and their equations and computations.*
- *To introduce the concepts of momentum principles.*
- *To impart the knowledge on pumps and turbines*

Course outcomes:

By the end of the course hydraulics and hydraulic machines, the stu-dents will be able to

- *To know the different types of flows and channels.*
- *To understand the performance of turbines and pumps.*
- *To know the applications of momentum principles.*
- *To make the student is expected to prepare models for prototypes of hydraulic structures.*
- *To make the student is expected to have thorough knowledge on the selection of turbines and pumps for practical purposes*

UNIT - I

Open Channel Flow - Uniform Flow : Introduction, Classification of flows, Types of channels; Chezy, Manning's, Bazin, Kutter's Equations;

Hydraulically efficient channel sections - Rectangular, Trapezoidal and Circular channels; Velocity distribution; Energy and momentum correc-tion factors; Pressure distribution.

Open Channel Flow - Non - Uniform Flow : Concept of specific energy; Specific energy curves; Critical flow; Critical flow in a rectangular channel; Critical slope; Different slope conditions; Channel transitions-Reduction in width of channels, hump; Momentum principle applied to open channel flow; Specific force.

UNIT - II

Open Channel Flow - Gradually Varied Flow : Dynamic equation; sur-face profiles; Computation of surface profiles by single step method; Back water curves and Draw down curves; Examples of various types of water surface profiles.

Open Channel Flow - Rapidly Varied Flow : Hydraulic jump; Elements and characteristics of hydraulic jump; Types of hydraulic jump; Location and applications of hydraulic jump; Energy loss in a hydraulic jump.

UNIT - III

Momentum Principles : Action of jets on stationary and moving flat plates and curved vanes; Angular momentum principle; Torque in roto dynamic machines.

Hydraulic Turbines : Classification; Impulse; Reaction; Radial, Axial, mixed and tangential flow turbines; Pelton, Francis turbines; Runner pro-files; Velocity triangles; Head and efficiency; Draft tube theory; Similarity laws; Concept of specific speed and unit quantities; Selection of Tur-bines; Operational characteristics.

UNIT - IV

Centrifugal Pumps : Manometric head; Losses and efficiencies; Work done; Working Principle; Priming; Velocity triangles; Performance and characteristic curves; Cavitation effects; Similarity considerations.

Dimensional Analysis and Similitude : Dimensional homogenity; Rayleigh's method; Buckingham ? -method ; Geometric, Kinematic and Dynamic similarities; Reynold's, Froude, Euler, Mach and Weber num-bers; Model laws; Scale effect; Distorted models.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK

1. *Hydraulics and Fluid Mechanics including Hydraulic Machines by P. N. Modi and S. M. Seth; Standard Book house, New Delhi,2009.*

REFERENCE BOOKS

1. *Fluid Mechanics by A. K. Jain; Khanna Publishers, Delhi, 2008.*
2. *Flow in Open channels by K. Subramanya, 3rd Edition, Tata McGraw-Hill,2008.*
3. *Fluid Mechanics and Hydraulic Machines by R. K. Bansal,9th Edition, Laxmi Publications, 2011.*

WEB REFERENCES:

www.nptel.iitm.ac.in

www.springerlink.com for e-journals

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II/IV Year B.Tech.- Fourth Semester

CE - 226

ELEMENTS OF ELECTRICAL AND MECHANICAL ENGINEERING

Lectures	*: 4 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam.	*: 3 Hours*	*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- The course will present how the power is being transmitted using belt drives with many factors effecting in the process
- Presents the concepts of manufacturing processes and the study of their techniques and usage in the industry.
- To present the concepts of thermal prime movers and their principles and operation.
- To present the applications and working operation of air-compressors in thermal engineering stream

Course Outcomes :

Student will be able to

- Know how the power is transmitted by using belt dives and also the relation between the ratios of tensions in belts and how the factors affect the maximum power transmission and their solutions.
- Know the principles, application and their techniques of the manufacturing processes in engineering science and also the wielding and soldering processes and their differences & purpose of usage of the processes.
- Know technically how the boilers, steam turbines, gas turbines and internal combustion engines function & their working principles and operation and also the basic variation in their use in thermal power plants and automobiles.
- Learn the operation and the applications of Single - Stage and multi-stage reciprocating air compressors and also of the rotary air compressors and their differences in practical application

Part A: ELECTRICAL ENGINEERING

UNIT - I

Electrical Installation : Alternating current and its advantages; Single phase and three phase power supply; Ratings of different electrical appliances; Wires/Cables; Standard wire gauge; Number of strands and current carrying capacity; Types of wiring systems; Fuses; MCBs; Earthing - Purpose, Types; First aid for electric shock

Transformers : Function; Principle of operation; Construction details ; Types of transformers

UNIT - II

Electrical Machines: Alternators - Principle, Construction details, Applications Single phase induction motor-Principle of operation, types and applications of three phase induction motor - Principle of operation, types and applications

Lightning Phenomenon: What is lightning ?; Charge formation in cloud - Wilson's theory, Simpson's theory; Different forms taken by lightning; Mechanism of forked lightning ; Protection of structures against lightning using lightning rods

Part B: MECHANICAL ENGINEERING

UNIT - III

Transmission of motion and Power: Methods of drive; Power transmission elements - Shafting , Belt-drive, Belting, Pulleys; Velocity ratio of pulleys; Creep and slip in belt; Tension in a belt; Power transmitted by a belt; Rope drive; Chain drive; Friction drive; Gear drive; Spur gear; Power transmitted by gearing.

Air Compressors : Introduction; reciprocating compressors - Single stage, multi-stage; Rotary compressors

UNIT - IV

Metal Forming : Metal working Processes - Hot working, Cold working ; Rolling - Principle, Rolling stand arrangement, Roll passes, Break down passes, Roll pass sequences; Extrusion and other processes - Extrusion principle, hot extrusion, Cold extrusion, Extruding tubes ; Wire drawing ; Bar and tube drawing.

Fabrication processes : Classification; Welding - Classification of welding; Electric arc welding - Principle of arc, Arc welding equipment, Electrodes, Manual metal arc welding, Submerged arc welding

NOTE

1. Part A : Two questions of 12 marks each will be given from each unit of Part A out of which one is to be answered. Six questions of one mark each will be given from entire Part A syllabus which is a compulsory question.

2. Part B : Two question of 12 marks each will be given from each unit of Part B out of which one is to answered. Six questions of one mark each will be given from entire Part B syllabus which is compulsory question.

3. In the Semester End Examination, Part A and Part B should be answered on separate booklets.

LEARNING RESOURCES

TEXT BOOKS

1. *Electrical Installation and estimation by M. Rajalingam, Radiant Publishing House.*
2. *Fundamentals of Electrical and Electronics Engineering by T. Thyagarajan , SCITECH Publications (India) Pvt. Ltd., 2004.*
3. *An Introduction to High Voltage Engineering by Subir Roy, Prentice-Hall of India, 2006.*
4. *Elements of Mechnical Engineering by K.P. Roy et.al., Media Promoters & Publishers, 1986.*
5. *Manufacturing Technology - Foundary, Forming and Welding by P.N.Rao TataMcGraw- Hill Publishing Company Ltd., 2008.*

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II/IV Year B.Tech.- Fourth Semester

CE - 261 LABORATORY
HYDRAULICS AND HYDRAULIC MACHINES LABORATORY

Practicals	*: 3 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3 Hrs.*	*Semester End Exam. marks*	*: 60*
		Credits	*: 2*

Course Objectives:

- *To determine the Darcy's friction factor for the pipes.*
- *To determine the coefficient of discharge of venturimeter, orfice, ori-fice meter, mouth piece and v-notch.*
- *To determine the efficiency of jet of vane.*
- *To determine the loss of head in pipes due to sudden expansion and contraction.*
- *To determine the manning's and chezy's constant for open channel.*
- *To study the performance and determine the efficiencies of pelton turbine and Francis turbine.*
- *To study the performance characteristics and efficiency of centrifugal pump.*

Course outcomes:

- *By the end of the course the students will be able.*
- *To understand the determination of discharge for hydraulic equipments.*
- *To understand the minor and major losses in pipes.*
- *To understand the performance of turbines and pumps with varying speed.*

Note : A minimum of twelve (12 No) shall be done and recorded

1. Verification of Bernoulli's theorem.
2. Venturi meter : Determination of Coefficient of discharge.
3. Orifice meter: Determination of Coefficient of discharge.
4. **Orifices :** Determination of Coefficient of discharge by steady and unsteady flow methods.

5. **Mouth pieces:** Determination of Coefficient of discharge by steady and unsteady flow methods.
6. Characterization of laminar and turbulent flows by Reynold's appa-ratus.
7. Determination of friction factor of Pipes.
8. Determination of loss of head in pipes due to bend /sudden con-traction/ sudden expansion.
9. Determination of Coefficient of discharge for rectangular notch / V - notch.
10. Determination of Manning's and Chezy's coefficients in open chan-nel.
11. Study on Characteristics of Hydraulic Jump
12. Measurement of force due to impact of jets on vanes of different types.
13. Performance studies on Pelton turbine.
14. Performance studies on Francis turbine /Kaplan turbine.
15. Performance studies on single stage centrifugal pump.
16. Performance studies on Reciprocating pump.

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II/IV Year B.Tech.- Fourth Semester

CE - 262 LABORATORY
MATERIAL TESTING LABORATORY

Practicals	*: 3 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam.	*: 3 Hrs.*	*Semester End Exam. marks*	*: 60*
		Credits	*: 2*

Course objectives:

- *To study the behaviour of materials like steel, wood, concrete etc under direct tension, compression, shear, torsion and bending by conducting relevant tests*
- *To find young's modulus, modulus of rigidity, hardness, impact resistance of the given materials like steel, wood by conducting relevant tests*
- *To determine the modulus of rigidity of the spring*
- *To conduct tests like Normal consistency and fineness of cement, Initial setting and final setting time of cement, Specific gravity, soundness, Compressive strength of Cement to find the quality of cement*
- *To determine the workability of fresh concrete using Slump cone, Compaction factor, Vee-Bee consistometer tests*
- *To study the Bulking characteristics of fine aggregate and to determine the Specific gravity of fine and coarse aggregates and fineness modulus of fine aggregate and coarse aggregate.*
- *To determine the compressive strength of concrete & split tensile strength of concrete.*
- *To determine the modulus of Elasticity of concrete by conducting compression test on cylinders.*
- *To demonstrate the Non-destructive testing on concrete and concrete mix design (IS method)*

Course Outcomes:

*Behavior of materials like steel, wood, concrete etc under direct ten*sion, compression, shear, torsion and bending

- Finding properties of materials like young's modulus, modulus of rigidity, hardness, impact resistance
- Finding the quality of cement
- Fresh concrete workability properties to judge the suitability of concrete for the field conditions
- Physical properties of concrete making materials like cement, fine aggregate and coarse aggregate to judge suitability for making concrete
- Know the quality of concrete i.e compressive, tensile strength of concrete and also by using non destructive testing methods.

Note: A minimum of 6 experiments from PART-A and 6-experiments from PART-B shall be done and recorded

PART-A

1. Study of stress-strain characteristics of mild steel bars by UTM.
2. Study of stress-strain characteristics of HYSD bars by UTM.
3. Determination of modulus of elasticity of the material of the beam by conducting bending test on simply supported beam.
4. Determination of modulus of rigidity by conducting torsion test on solid circular shaft.
5. Determination of hardness of the given material by Brinnel's/ Vicker's/ Rockwell hardness test.
6. Determination of impact strength of the given material by conducting Charpy/Izod test
7. Determination of ultimate shear strength of steel by conducting direct shear test.
8. Determination of modulus of rigidity of the material of closely coiled helical spring.
9. Determination of compressive strength of wood with grain parallel / perpendicular to loading.

PART-B

1. Determination of (a) Normal consistency of cement (b) Fineness of cement using 90 microns IS sieve.
2. Determination of Initial setting and final setting time of cement.
3. Determination of (a) Specific gravity of cement (b) soundness of cement.
4. Determination of Fineness modulus of (a) Fine aggregate (b) Coarse aggregate.
5. Determination of workability of concrete by conducting Slump cone test.
6. Determination of workability of concrete by conducting Compaction factor / Vee-Bee consistometer test.
7. Determination of (a) Cube compressive strength (b) Split tensile strength of concrete.
8. Determination of modulus of elasticity of concrete by conducting compression test on concrete cylinder.
9. Determination of Bulk density and Specific gravity of (a) fine aggregate (b) coarse aggregates.
10. Determination of Bulking of fine aggregate.
11. Non-destructive test on concrete using Rebound Hammer / Ultrasonic Tester.

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II/IV Year B.Tech.- Fourth Semester

CE- 263LABORATORY
COMMUNICATION SKILLS LABORATORY

Lectures	*: 3 Periods/week*	*Sessional Marks*	*: 40*
Semester End Exam	*: 3 hours*	*Semester End Exam. Marks*	*: 60*
		Credits	*: 2*

Course Objectives:

- To incorporate creativity and innovative thinking in problem solving.
- Students will be trained to acquire conclusions using well structured and logical reasoning.
- To select and apply appropriate qualitative and/or quantitative analytical methods and to identify reasonable alternatives.
- To develop a reasonable line of argument by using valid and reliable evidence, avoiding appeals to the emotions.
- To bring about an understanding of the importance of interpersonal skills in both professional and personal lives.
- To extend their abilities to listen effectively in a variety of situations for a variety of purposes.
- To extend their abilities to: read fluently and confidently a variety of texts for a variety of purposes.

8. Train the students to make inferences from information in a sentence or paragraph, cause and effect logic, functional concepts and context clues.

Course Outcomes:

- Arrive at objective, well-reasoned decisions in reasonable time.
- Understand creativity and blocks to creativity.
- The student holds a particular value or belief that now exerts influence on his/her behaviour so that it becomes a characteristic.
- Comprehend and use language with accuracy, clarity, and discernment.
- Students focus on assignments using processes that apply content rather than on lectures and simply acquiring content.

- Students express ideas in a non-judgmental environment which encourages synthesis and creative applications.
- Problem-solving exercises nurture students' cognitive abilities.
- Students will understand and measure the impact deriving from their analyses by knowing their limitations.

UNIT-I

Analytical thinking

- Emotional intelligence, emotional quotient, cognitive skills, analysis and logical thinking, creative thinking and lateral thinking
- Managing anger, failures, and disappointments
- Positive approach

UNIT-II

Behavioural Skills

- Attitude, self esteem, time management
- Punctuality, confidence, integrity
- Role plays
- Mock press

UNIT-III

- Listening Skills - Effective listening
- News paper reading - Reading aloud

UNIT-IV

- Group discussions - Do's and Don'ts, modulation of voice
- Case studies.

LEARNING RESOURCES

TEXT BOOKS:

1. *Listening skills - Shrinky Slicy.*
2. *Call centre Stories - Case Studies.*

REFERENCE BOOKS:

1. *Kevin Gallagher, Skills Development for Business and Management Students.1st edition, Oxford university press. 2010.*
2. *Daniel Goleman, Working with Emotional Intelligence (1998) Bantam Books*
3. *Hari Mohan Prasad & Rajnish Mohan, How to prepare for Group Discussions and Interview, 2nd edition, TMT.*

III/IV Year B.Tech.- Fifth Semester

CE - 311 ENVIRONMENTAL ENGINEERING - I

Lectures	*: 4 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam.	*: 3 Hours*	*Semester End Exam. Marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- To emphasize the importance of protected water supply, understand the design period concept and to estimate future population and to determine water requirement to satisfy various water demands.
- To learn about various sources of water and to select a suitable source based on quality and quantity criteria.
- To design required pipe diameter by using various hydraulic formulae and to discuss the method of laying and testing of pipes.
- To discuss methods for determining the physical, chemical and bio-logical characteristics of water and to ascertain suitability for drinking based on BIS standards for drinking water.
- To understand theory and design aspects of water treatment facili-ties-sedimentation, coagulation, filtration.
- To discuss various methods of disinfection with special emphasis on chlorination and types of chlorination.
- To introduce methods for water softening, defloridation and removal of colour, odour and taste.
- To learn about various layouts of distribution networks and analyse distribution systems by Hardy-cross method and Equivalent pipe method.

Course Outcomes:

- At the end of the course the student will be able to:
- Determine the future population at the end of design period and per capita water requirement.
- Choose a suitable source of water supply based on required quantity

and available quality.

- Conduct various test to ascertain physical, chemical and biological quality of water.
- Ascertain the suitability of water for drinking based on water quality standards.
- Design various water treatment facilities.
- Select a suitable method of disinfection depending on the situation.
- Suggest suitable treatment method for removal of hardness, excess fluorides and colour, odour and taste.
- Analyse complex water distribution networks.
- Design complete water treatment plant for given population and per capita consumption.

UNIT - I

Introduction to Water Supply Engineering : Need for protected water supplies; Objectives of water supply systems; Water borne diseases; Role of Environmental Engineers.

Quantity of Water : Estimating requirements; Design period; Per capita consumption; Factors affecting per capita consumption; Fire demand; Fluctuations in demand; Prediction of population.

Sources & Intake Works : Classification of sources of water supply; Choice of source; Suitability with regard to quality and quantity; River, reservoir and canal intakes.

UNIT - II

Transportation and Pumping of Water : Types of conduits; Capacity and design; Materials for pipes, Laying and Jointing of pipes; Leakages; Classification of pumps; Choice of pumps.

Quality of Water : Impurities in water; Routine water analysis - physical, chemical and bacteriological tests; BIS Standards for drinking water.

Purification of Water : Methods of purification of water; Sequence of

treatment units.

Plain Sedimentation and Coagulation : Theory of sedimentation; Stoke's law; Sedimentation tanks; Design aspects; Principle of coagula-tion; Chemicals used for coagulation; Units of coagulation plant; Opti-mum Dose of Coagulant.

UNIT - III

Filtration of Water: Theory of filtration; Filter materials; Slow sand and rapid sand filters; Construction operation and design; Slow sand filters verses rapid sand filters; Under drainage system design in rapid sand filters; Troubles in rapid sand filters; Pressure filters.

Disinfection of Water : Different methods of disinfection; Chlorination; Types of chlorination

Miscellaneous Treatment Methods : Water softening: Methods of re-moving temporary and permanent hardness; Removal of colour, odour and taste from water; Defluoridation.

UNIT - IV

Distribution System : General requirements; Classification; Methods of supply; Available pressure in the distribution system; Layouts of distri-bution networks; Distribution reservoirs; Functions; Types; Capacity of balancing tank; Analysis of distribution system by Hardy-cross method and Equivalent pipe method.

Pipe Appurtenances : Appurtenances in the distribution system; Ser-vice connection, Sluice valves; Check valve; Air valve; Drain valve; Hydrants; Meters.

*Field visit to water treatment facility covering all treatment units

NOTE

Two questions of 12 marks each will be given from each unit out of which

one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS

1. *Elements of Environmental engineering by K. N. Duggal, S. Chand & Company Ltd., 2012.*
2. *Environmental Engineering Vol. I - Water supply engineering by S. K. Garg; Khanna Publishers, Delhi, 2010.*

REFERENCE BOOKS

1. *Water Supply and Sanitary Engineering Vol. 1 by Gurucharan Singh; Standard Publishers Distributors, 2009.*
2. *Environmental Engineering by Peavy and Rowe, Mc Graw Hill 7th Edition, 1987.*
3. *Water Supply and Sewerage by E.W. Steel and Terence J. Mc Ghee, Mc Graw Hill Publishers, New York.*
4. *Water & Wastewater Technology by Mark J. Hammer; John Wiley & Sons.*
5. *Manual on Water Supply & Treatment; CPH and EEO, Ministry of Urban Development; Govt. of India, New Delhi.*

WEB REFERNCES:

_ *www.nptel.iitm.ac.in*

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III/IV Year B.Tech.- Fifth Semester

CE - 312 STRUCTURAL ANALYSIS - I

Lectures / Tutorials :	*4/ 1 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3Hours*	*Semester End Exam. Marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- *Students will learn to analyze three hinged and two hinged, circular arches for static and moving loads.*
- *Students will learn about establishing different types of structures and degree of determinacy, calculating reactions and internal forces (axial force, shear, and bending moment) for determinate and indeterminate structures and its components.*
- *Students will learn about calculating deflections for beams and frames using energy methods.*
- *Let the students understand the behavior of various buildings, bridges, and catenary cable systems so that they can reasonably select and analyze a type of building, bridge, or catenary cable system in structural design.*
- *Students will learn about constructing influence lines for beams, trusses and three hinged arches*
- *To analyze the statically indeterminate structures like fixed beams, continuous beams, two hinged arches and influence lines for continuous members by Muller Breslau's principle*
- *Students will learn to analyze multistoried frames by using portal and cantilever methods.*

Course Outcomes :

- *Students will learn to analyze determinate arches subjected to different loading which in turn helps them to resolve forces of certain type of circular and arched structures*
- *Students will have an ability to formulate questions and develop analytical answers for analysis of structures, and solve broad-based structural analysis problems.*

- *Student can make qualitatively correct sketches of deflections and moment diagrams for statically determinate beams and frames.*
- *Students will be able to Determine the stresses in anchors, cables and suspension bridges and also calculate shear and bending in stiffening girders*

UNIT - I

Arches : *Theoretical and actual arch, Eddy's theorem Types of arches, Three-hinged arch Displacements of statically determinate structures by Energy Methods Virtual Work, Betti's and Maxwell's laws of reciprocal deflections, Applications of virtual work, Deflection of trusses and frames, Castigliano's theorems.*

UNIT -II

Cables : *Equation of the cable subjected to uniformly distributed load, Horizontal tension in the cable, Tension in the cable supported at different levels, Length of the cable, Effect of change in temperature.*

Rolling loads and Influence Lines : *Maximum shear force and bending moment in simply supported beams due to single concentrated load, uniformly distributed load longer than span, uniformly distributed load shorter than span, two concentrated loads, series of concentrated loads; Concept of influence line, Influence Lines for reaction, shear force and bending moment in simply supported beams, Influence lines for simple trusses and three-hinged arches*

UNIT -III

Statically Indeterminate Structures -Compatibility methods : *Degree of indeterminancy and stability of structures, Fixed beams, Theorem of three moments, Two-hinged arches, Influence lines for continuous members-Muller-Breslau's principle*

UNIT -IV

Statically Indeterminate Structures -Approximate Methods :
Indeterminate trusses, Portal frames , Continuous beams, Building frames subjected to gravity loads, Building frames subjected to lateral loads - Portal method.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK

Basic structural analysis by CS Reddy, 3rd Edition, Tata McGraw-Hill, 2010.

REFERENCE BOOKS

1. *Basic structural analysis by KU Muthu et.al. , IK International,2011.*
2. *Intermediate structural analysis by CK Wang, Tata McGraw-Hill, 2010.*
3. *Structural Analysis by Devdas Menon, Narosa Publishinh House, 2008.*
4. *Structural analysis by RC Hibbeler, 6th Edition, Pearson Education.*

WEB REFERENCES:

http://www.cdeep.iitb.ac.in/nptel/Civil%20Engineering/Structural%20Mechanic%20II/Course%20Objective.html.

http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Structural%20Analysis/New_index1.html

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III/IV Year B.Tech.- Fifth Semester

CE - 313 WATER RESOURCES ENGINEERING - I

Lectures / Tutorials : 4 / 1 Periods/Week		*Sessional marks*	*: 40*
Semester End Exam. : 3 Hours		*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- To study hydrologic cycle, measure precipitation and compute aver-age rainfall over a basin
- To study evaporation and infiltration and to determine infiltration indi-ces and to compute runoff from a basin.
- To introduce concept of Unit Hydrograph and to construct Unit Hydrograph and S-curve and to discuss their applications.
- To study well hydraulics and to discuss Dupit's theory for steady ra-dial flow into a well and to determine yield from open well by constant pumping and recuperation tests.
- To introduce scope, benefits and ill-effects of irrigation and to study various types and methods of irrigation.
- To discuss duty, delta and their relation, consumptive use and fre-quency and depth of application of irrigation water.
- To discuss Kennedy's silt theory and Lacey's regime theory and the comparison of the two theories and to discuss the design aspects of channels based on these two theories.
- To discuss the causes and remedial measures of water logging and to design lined canals.
- To study component parts of diversion head works and their functions and to discuss Bligh's creep theory and Khosla's theory and their ap-plications in the design of weirs on permeable foundations.

Course Outcomes:

- At the end of the course the student will be able to:
- compute average rainfall over a basin and to distinguish between recording and non-recording rain gauges.

- determine the infiltration indices and run off from a basin.
- construct unit hydrograph and S-curves and determine the peak flood discharge.
- determine the discharge from tube wells and open wells.
- estimate consumptive use and determine the depth and frequency of irrigation water required for the given crop.
- ascertain the discharge required in the irrigation canal.
- design unlined canals by using Kennedy's and Lacey's theories and able to distinguish between these two theories.
- use Garrot's diagrams and Lacey's diagrams for design of unlined canals.
- suggest suitable methods to control water logging of irrigation lands.
- design lined irrigation canals for varying discharges.
- design weirs on permeable foundations based on Bligh's creep and Khosla's theory

UNIT - I

Hydrology : Hydrologic cycle; Precipitation types; Rain gauges; Computation of average rain fall over a basin; Abstraction from rainfall; evaporation, factors affecting evaporation, measurement of evaporation; Infiltration, factors affecting infiltration, measurement of infiltration, infiltra-tion indices; Run off; Factors affecting run off; Computation of run-off; Design flood, Estimation of maximum rate of run-off.

Hydrographs : Hydrograph analysis; Unit hydrograph; Construction of UH for an isolated storm, Application of UH to the construction of a flood hydrograph resulting from rainfall of unit duration; Construction of unit hydrograph of different unit duration from a unit hydrograph of some given unit duration by superposition method and S-curve method.

UNIT - II

Ground Water - Well Irrigation : Introduction; Aquifer; Aquiclude; Aquifuge; Specific yield; Specific retention; Divisions of sub-surface water; Water table; Types of aquifers; Well hydraulics- Steady radial flow to a

well- Dupuit's theory for confined and unconfined aquifers; Tube wells - Open wells; Yield of an open well-Constant level pumping test and Recu-peration test.

Introduction to Irrigation : Definition; Necessity; Scope of irrigation science; Benefits of irrigation; Ill-effects of irrigation; Types of irrigation.

Methods of Irrigation : Methods of applying water to crops; Uncontrolled or wild flooding; Free flooding; Contour laterals; Border strip method; Check flooding; Basin flooding; Zigzag method; Furrow method; Contour Farming; Sub-surface irrigation; Sprinkler irrigation; Drip irriga-tion.

UNIT - III

Water Requirement of Crops : Functions of irrigation water; Classes and availability of soil water; Saturation capacity; Field capacity; Wilting point; Available moisture and readily available moisture; Moisture equiva-lent; Soil - moisture deficiency; Limiting soil moisture conditions; Depth and frequency of irrigation; Duty and Delta; Base period; Relation be-tween Duty and Delta; Factors affecting duty; Methods of improving duty; Gross command area; Culturable command area; Culturable cultivated and uncultivated area; Kor depth and Kor period; Consumptive use of water ; Irrigation efficiencies - Water conveyance efficiency, Water appli-cation efficiency, Water distribution efficiency and Consumptive use effi-ciency; Determination of irrigation requirements of crops; crop rotation, Assessment of Irrigation water.

Irrigation Channels - Silt Theories and Design Procedure : Classifi-cation; Canal alignment; Inundation canals; Cross-section of an irriga-tion channel; Balancing depth; Borrow pit; Spoil bank; Land width; Silt theories-Kennedy's theory, Kennedy's method of channel design; Draw-backs in Kennedy's theory; Lacey's regime theory; Lacey's theory ap-plied to channel design; Defects in Lacey's theory; Comparison of Kennedy's and Lacey's theory.

UNIT - IV

Water Logging and Canal Lining : Water logging; Effects of water logging; Causes of water logging; Remedial measures; Saline and alkaline

soils and their reclamation; Losses in canal; Lining of irrigation channels - necessity, advantages and disadvantages; Types of lining; Design of lined canal.

Diversion Head Works : Component parts of a Diversion Head work; Weirs and barrages- Types of weirs; Causes of failure of weirs and their remedies; Design of weirs on permeable foundations - Bligh's creep theory, Silt control at head works.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS

1. *Irrigation and water power Engineering by B.C. Punmia and Pande B.B. Lal; 16th Edition,Laxmi Publications Pvt. Ltd., New Delhi.*
2. *Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi,2011.*

REFERENCE BOOKS

1. *Irrigation, Water Resources and Water Power Engineering by P.N. Modi, 7th Edition, Standard Book House, 2008.*
2. *Irrigation, water power and water resources Engineering by K R Arora, Standard Publishers, 2010.*
3. *Engineering Hydrology by K. Subramanya, 3rd Edition, Tata McGraw-Hills*
4. *Engineering Hydrology by P. Jayarami Reddy, Laxmi Publications*
5. *Applied Hydrology by Ven Te Chow, Maidenment and Mays, Mc Graw Hill Publications.*

WEBREFERENCES:

www.nptel.iitm.ac.in

www.sprinkerlink.org for e-journals.

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III/IV Year B.Tech.- Fifth Semester

CE - 314 DESIGN OF CONCRETE STRUCTURES-I

Lectures / Tutorials : 4 / 1 Periods/Week		*Sessional marks*	*: 40*
Semester End Exam. : 3 Hours		*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course objectives:

- Course is designed to shape the concrete and use the steel bars for external loads on different building elements.
- To understand the codal recommendations for methods of design
- To understand the analysis and design of singly, doubly and flanged beams
- To understand the design for dog legged stair case
- To understand the design for shear, development length, deflection and cracking

Course outcomes:

- Students can handle the isolated design of individual elements independently
- Indian Standards of approach can be practiced by the student.

UNIT - I

Introduction : Role of structural engineer; Reinforced concrete; Structural elements ; Loads on structures ; Strength and serviceability ; Methods of design ; Codes of practice

Design of beams for Flexure (Working Stress Method)

Assumptions; Permissible stresses in concrete and steel; Transformed section; Analysis and design of beams for flexure of singly reinforced, doubly reinforced and flanged sections.

UNIT-II

Design of beams for Shear and Bond (Working Stress Method) :

Shear in a homogeneous beam; Shear in R.C. beams; Diagonal tension and diagonal compression; Design for shear ; Anchorage bond; Flexural bond, Design for bond - Development length

Deflection and Cracking : Span/Effective depth ratio; Calculation of short-term deflection and long term deflection; Cracking; Bar spacing controls.

UNIT-III

Design for Flexure (Limit State Method) : Assumptions; Limit states; Partial safety factors; Modes of failure; Maximum depth of neutral axis; Analysis and design for flexure of singly reinforced, doubly reinforced and flanged sections.

Design of beams for Shear, Bond and Torsion (Limit State Method) : Design for shear ; Design for bond - Development length Torsion - Introduction, Effect of torsion, IS Code provisions.

UNIT-IV

Design and detailing of the following :

a) Simply supported and Cantilever beams (Working stress method)

b) Simply supported and Cantilever beams (Limit State method)

c) Dog-legged stair case (Limit State method)

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS

1. *Reinforced concrete , Vol.1 by H. J. Shah, Charotar publishing house Pvt. Ltd.,2012.*

REFERENCES

1. *Reinforced Concrete (limit state design) by Ashok K. Jain, 6th Edition, NemChand & Bros., Roorkee*
2. *Reinforced concrete design by Pillai and Menon, 2nd Edition,Tata Mc Graw-Hill*

WEBREFERENCES:

For subject videos refer to www.nptel.iitm.ac.in

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III/IV Year B.Tech.- Fifth Semester

CE - 315 DESIGN OF STEEL STRUCTURES - I

(Using Limit State Method)

Lectures / Tutorials : 4 / 1 Periods/Week		*Sessional marks*	*: 40*
Semester End Exam. : 3 Hours		*Semester End Exam. Marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- To introduce steel structures and its basic components
- To introduce structural steel fasteners like welding and bolting
- To design tension members, compression members, beams and beam-columns
- To design column splices and bases

Course Outcomes:

- Learn the basic elements of a steel structure
- Learn the fundamentals of structural steel fasteners
- Able to design basic elements of steel structure like tension members, compression members, beams and beam-columns
- Able to design column splices and bases.

UNIT - I

Introduction : What are steel structures ? ; What a steel structure consists of ?; Structural steel; Products of structural steel; Standards, Codes and Specifications; Fatigue; Brittle fracture; Corrosion protection of steel structures; Design philosophies; Methods of structural analysis ; Plate(Local) buckling; Classification of sections.

Structural steel fasteners : Introduction; Welding - Shield metal arc-welding, Automatic submerged arc- welding, Types of welds, Quality of welds, Weld symbols and notation, Specifications for welding ; Bolting-Types of failure, Design specifications, High- strength bolts

Tension members : Introduction ; Net area ; Shear-lag ; Design of tension members

UNIT - II

Compression members : Introduction; Euler's buckling theory; Behaviour of real columns; Types of sections; Design of columns; Validity of design strength calculations; Design of compression members ; Design Procedure; Built-up compression members.

UNIT - III

Beams : Introduction ; Flexural behaviour of beams which does not undergo lateral buckling; Flexural behaviour of beams which undergo lateral buckling ; Shear behaviour ; Web buckling and Crippling ; Design strength in bending ; Design strength in shear ; Limit state serviceability - Deflection

UNIT - IV

Beam-columns : Introduction; Analysis of beam-columns; Modes of failure; Design specifications

Column Splices and Bases : Introduction ; Column splices ; Column bases

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK :

1. Design of steel structures by K.S.Sai Ram, Pearson Education, 2010

REFERENCE BOOKS :

1. *Steel Structures - Design and Practice by N. Subramanian, Oxford University press, 2010.*
2. *Limit state design of steel structures by M.R.Shiyekar , PHI Learning,2010.*

WEB REFERENCES:

http://nptel.iitm.ac.in/courses/IIT-MADRAS/Design_Steel_Structures_I/index.php

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III/IV Year B.Tech.- Fifth Semester

CE - 316 GEOTECHNICAL ENGINEERING - I

Lectures	*: 4 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam.	*: 3 Hours*	*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- To introduce the subject including genesis and historical aspect to the student.
- To understand the significance of the basic principles of soil mechanics and their applications.
- To go through basic definitions, simple tests, plasticity characteristics, flow of water through soils, permeability, seepage and effective stress principle.
- To bring out the importance of concepts of stresses due to vertical loads, compression, consolidation and shear strength of soil and their applications.

Course Outcomes:

Students will be able to:

- Classify the soil.
- Assess engineering properties of soils like permeability, compaction, consolidation, shear strength and their importance.
- Calculate vertical stresses increase due to applied loads, useful to determine settlement of structures

UNIT - 1

Introduction : Soil formation and soil types; Regional soil deposits of India

Basic Definitions and Relations : Phase diagrams; Simple definitions; some important relationships; Index Properties; Grain size distribution; Atterberg Limits; Significance of other Soil Aggregate properties

UNIT - II

Soil Classification : Introduction; Particle size classification as per IS-code; Unified soil classification system; Indian standard soil classification system

Permeability: Capillary rise; Darcy's law and its Validity; Determination of coefficient of permeability - constant and variable head methods, indirect methods, Factors affecting permeability; Permeability of stratified soil deposits.

Seepage through Soils : Principle of effective stress; physical meaning of effective stress; Types of head, seepage forces and quicksand condition.

UNIT - III

Compaction of Soils : Introduction; Laboratory tests; Factors affecting compaction; Structure and engineering behaviour of compacted cohesive soils; Compaction in the field; Compaction specifications and field control.

Vertical Stresses below Applied Loads : Introduction; Boussinesq's equation; vertical stress distribution diagrams; vertical stress beneath loaded areas; Newmark's influence chart; Approximate stress distribution methods for loaded areas; Westergaard's equation

UNIT - IV

Compressibility of Soil And Consolidation : Introduction; Compressibility; Time-rate of consolidation; Consolidation test; Computation of settlement; extrapolation of field consolidation curve; Settlement analysis.

Shear Strength of Soils : Introduction; Stress at a point- Mohr Circle of stress; Mohr-coulomb Failure Criterion; Modified failure envelope; Measurement of Shear Strength-Direct shear test, Triaxial test, Unconfined compression test and vane shear tests; Shear strength of Clayey soils; Shear Strength of Sands, Drainage conditions and Strength parameters, critical void ratio, liquefaction.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK

1. *Basic and Applied Soil Mechanics - Gopal Ranjan and A.S.R.Rao, New Age International Publishers, 2011.*

REFERENCES

1. *Foundation Analysis & Design by Bowles, J.E., McGraw- Hill , 1995.*
2. *A Text book of Soil Mechanics and Foundations by B.C.Punmia, Laxmi Publications,2005.*
3. *A Text book of Soil Mechanics and Foundation Engineering by K.R.Arora, Standard Publishers & Distributors, 2011.*
4. *A Text book of Soil Mechanics and Foundation Engineering - P.Purushotthama Raj, Pearson Education*

WEB REFERENCES:

www.iitm.ac.in

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III/IV Year B.Tech.- Fifth Semester

CE - 351 LABORATORY

ENVIRONMENTAL ENGINEERING LABORATORY

Practicals	*: 3 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3 Hrs.*	*Semester End Exam. marks*	*: 60*
		Credits	*: 2*

Course Objectives:

- To determine the physical characteristics of drinking water/sewage - turbidity.
- To determine chemical characteristics of drinking water/sewage - pH, various types of solids, acidity, alkalinity, D.O etc.
- To determine the chlorine dosage and residual chlorine in treated water sample.
- To determine the Bio-chemical and Chemical Oxygen Demands of sewage.
- To estimate Most Probable Number of given water sample.
- To train the student for using instruments like pH meter, turbidimeter etc.
- To estimate optimum dosage of coagulant (Alum).

Course Outcomes:

- At the end of the course the student will be able to:
- Conduct tests for physical, chemical, biological quality of water/sew-age.
- Use the instruments with appropriate precautions to obtain maximum precision in the readings.
- Conduct jar test to determine the exact quantity of alum needed at treatment plant based on the turbidity of the given sample.
- Ascertain whether the given water sample contain pathogens or not.
- Conclude whether the given water is fit for drinking or not by comparing the quality parameters with BIS standards (IS 10500 - 1991)

- Decide whether the given sewage can be directly disposed off into a stream or to be treated.

Note: A minimum of twelve (12No) shall be done and recorded

1. Determination of total, suspended and dissolved solids in water / sewage sample.
2. Determination of fixed and volatile solids in water / sewage sample.
3. Determination of Settleable Solids.
4. Determination of turbidity of water / sewage sample.
5. Determination of pH value of water / sewage sample.
6. Determination of optimum dose of coagulant.
7. Determination of residual chlorine.
8. Determination of temporary and permanent hardness of water sample.
9. Determination of chloride concentration of water / sewage sample.
10. Determination of acidity of water sample.
11. Determination of alkalinity of water sample.
12. Determination of fluorides in water sample.
13. Determination of Dissolved Oxygen of water / sewage sample.
14. Determination of Biochemical Oxygen Demand (BOD) of waste wa-ter.
15. Determination of Chemical Oxygen Demand (COD) of waste water.

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III/IV Year B.Tech.- Fifth Semester

CE - 352 LABORATORY

GEOTECHNICAL ENGINEERING LABORATORY

Practicals	*: 3 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam.	*: 3 Hrs.*	*Semester End Exam. marks*	*: 60*
		Credits	*: 2*

Course Objectives:

- To determine physical properties like water content, specific gravity, bulk unit weight, Atterberg limits and gradation analysis.
- To determine engineering properties of soils like permeability, compaction, consolidation and shear strength of soils.

Course Outcomes:

Students will be able to:

- Classify the soil.
- Based on classification plan for suitability of soil for various civil engi-neering projects.
- Determine engineering properties of soils which are required design of retaining walls, foundations, checking settlements and stability of slopes.

Note: A minimum of twelve (12No) shall be done and recorded

1. Determination of water content by oven drying method and rapid moisture tester.
2. Determination of specific gravity soil by using density bottle and py-cnometer
3. Gradation analysis
   (a) Mechanical Sieve analysis
   (b) Hydrometer analysis.
4. Determination of Atterberg limits
5. Determination of free swell index and swelling pressure of expansive soils.

6. Determination of field unit weight by
   a) Core cutter method.
   b) Sand replacement method.
7. Determination of permeability by
   a) Constant head permeameter.
   b) Variable head permeameter.
8. Direct shear test.
9. Vane shear test.
10. Unconfined compression test
11. IS - Light compaction test
12. IS - Heavy compaction test
13. Triaxial shear test.(demonstration only)
14. Det.of coefficient of consolidation by Taylor's and Casagrande's methods.
15. Det.of relative density of soil.

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III/IV Year B.Tech.- Fifth Semester

CE - 353 LABORATORY

ADVANCED COMMUNICATION SKILLS LABORATORY

Lectures	*: 3 Periods/week*	*Sessional Marks*	*: 40*
Semester End Exam	*: 3 hours*	*Semester End Exam Marks*	*: 60*
		Credits	*: 2*

Course objectives:

- To expose the students to a variety of learner-friendly methods of language learning
- To train the students to use language effectively to face interviews, group discussion and public speaking
- " To initiate the students to speak better
- To expose the students to corporate etiquette
- To develop proficiency in presentation
- To train the students in speech writing
- To develop employability skills
- To develop civic sense and concern to the society

Course outcomes:

- The student develops a variety of learner -friendly methods of language learning
- The students are capable of using language effectively to face interviews, group discussion and public speaking
- The students develop confidence level to speak better
- The students learn the corporate etiquettes
- They are proficient in presentations
- The students develop felicity of expression
- The students develop employability skills
- The students turn out to be responsible and become service minded.

1. Employability skills - Interview skills
2. Critical appreciation
   - Poems
   - Short stories
   - Life stories
   - Excerpts of great personalities
3. Film clippings
4. Briefing and explaining
5. Board room discussions
6. Presentations
7. Mini Projects

   A ssignment on - Visiting orphanages, old age homes, hospitals, bank, traffic etc.,
8. Speech writing
   - Acceptance speech
   - Hositng
   - Vote of thanks
   - Introducing people on the stage
   - Farewell speech
   - Comparing
   - Commentary
   - Thank you speech

LEARNING RESOURCES

BOOKS:

1. *Soft skills for Everyone - Jeff Butterfield Cengage learning First print 2010, Third Indian Reprint 2012.*
2. *Personality Development and Soft Skills - Barun K.Mitra Oxford University Press , First published 2011.*

bbb

III/IV Year B.Tech.- Sixth Semester

CE - 321 ENVIRONMENTAL ENGINEERING - II

Lectures	*: 4 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3 Hours*	*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- To introduce water carriage systems of sanitation and their relative merits.
- To estimate quantities of sewage and drainage and to learn procedures for sewer design and to discuss the importance of various sewer appurtenances like manholes etc.
- To discuss cycles of decomposition and methods for determining the quality and characteristics of waste water.
- To discuss theoretical aspects and design procedures for primary and secondary wastewater treatment units - grit chambers, sedimentation tanks, Trickling Filters and Activated Sludge Process ,Oxidation ponds ,Oxidation ditches and lagoons.
- To design wastewater treatment and disposal in un-sewered areas - septic tanks.
- To learn methods of ultimate sewage disposal.
- To discuss various stages and factors affecting anaerobic sludge digestion and to design anaerobic sludge digester and to learn methods of sludge handling and disposal.
- To introduce sanitary fittings and plumbing systems of drainage and to discuss principles governing house drainage.

Course Outcomes:

- At the end of the course the student will be able to:
- Select a suitable type of water carriage system based on relative merits.
- Determine the quantity of drainage and sewage produced from a community.

- Design sewers and to select suitable locations for various sewer appurtenances.
- Ascertain the quality and characteristics of wastewater.
- Design primary treatment units like grit chambers, sedimentation tanks etc.
- Design conventional biological treatment units - Trickling Filters and Activated
- Sludge Process with all its component parts.
- Design septic tanks and its effluent disposal methods like cess pools and soak pits.
- Select suitable method for disposal of sewage treated or untreated.
- Design anaerobic digester for primary and secondary sludge and to select suitable method for disposal of wet or conditioned sludge
- Plan plumbing system for various types of residential buildings

UNIT - 1

Introduction to Sanitary Engineering : Sanitation; Sewerage systems; Relative merits and Suitability.

Sanitary Sewage and Storm Sewage : Sanitary Sewage: Factors affecting sanitary sewage; Determination of quantity of sanitary sewage; Storm Water Sewage: Factors affecting storm water sewage; Determination of quantity of storm water sewage.

Sewers, Sewer Appurtenances and Sewage Pumping : Types of sewers; Design of sewers; Construction; Testing; Maintenance of sewers; Sewer appurtenances - Man holes, Drop man holes, Inverted siphons; Street inlets; Catch basins; Storm water regulators; Sewage pumping; Types of pumps.

UNIT - II

Quality and Characteristics of Sewage : Characteristics of sewage; Decomposition of sewage; Carbon, nitrogen and sulphur cycles of decomposition; BOD; COD; Physical and chemical analysis of sewage.

Primary Treatment of Sewage : Screens; Grit chamber; Grease traps; Skimming tanks; Sedimentation tanks.

Septic Tank : Septic tank design; Septic tank effluent disposal, soak pits, leaching cess pools;

UNIT - III

Secondary Treatment of Sewage: Trickling filters: Principles of action; Filter types; Recirculation; Operational problems and remedies; Activated sludge process: Principle of action; Features of operation; Organic loading parameters; Methods of aeration; Diffused air system; Mechanical aeration; Combined system; Activated sludge process vs Trickling filter process; Sludge bulking; Sludge volume index, Secondary Settling Tanks.

Miscellaneous treatment methods : Oxidation Ponds - Working principle and design; Oxidation ditches and aerated lagoon (only theoretical aspects)

UNIT - IV

Sewage Disposal : Objects; Methods; Disposal by dilution; Disposal by irrigation; Sewage sickness.

Sludge Treatment and Disposal : Characteristics of sewage sludge; Anaerobic sludge digestion process; Stages of sludge digestion; Factors affecting sludge digestion; Sludge digestion tank; Methods of de-watering the sludge; Methods of sludge disposal.

House Plumbing : House drainage - Sanitary fittings, Traps; Plumbing system of drainage - Single stack, One pipe and Two pipe systems; Principles governing design of building drainage.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS

1. *Elements of Environmental Engineering by K. N. Duggal, S. Chand & Company Ltd., 2012.*
2. *Environmental Engineering vol. II - Sewage disposal and air pollution engineering by S. K. Garg; Khanna Publishers, Delhi., 2010.*

REFERENCE BOOKS

1. *Wastewater Engineering : Treatment, Disposal & Reuse by Met Calf ,McGraw-Hill.*
2. *Water & Wastewater Technology by Hammer and Hammer, PHI, 2012.*
3. *Water Supply and Sewerage by E.W. Steel and Terence J. Mc Ghee, McGraw-Hill,1991.*
4. *Environmental Engineering by Peavy and Rowe, McGraw-hill, 1987.*
5. *Manual on Sewerage & Sewage treatment; CPH and EEO, Ministry of Works and Housing; Govt. of India; New Delhi.*

WEB REFERENCES: _

www.nptel.iitm.ac.in

bbb

III/IV Year B.Tech.- Sixth Semester

CE - 322 STRUCTURAL ANALYSIS - II

Lectures / Tutorials : 4 / 1 Periods/Week		*Sessional marks*	*: 40*
Semester End Exam. : 3 Hours		*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course objectives:

- To develop a technical competence in the fundamental concepts and application of displacement methods of statically indeterminate, structures.
- Awareness of the Displacement methods for solving statically indeterminate beams and frames by using slope deflection, moment distribution method.
- To understand the plastic behaviour of structures and collapse load analysis of the structures
- To understand the concept of stiffness and flexibility in matrix form
- To know how to analyse the structures like beams and simple frames using stiffness and flexibility matrix methods

Course Outcomes:

- Students will have an ability identify, formulate, and determine stability of structures; external reactions, internal forces, and deflection for determinate and up to three-degree of freedom indeterminate structures.
- Student will be able to develop a computer program by Staad Pro, Sap and various software's and also Solve problems similar to problems done "by hand."
- Behaviour of structures beyond yield load, finding shape factors, length of plastic hinge etc
- Collapse load analysis
- Analysing the structures like continuous beams and single bay, storey rigid jointed frames for internal forces using stiffness and flexibility matrix methods

- Analysing the structures like pin jointed frames for internal forces using stiffness matrix method

UNIT - I

Slope Deflection Method : Slope - deflection equations; Principles of the method; Applications of the method to the analysis of continuous beams and portal frames (Single bay, single storey with vertical legs only) without and with sidesway.

UNIT - II

Moment Distribution Method : Principles of the method; Application of the method to analysis of continuous beams and portal frames (Single bay, single storey with vertical legs only) without and with side sway.

UNIT - III

Matrix methods of Structural analysis : Flexibility and stiffness; Flexibility matrix; Stiffness matrix; Relationship between flexibility matrix and stiffness matrix; Analysis of continuous beams and rigid jointed plane frames (Single bay, single storey with vertical legs only) by flexibility and stiffness methods

UNIT - IV

Plastic analysis of structures : Introduction, Stress-strain curve, Plastic moment - Plastic section modulus, Shape factor, Load factor, Failure mechanisms; Methods of analysis - Static method and Mechanism method; Analysis of continuous beams and single bay rectangular portal frames

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK

1. Basic structural analysis by CS Reddy, 3rd Edition, Tata McGraw-Hill ,2010.

REFERENCE BOOKS

1. *Structural Analysis by Devdas Menon, Narosa Publishinh House, 2008.*
2. *Intermediate structural analysis by CK Wang, Tata McGraw-Hill,2010.*
3. *Structural Analysis - A matrix approach by G. S. Pandit & S. P. Gupta; Tata Mc Graw - Hill Publishing Co. Ltd., 2008.*
4. *Fundamentals of limit analysis of structures by Manicka Selvam, Dhanpat Rai &Sons*

WEB REFERENCES:

http://www.cdeep.iitb.ac.in/nptel/Civil%20Engineering/ Structural%20Mechanic%20II/Course%20Objective.html.

http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/ Structural%20Analysis/New_index1.html

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III/IV Year B.Tech.- Sixth Semester

CE - 323 WATER RESOURCES ENGINEERING - II

Lectures / Tutorials :	*4/ 1 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3Hours*	*Semester End Exam. Marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- To measure stage, velocity and discharge of a stream at a given location.
- To study functions, types and suitable locations for canal outlets, canal falls, canal regulators and canal escapes.
- To discuss different types of cross-drainage works and the criteria for selection of suitable type.
- To discuss the selection criteria for a reservoir and to determine its storage capacity by mass curve method.
- To study about reservoir sedimentation and to estimate the life of reservoir and to discuss the flood routing methods.
- To study forces on gravity dam, modes of failure of gravity dam and to analyse the stability of gravity dam.
- To discuss criteria for high and low gravity dam and to design a gravity dam.
- To steady types of earth dams and to discuss causes of failure of earth dams and seepage control measures.
- To explain various types of spillways and their suitability, energy dissipation under spillways and types of spillway gates.
- To steady about component parts and their function of hydel project and estimation of load factor, capacity factor, utilization factor etc.

Course Outcomes:

At the end of the course the student will be able to:

- Understand the methods for measuring stage, velocity and discharge of a stream at a given location.

- Understand the functions and suitable locations of canal outlets, canal falls and canal regulators.
- Suggest suitable type of cross drainage work based on existing levels and discharge conditions of canal and drainage.
- Suggest suitable type of aqueducts for the existing condition.
- calculate the storage capacity of a reservoir.
- Estimate the life of a reservoir based on sediment inflow.
- analyse stability of gravity dam under various conditions (including seismic forces).
- Design an earth dam based on the locally available materials and carry out stability analysis of earth dam under various conditions.
- Suggest a suitable spillway at a dam site and understand the criteria for design of stilling basin for energy dissipation under spillway.
- Understand the functions of component parts of a hydro electric power scheme and determine load, capacity, utilization factors for a hydel project.

UNIT - I

Stream Gauging : Necessity; Selection of gauging sites; Discharge measurement- Area-Velocity method; Slope-Area method; Tracer method, Electromagnetic induction method, ultrasonic method; Measurement of depth - Sounding rod, Echo-sounder; Measurement of velocity; Floats - Surface float, Sub-surface float, Velocity rod; Current meter; Measurement of stage - Staff gauge, wire gauge, water stage recorder, bubble gauge recorder; stage-discharge curve.

Canal outlets and regulation works : Types of outlets; Non-modular outlets; Semi-module outlets; Rigid modules; Canal falls; Necessity and location of falls; Development of falls; Types of falls; Canal regulators; Off-take alignment; Head regulators and cross-regulators; Canal escape (Designs not included).

Cross Drainage Works : Introduction; Types of cross - drainage works; Selection of suitable type of cross - drainage work; Classification of Aqueducts and Syphon Aqueducts.

UNIT - II

Reservoir Planning : Introduction; Investigations for reservoir planning; Selection of site for a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass inflow curve; Determination of safe yield from a reservoir of a given capacity; Sediment flow in streams; Reservoir sedimentation; Life of reservoir; Reservoir sediment control; Multipurpose reservoir; Flood routing; Methods of flood routing - Inflow - Storage Discharge Curves method and Trial and error method (Description only).

Dams In General : Introduction; Classification; Gravity dams, Arch dams, Buttress dams, Steel dams, Timber dams, Earth dams and rock fill dams; Physical factors governing selection of type of dam and selection of site for a dam.

UNIT - III

Gravity Dams : Introduction; Forces acting on a gravity dam; Combination of loading for design; Modes of failure and criteria for stability requirements; Stability analysis; Elementary profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam; High and low gravity dams; Design of gravity dams-single step method; Galleries; Joints; Keys and Water seals; Stability analysis of non-overflow section of gravity dam.

UNIT - IV

Earth Dams : Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams; Section of an earth dam; Seepage control measures.

Spillways : Introduction; Types of spillways; Energy dissipation below spillways for relative positions of jump height curve and tail water curve; Stilling basins; Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal and sloping aprons.

Water Power Engineering : Introduction; Hydropower - Advantages and disadvantages; Estimation of hydropower; Flow duration curve; Power duration curve; Load curve; Load factor; Capacity factor; Utilization factor; Diversity factor; Load duration curve; Firm Power; Secondary power; Types of hydel schemes; Forebay; Intake structures; Penstocks; Surge tank; Tail race; Turbines; Selection of suitable type of turbine.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS

1. *Irrigation and Water Power Engineering by B.C. Punmia and Pande B.B. Lal; 16th Edition, Laxmi Publications,New Delhi.*
2. *Irrigation Engineering and Hydraulic Structure by S. K. Garg; Khanna Publishers, Delhi, 2011.*

REFERENCE BOOKS

1. *Irrigation, Water Resources and Waterpower Engineering by P.N. Modi, 7th Edition, Standard Book House, 2008.*
2. *Irrigation, Waterpower and Water Resources Engineering by K R Arora, Standard Publishers, 2010.*
3. *Water Power Engineering by M.M. Dandekar and K. K. Sharma; Vikas Publishing House Pvt. Ltd., 1979.*

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III/IV Year B.Tech.- Sixth Semester

CE - 324 DESIGN OF CONCRETE STRUCTURES-II

Lectures / Tutorials : 4 / 1 Periods/Week	*Sessional marks*	*: 40*
Semester End Exam. : 3 Hours	*Semester End Exam. Marks*	*: 60*
	Credits	*: 4*

Course objectives:

- Course is designed to shape the concrete and use the steel bars for external loads on different building elements.
- To understand the codal recommendations for methods of design.
- To understand the design of continuous beams.
- To understand the design of one way, and cantilever slabs.
- To understand the design of continuous slabs.
- To understand the design of two way slabs, and flat slabs.
- To understand the design of columns.
- To understand the design of retaining walls and foundations

Course outcomes:

- Students can handle the isolated design of individual elements inde-pendently.
- Indian Standards of approach can be practiced by the student.

UNIT - I

Continuous Beam (Limit State Method) :

Design of continuous beam

One way Slabs (Limit State Method)

Design of Simply supported, Cantilever and Continuous slabs

UNIT-II

Two Way Slabs (Limit State Method)

Design and detailing of two way slabs

Flat Slabs (Limit State Method)

Design and detailing of flat slabs by direct design method.

UNIT-III

COLUMNS (LIMIT STATE METHOD) : Assumptions; Design of axially loaded columns ; Design of rectangular columns (short and Long) sub-jected to axial load and bending moment using Interaction diagrams (SP-16 Charts)

UNIT-IV

Retaining Walls (Limit State Method): Types of retaining walls, Forces on retaining walls; Stability requirements; Design and detailing of cantile-ver type retaining wall.

Foundations (Limit State Method) : Design and detailing of rectangu-lar Isolated footing and Combined footing

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK

1. *Reinforced concrete , Vol.1 & 2 by H. J. Shah, Charotar publishing house Pvt. Ltd.,2011.*

REFERENCES

1. *Reinforced Concrete (limit state design) by Ashok K. Jain; 6th Edition, NemChand & Bros., Roorkee*
2. *Reinforced concrete design by Pillai and Menon, 2nd Edition,Tata Mc Graw-Hill*

WEB REFERNCES:
_www.iitm.ac.in

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III/IV Year B.Tech.- Sixth Semester

CE - 325 DESIGN OF STEEL STRUCTURES - II

(using Limit State Method except Chapter 5)

Lectures / Tutorials : 4 / 1 Periods/Week	*Sessional marks : 40*
Semester End Exam. : 3 Hours	*Semester End Exam. Marks : 60*
	Credits : 4

Course objectives:

- To design welded plate girder and gantry girder
- To design welded and bolted connections
- To design roof trusses
- To design light gauge sections
- To design structural steel and concrete composite beams

Course outcomes:

- Learn the design of welded plate girder and gantry girder
- Able to design welded and bolted connections
- Able to design roof trusses
- Learn the design of light gauge sections
- Able to design concrete composite beams

UNIT - I

Gantry girder : Introduction; Loads on gantry girder; Web buckling and Crippling; Deflection, Check ; Design of gantry girder

Welded Plate girder : Introduction ; Behaviour of transversely stiffened plate girder panels in shear ; Design methods for transversely stiffened web panels ; Design of end panels ; Other design specifications ; De-sign of stiffeners ; Design of welded plate girder

UNIT - II

Welded connections : Introduction; Bracket connections; Simple beam end connections; Moment resistant beam end connection.

Bolted connections : Introduction; Bracket connections; Simple beam end connections; Moment resistant beam end connection; Splicing of beams /girders

UNIT - III

Light-gauge steel sections : Introduction; Types of sections; Design of light gauge sections; Design of axially loaded columns; Design of beams which do not buckle laterally.

Composite Construction : Introduction; Composite beam ; Method of construction ; Limit states of collapse; Limit states of serviceability - Deflection

UNIT - IV

Roof Trusses : Components of a trussed roof; Types of trusses; Dead, Live and wind loads on trussed roof; Design of purlins ; Design of members of a roof truss ; Design of connections ; Design of end bearings

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK

Design of steel structures by K.S.Sai Ram, Pearson Education, 2010

REFERENCE BOOKS

1. *Steel Structures - Design and Practice by N. Subramanian, Oxford University press,2010.*
2. *Limit state design of steel structures by M.R.Shiyekar , PHI Learning,2010.*

WEBREFERNCES:
_www.iitm.ac.in

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III/IV Year B.Tech.- Sixth Semester

CE - 326 GEOTECHNICAL ENGINEERING - II

Lectures	*: 4 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3 Hours*	*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- To introduce the soil exploration, field testing of soil to know soil strata, strength and water table location.
- The civil engineering structures like retaining wall which are to resist lateral stresses are also introduced.
- To introduce concepts of stability of slopes, bearing capacity, pile ca-pacity and its determination.

Course Outcomes:

- Equip the student with knowledge of how to explore the soil, design the foundations for different conditions and check the stability of struc-tures.

UNIT - I

Sub-Soil Investigation And Sampling : Introduction; Methods of ex-ploration; Methods of Boring; Soil Samples; Soil samplers and Sampling; Number and disposition of trial pits and borings; Depth of exploration; Ground water observations; Plate load test; Penetration tests-SPT,CPT(static and dynamic), Geophysical methods- Electrical resistiv-ity and seismic refraction methods; Bore logs; Site investigation report.

Lateral Earth Pressure & Retaining Walls : Introduction; Effect of wall movement on Earth Pressure; Earth Pressure at rest; Rankine's theory of Earth pressure; Coulomb's theory of earth pressure; Culmann's graphi-cal method for active earth pressure; Design considerations for retaining walls.

UNIT - II

Stability of Slopes : Introduction; Infinite slopes and translational slides; Definitions of factor of safety; Finite slopes- forms of slip surface; Total stress and Effective stress methods of analysis; u=0 Analysis (Total Stress

Analysis) ; c- Analysis- Method of slices; Location of most Critical Circle; Stability of Earth Dam Slopes; Friction Circle Method; Taylor's Stability Number.

Shallow Foundations : Concept of foundations; Types of foundations and their applicability; General requirements of foundations; Location and Depth of foundation.

UNIT -III

Bearing Capacity of Shallow Foundation : Terminology relating to bear-ing capacity; Bearing Capacity of Shallow Foundations - Terzaghi's Bearing Capacity theory; Skempton's Bearing Capacity Analysis for Clay soils; IS-Code Recommendations for Bearing Capacity; Influence of water table on bearing capacity.

Settlement Analysis : Settlement of Shallow foundation - types; Meth-ods to reduce differential settlements; Allowable Bearing Pressure; Im-mediate settlemtent -Terzaghi's Method; Allowable Bearing pressure of Granular Soils based on Standard Penetration Test Value - Terzaghi and IS methods.

UNIT - IV

Pile Foundations : Introduction; Uses of Piles; Types of Piles; Cast-in-situ Pile construction; Selection of Pile type; Pile driving; Pile load carry-ing capacity in compression - Static Pile Load formula, Load tests-static and cyclic pile load tests, Dynamic Pile formulae; Correlations with Pen-etration test data; Group action of Piles - load carrying capacity and settle-ment; Negative skin friction.

Well Foundations : Types of wells; Components of well foundation; Shapes of wells; Forces acting on well foundation; Construction and Sink-ing of wells.

Foundations in Expansive Soils : Clay minerals ,Clay water relations, Identification of expansive soil; Field conditions that favour swelling; con-sequences of swelling; Laboratory methods for determination of swell pressure, Different alternative foundation practices in swelling soils; Con-struction practice of UR piles in swelling soils.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK

1. *Basic and Applied Soil Mechanics - Gopal Ranjan and A.S.R.Rao, New Age International Publishers, 2011.*

REFERENCES

1. *Foundation Engineering by B. J. Kasmalkar; Pune Vidyarthi Griha Prakashan, Pune*
2. *Foundation Analysis & Design by Bowles, J.E., McGraw- Hill, 1995.*
3. *Foundations on Expansive Soils, F.H. Chen. Elsevier Publications,1988.*
4. *Geotechnical Engineering by SK Gulati & Manoj Datta, Tata McGraw-Hill,2010.*
5. *Principles of Foundation Engineering by B.M. Das., PWS Publishing Company, 4th edition, 1999.*
6. *Geotechnical Engineering by Codutu, 2nd Edition, PHI, 2010.*

WEB REFERNCES:

_www.iitm.ac.in

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III/IV Year B.Tech.- Sixth Semester

CE - 361 LABORATORY

SURVEYING FIELD WORK - II

Practical	*: 3 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam.	*: 3 Hrs.*	*Semester End Exam. marks*	*: 60*
		Credits	*: 2*

Course Objectives:

The main objective of this laboratory course is to introduce Total Station instrument for regular field survey purpose

- All of the experiments which are done by mechanical instruments before are now dealt with Total station
- Each and every design/plot related to field survey is carried out by Total Station and required computations are directly made at the site itself
- This course will also present a survey camp after completing the regu-lar lab sessions.

Course Outcomes:

- Every student can gain required excellence in using the Total Station Instrument
- Students can make accurate designs/plots thus by avoiding any manual errors
- Every student can meet the requirement of knowing the Total Station instrument which is vital for any construction firm
- Not only he/she can work out the experiments inside the institution but also they are trained for the on-site works outside the institution

Any 8 of the following:

1. Theodolite
1. Traversing and adjustment of traverse
2. Determination of Horizontal and Vertical distances by stadia meth-ods

3. Determination of Elevations and Heights
2. Total Station
4. Study of Instrument - Determination of Distances, Directions and Elevations
5. Determination of Boundaries of a Field and computation of area.
6. Determination of Heights of objects.
3. Setting Out
7. Setting of simple circular curve using tape and chain.
8. Setting of simple circular curve using tape or/and theodolite
9. Setting of a simple circular curve using Total Station.
10. Setting out for Building.

Survey Camp is to be conducted for a minimum period of seven days to train in one of the following areas:

i. Preparation of a contour Plan/ Map.
ii. Earth work Computations for a high way / canal projects
iii. Marking of a Sewer line/ Water supply line.
iv. Any type of Execution works.

NOTE

50% Weight- age of total marks of this laboratory is to be given for total survey camp work including for Report submission by each batch.

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III/IV Year B.Tech.- Sixth Semester

CE - 362 LABORATORY

COMPUTER PROGRAMMING IN CIVIL ENGINEERING

Practicals	*: 3 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam	*: 3 Hrs.*	*Semester End Exam. marks*	*: 60*
		Credits	*: 2*

Course objectives:

- To write programmes for design of various structural elements like beams, slab, steel structural connections, slab base, open channel etc using C or C++ programming languages
- To write programmes for determining various properties of soils using C or C++ programming languages
- To write programmes for solving different problems in surveying

Course out comes :

By the end of this course students will have the capability/knowledge of

- To write programmes for design of various structural elements like beams, slab, steel structural connections, slab base, open channel etc using C or C++ programming languages
- To write programmes for determining various properties of soils using C or C++ programming languages
- To write programmes for solving different problems in surveying

Note: A minimum of twelve (12No) shall be done and recorded Students are required to write and execute programmes to solve the following problems. Programmes shall be in C or C++ language or MATLAB/JAVA. or MS-Office Softwares

CYCLE-1

(Write any SIX programmes)

1. Design of Reinforced Beam for flexure by limit state method.
2. Design of T- Beam for flexure by limit state method.
3. Design of Reinforced beam for Shear by limit state method.

4. Design of simply supported one-way slab.
5. Design of steel tension member
6. Design of steel compression member
7. Design of slab base for a steel column
8. Design of laterally supported steel beam
9. Design of beam to column framed connection using bolts

CYCLE-2

(Write any THREE programmes)

1. Classification of soil by Indian standard classification system.
2. Stresses due to applied loads both Boussinesq and Westerguard analysis

a. Concentrated load b) circular loaded area c) Rectangular loaded area

3. Determination of permeability coefficient by constant head and fall-ing permeability tests.
4. Determination of index properties of soil.

CYCLE-3

(Write any THREE programmes)

1. Design of an open channel
2. Analysis of water distribution networks (Hardy cross method).
3. Determination of the height of the building when base is accessible.
4. Determination of included angles from the given bearing and check for local attraction.

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IV/IV Year B.Tech.- Seventh Semester

CE - 411 TRANSPORTATION ENGINEERING - I

Lectures	*: 4 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam.	*: 3 Hours*	*Semester End Exam. Marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- To emphasize on highway development planning and various surveys to be conducted.
- To understand material properties and performances and limits of various tests
- Introduction to the design concepts, vehicle loading criteria and to demonstrate how they are combined to design and construct road pavements.
- To understand the principles of geometric design, both vertical and horizontal
- Emphasize on various traffic control operations and regulations.

Course Outcomes:

- For proper planning of a road network by linking of various surveys and to evaluate and develop master plans for a better road network.
- Selecting the appropriate materials for use in different road layers for different types of pavements.
- Perform road pavement design and analysis by various IRC and other methods.
- Interpret geometric design fundamentals, in relation to safety and driver comfort, focusing on horizontal and vertical alignment.
- An ability to develop traffic signals and help to properly regulate the traffic and better use of road network.

UNIT - 1

Highway Development and Planning : Brief Introduction; necessity of highway planning suveys preparation of master plan highway planning in India.

Highway alignment : Factors controlling alignment; Engineering surveys, Drawing & report.

UNIT - II

Highway Geometric Design : Highway cross section elements; Sight distance; Design of horizontal alignment; Design of vertical alignment.

Highway materials

Sub grade soils- CBR tests; Stone aggregates; Bitumen materials; Pav-ing mixes.

UNIT - III

Design of Highway Pavements : Design factors; Design of flexible pave-ments - IRC method, IRC recommendations; Design of Rigid pavements -Westergard's stress equation for wheel loads and temperatures stress; IRC recommendations.

Highway construction and maintenance: Construction of water bound macadam roads; bituminous pavements and cement concrete pave-ments; Construction of joints in cement concrete pavements; Mainte-nance of highways- Water bound macadam roads, Bituminous pave-ments, Cement concrete pavements.

UNIT - IV

Highway Drainage : Importance of highway drainage; Requirements; Surface drainage; Sub-surface drainage; Road construction in water logged areas and black cotton soils.

Traffic engineering : Introduction; Traffic characteristics- Road user, vehicular & travel pattern; Traffic operation- signal design; Types of inter-sections; Design of rotary intersection;

NOTE:

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK:

1. *Highway Engineering by S. K. Khanna & C. E. G. Justo; Nemchand & Brothers, Roorkee, 2011.*

REFERENCE BOOKS:

1. *Principles of Transportation Engineering by Partha Chakroborty & Animesh Das, PHI Learning, 2009.*
2. *Principles of Transportation Engineering and highway engineering by G. Venkatappa Rao, Tata McGraw-Hill, 1995.*

WEB REFERENCES:

http://nptel.iitm.ac.in/syllabus/syllabus.php?subjectId=105101087

www.irc.org.in (for various journals and manuals and code provisions)

www.springerlink.com (for various e journals)

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IV/IV Year B.Tech.- Seventh Semester

CE - 412 CONSTRUCTION TECHNOLOGY and MANAGEMENT

Lectures	*: 4 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3 Hours*	*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- Can able to plan different stages in construction project, project dura-tion and job layout
- Using PERT and CPM able to determine critical path for projects.
- Optimization of project cost using cost control techniques.
- Learn importance of man power, materials and machinery in con-struction projects.
- Optimization of man power; total quality management, safety mea-sures in construction projects, utilization of Management Information System.
- Learn economic terms like assets, capital, annuity, project profitabil-ity useful for planning project

Course Outcomes:

Student able to:

- Design shallow foundations and checking settlements.
- Student able to :
- Planning for any project and its duration.
- Optimization of men, material and project cost.
- Know the importance of machinery.
- Implementation of quality management, safety measures and best utilization of Management Information system.
- Assessing project profitability

UNIT - I

Introduction

Significance of Construction Management, Objectives and functions of construction management.

Planning and Scheduling : Planning techniques - Bar charts; Limitations of Bar Charts; Mile stone charts.

UNIT - II

Project Management through Networks : Objectives of network tech-niques; Events; Activities; Time estimates; Float and Slack; Critical path, near critical path; CPM and PERT and their use in Construction Plan-ning; Difference between CPM and PERT; Probability of completion time for a project.

Cost Control : Direct cost; indirect cost; Total project cost; Optimization of cost through networks.

UNIT - III

Resource Management (Manpower) : Introduction; Resource smooth-ing; Resource leveling.

Construction Equipment : Different types of construction equipment and their use in Constriction Industry; Factors affecting selection of Equipments; Owning and operating the equipment; Equipment maintenance.

UNIT - IV

Quality Control : Importance of quality; Elements of quality; Quality as-surance techniques; Documentation; Total quality management.

Safety Management : Importance of safety; Approaches to improve safety in construction industry; Safety benefits to employers, employees and customers.

Project Economics : Time value of money; discounted cash flow analy-sis; Payback period; Return on investment; Benefit cost analysis, re-placement analysis, Inflation.

NOTE:

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS :

1. *Fundamentals of PERT/CPM and Project Management by S. K. Bhattacharjee; Khanna Publishers,2004.*
2. *PERT & CPM Principles and applications by L. S. Srinath, 3rd Edition, Affiliated East West Press.*

REFERENCE BOOKS:

1. *Construction Engineering and Management by Dr. S. Seetharaman,4th Edition, Umesh Publications, 2008.*
2. *Construction Planning, Equipment & Methods by Peurifoy R. L.; Tata McGraw-Hill, 2008.*

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IV/IV Year B.Tech.- Seventh Semester

CE - 413 QUANTITY SURVEYING

Lectures	*: 4 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3 Hours*	*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- Quantity estimation for different civil engineering works like single storey residential building, BT road, canal etc.
- Cost estimation for different civil engineering works like single storey residential building, BT road, canal etc.
- Rate analysis for different items of work
- Quantity estimation and preparing schedule of bars of different items of RC works using software like MS Excel
- To prepare project management report for different civil engineering projects like residential building, BT road, canal etc using software packages like Primavera/MS Project etc

Course Outcomes:

By the end of this course students will have the capability/knowledge of

- Estimating quantities required for different civil engineering works like single storey residential building, BT road, canal etc.
- Cost estimation of different civil engineering works like single storey residential building, BT road, canal etc.
- finding the unit rate of different items of work
- prepare schedule of reinforcement bars
- " scheduling a project
- analysing a project and finding critical activities and hence allocate resources as per the schedule.

UNIT - I

Procedure of Estimating : Methods of estimating; Main items of work; Deduction for openings; Degree of accuracy; Units of measurement.

Methods of building estimates : Individual wall method; Centre line method; Arch masonry calculation; Estimate of steps.

Estimate of Buildings : Estimate of residential building; Estimate of a building from line plan.

UNIT - II

Estimate of RCC works : Standard hooks and cranks; Estimate of RCC slab; RCC beam; RCC T-beam slab and RCC column with foundation.

Road Estimating : Estimate of earthwork; Estimate of pitching of slopes; Estimate of earthwork of road from longitudinal sections; Estimate of earthwork in hill roads.

Canal estimate : Earthwork in canals-different cases; Estimate of earthwork in irrigation channels.

UNIT - III

Specifications : Purpose and method of writing specifications; General specifications. Detailed Specifications for Brick work; R.C.C; Plastering; Mosaic Flooring; R.R.Stone Masonary.

Analysis of Rates : Task or out - turn work; Labour and materials required for different works; Rates of materials and labour; Preparing analysis of rates for the following items of work: i) Concrete ii) RCC Works iii) Brick work in foundation and super structure iv) Plastering v) CC flooring vi) White washing.

UNIT - IV

PWD Accounts and Procedure of Works : Organization of Engineering department; Work charged establishment; Contract; Tender; Tender notice; Tender Schedule; Earnest money; Security money; Measurement book; Administrative approval; Technical sanction; Plinth area; Floor Area; Carpet area; Approximate Estimate; Plinth area estimate; Revised Estimate; Supplementary estimate.

Valuation : Cost; Price & value; Methods of valuation; Out goings; Depreciation; Methods for Estimating cost depreciation; Valuation of building.

Miscellaneous Topics : Gross income; Net income; Scrap value; Salvage value; Obsolescence; Annuity; Capitalized value; Years purchase; Life of structures; Sinking fund; Standard rent; Process of fixing standard rent; Mortgage.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS:

1. *Estimating & Costing in Civil Engineering by B.N. Dutta; UBS Publishers & Distributors, 2010.*
2. *Valuation of Real properties by S. C. Rangwala, 8th Edition, Charotar Publishing House, 2011.*

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IV/IV Year B.Tech.- Seventh Semester

CE - 414 /A ELECTIVE - I

PRESTRESSED CONCRETE

Lectures / Tutorials :	*4 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. : 3 Hours		*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course objectives:

- To introduce pre-stressed concrete and its materials
- To explain the various pre-stressing techniques
- To analyse a pre-stressed concrete beam
- To study the losses in pre-stress
- To determine the deflection of a pre-stressed concrete beams
- To design pre-stressed concrete beam for bending moment and shear force
- To determine bond and anchorage stresses and to design end block

Course Outcomes:

- Learn the basic concept of pre-stressing of concrete and various pre-stressing systems
- Able to analyse and design pre-stressed concrete beams
- Able to estimate the losses in pre-stressing
- Able to design pre-stressed concrete beams including the end block

UNIT - I

Introduction : Basic concepts of prestressing; Historical development; Need for High strength steel and high strength concrete; Advantages of prestressed concrete.

Materials for Prestressed Concrete

High strength concrete; High tensile steel

Pretressing Systems : Tensioning devices; Hoyer's long line system of pretensioning; Post tensioning systems; detailed study of Freyssinet

system, Lee-McCall System and Gifford - Udall system

Analysis of Prestress and Bending Stresses : Basic assumptions; Analysis of prestress; Resultant stresses at a section; Pressure (Thrust) line and internal resisting couple; Concept of Load balancing; Stresses in tendons; Cracking moment.

UNIT - II

Losses of Prestress : Nature of losses of prestress; Loss due to elastic deformation of concrete, shrinkage of concrete, creep of concrete, re-laxation of stress in steel, friction and anchorage slip; Total losses al-lowed for in design.

Deflections of Prestressed Concrete Members : Importance of control of deflections; Factors influencing deflections; Short term deflections of uncracked members

UNIT-III

Flexural strength of prestressed concrete sections: Types of flexural failure; Flexural strength of prestressed concrete sections as per IS1343: 1980

Design of sections for flexure as per IS1343 : 1980 Introduction; De-sign loads and strengths; Strength and serviceability limit states; Mini-mum section modulus; Prestressing force; Limiting zone for the prestress-ing force; Design of rectangular and I sections for the limit state of collapse in flexure.

UNIT - IV

Shear Resistance : Shear and Principal Stresses; Ultimate shear resis-tance of prestressed concrete members and design of shear reinforce-ment as per IS1343 : 1980 Transfer Of Prestress In Pre-Tensioned Mem-bers & Flexural Bond Stresses

Transmission of prestressing force by bond; Transmission length; Bond stresses; Transverse tensile stresses; End zone reinforcement; Flex-ural bond stresses in pre - tensioned and post - tensioned grouted beams.

Anchorage Zone Stresses In Post-Tensioned Members : Stress dis-tribution in end block; Anchorage zone stresses and Anchorage zone Reinforcement as per IS1343 : 1980

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK

1. *Prestressed Concrete by N. Krishna Raju; 4th Edition, Tata Mc Graw - Hill Publishing Company Limited, 2012.*

REFERENCE BOOKS

1. *Design of Prestressed Concrete Structures by T.Y. Lin & Ned H. Burns,3rd Edition, John Wiley & Sons, 2010.*
2. *Prestressed Concrete by Pandit & Gupta , CBS Publishers, 1995.*
3. *Fundamentals of Pre-stressed concrete by NC Sinha and SK Roy, 3rd Edition, S.Chand Publishers, 1985.*
4. *Prestressed Concrete by N.Raja Gopalan ,2nd Edition,Narosa Publishing House, 2008.*

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ELECTIVE-I

IV/IV Year B.Tech.- Seventh Semester

CE - 414 /B WATER RESOURCES SYSTEMS ANALYSIS

Lectures / Tutorials : 4 Periods/Week		*Sessional marks*	*: 40*
Semester End Exam. : 3 Hours		*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- To study types of systems and systems approach to water resources planning and management.
- To understand role of optimization in water resource planning, economy and management.
- To study various linear programming models and their applications in water resources.
- To study the concept of dynamic programming and its applications in water resources problems.
- To understand various simulation techniques and to develop simula-tion models for various water resources problems.
- To study techniques for operation and management of available wa-ter resources.

Course Outcomes:

At the end of the course the student will be able to:

- Understand concept of systems approach to water resources plan-ning and management.
- Develop objective function and constraints for various water resources optimization problems.
- Develop linear programming models for water resources problems by using graphical and simplex and revised simplex techniques.
- Carry out sensitivity analysis and post optimality analysis.
- Develop and solve forward and backward recursive dynamic program-ming models.

- Apply simulation techniques in water resources problems
- Plan for optimal operation of a single reservoir system.
- Able to develop models for allocation of water resource for optimal crop yields.

UNIT I

Concept of System and System Analysis : Introduction, Definition of a system, Types of systems, Systems approach to water resources plan-ning and Management

Optimization : Definition, role of optimization models, objective function and constraints, Types of optimization techniques

UNIT II

Linear Programming -I : General formulation of Linear Programming models, Graphical Method, Simplex method, Application of Linear Pro-gramming in Water Resources.

UNIT III

Linear Programming -II : Revised Simplex method, The Dual problem, Sensitivity Analysis, Post optimality Analysis

Dynamic Programming : Introduction; Characteristics of a DP prob-lem; Belman's principle of optimality; Forward and Backward recursive dynamic programming, Application of DP to water resources problems.

UNIT IV

Simulation : Definition, Concepts of a simulation model, steps in simu-lation, Application of simulation techniques in water Resources.

Water Resources Management : Planning of reservoir system, optimal operation of single reservoir system, allocation of water resources, opti-mal cropping pattern, Conjunctive use of surface and sub surface water resources.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK

3. *Water Resources Systems by S.Vedula and P.P. Majumdar, Tata McGraw-Hill,2005.*

REFERENCE BOOKS

1. *Water Resources Systems Planning and Analysis by D.P. Loucks, J.R. Stedinger and D.A. Haith, Prentice-Hall, 1983.*
2. *Operations Research: An Introduction by H.A.Taha, 8th Edition,Pearson Education, 2008.*
3. *Analysis of water distribution networks by Bhave and Gupta, Narosa Publishing House, 2011.*
4. *Engineering Optimization: Theory and Practice by SS Rao, 3rd Edition, New Age International, 2010.*

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ELECTIVE-I

IV/IV Year B.Tech.- Seventh Semester

CE - 414 /C GREEN BUILDINGS

Lectures / Tutorials :	*4 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. : 3 Hours		*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- Describe green building and the role of USGBC and LEED
- Recognize the intents of each LEED credit category
- Explain key sustainability terms and concepts
- Identify green building best practices
- Recognize cutting-edge examples
- Discuss cost considerations of green building

Course Outcomes:

Student will be able to

- Describe the green building & sustainable design concepts.
- Comprehend properties of green building construction materials and their qualitative input to design.
- Begin to formulate a personal attitude toward green building design.
- Describe the requirements for LEED (Leadership in Energy and Environmental

UNIT-I

Introduction to green building: Introduction to the ideas, issues and concepts of sustainable planning, global environment and the built environment, principles of environmentally and ecologically supportive planning.

Building Science Fundamentals : General features- Use of energy, materials, health and global environment, indoor air quality as related to the construction and operation of buildings.

UNIT-II

Green materials: Traditional and Recycled Materials in context of Sustainability

Green Design: Sustainable and conservation practices - water

conservation, harvesting and recharge - Traditional and Modern Methods sewerage treatment, solid waste treatment-Solid and Liquid Waste Management, (with special reference to energy efficiency, recycling and re-use) , economics and management

UNIT-III

Energy Auditing: Low energy design, hybrid systems, modeling and simulation of energy systems, integration of PV and wind systems in the building, wind solar and other non conventional energy systems, solar thermal applications for heating and cooling, electricity generation in buildings

UNIT IV

Overview of Green Building rating systems: USGBC, TERI-GRIHA and LEED rating systems

Case studies on specific contemporary sustainable practices: Case studies on green practices of abroad countries, Case studies on green practices in India countries,contemporary and famous examples of sustainable / energy efficient architecture / settlement planning across the world.

Books/Manuals:

1. Green homes : Efficient,Healthyand Smart by R.K .Gautham, BS publications,2009.
2. Sustainable Building Technical Manual - Green Building Practices for Design, Construction and Operations, US Green Building Council, 2011.
3. IGBC Green Homes - Rating System (Version 1.0) - Abridged reference guide, 2009.

LEARNING RESOURCES

REFERENCES:

1. *Green Building A Basic Guide to Building and Remodeling Sustainably; Tree Hugger Consulting.*
2. *Green Building Handbook, Volume 1, Tom Woolley, Sam Kimmins, Paul Harrison and RobHarrison; E & FN Spon, an imprint of Thomson Science & Professional.*

WEB REFERENCES:

WWW.IGBC.in

WWW.sbtmanual.in

ELECTIVE - I

IV/IV Year B.Tech.- Seventh Semester

CE - 414 /D

GROUND WATER DEVELOPMENT AND MANAGEMENT

Lectures / Tutorials :	*4 Periods/ week*	*Sessional Marks*	*: 40*
Semester End Exam. :	*3 Hours*	*Semester End Exam. Marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- To provide knowledge on groundwater availability and distribution in different types of rocks
- To demonstrate the groundwater movement and groundwater reservoir parameters
- To develop the skills needed for ground water investigation
- To teach the concept of artificial recharge of ground water
- To give an idea of groundwater management and conjunctive uses of ground water

Course Outcomes:

The student will be able to understand

- The location of availability of ground water and the relationship with the rock type.
- Assess the ground water movement and reservoir parameters
- Use of the different techniques of ground water investigation
- The GIS and its use in the artificial recharge of groundwater.
- The effective management of groundwater and conjunctive use

UNIT - I

Introduction : Ground Water Occurrence: Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention.

Ground Water Movement : Permeability, Darcy's law, storage coefficient, Transmissivity, differential equation governing ground water flow in three dimensions derivation, Ground water flow contours their applications.

UNIT - II

Analysis of Pumping Test Data : Steady flow towards a well in confined and unconfined aquifers - Dupit's and Theim's equations, Assumptions, Formation constants, yield of an open well interface and well tests. Unsteady flow towards a well - Non equilibrium equations - Theis solution - Jocob and Chow's simplifications, Leaky aquifers.

UNIT - III

Surface and Subsurface Investigation : Surface methods of exploration -Electrical resistivity and Seismic refraction methods. Subsurface methods - Geophysical logging and resistivity logging. Aerial Photogrammetry applications along with Case Studies in Subsurface Investigation.

Artificial Recharge of Ground Water : Concept of artificial recharge - recharge methods, relative merits. Applications of GIS and Remote Sensing in Artificial Recharge of Ground water along with Case studies.

UNIT - IV

Saline Water Intrusion in aquifer : Occurrence of saline water intrusions, Ghyben-Herzberg relation, Shape of interface, control of seawater intrusion.

Groundwater Basin Management

Concepts of conjunction use, Case studies.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS

1. *Groundwater by H.M. Raghunath, New Age International, 2008.*
2. *Ground water Hydrology by David Keith Todd, John Wiley & Sons, 1980*

REFERENCES:

1. *Fundamentals of Ground Water by Franklin W. Schwartz and Hubao Zhang, Wiley India Pvt.Ltd.,2012.*
2. *Groundwater System Planning & Management by R. Willis & W.W.G. Yeh, Printice Hall,1987.*

WEB REFERENCE:

http://www.fs.fed.us/biology/resources/pubs/watershed/groundwater/ground_water_technical_guide_fs-881_march2007.pdf

http://www.fs.fed.us/biology/resources/pubs/watershed/groundwater/ground_water_technical_guide_fs-881_march2007.pdf

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OPEN ELECTIVE

IV/IV Year B.Tech.- Seventh Semester

CE - 415 /A FINITE ELEMENT METHOD

Lectures / Tutorials : 4 Periods/Week		*Sessional marks*	*: 40*
Semester End Exam. : 3 Hours		*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- To introduce basic principles of solid mechanics and energy methods
- To explain the properties of one-dimensional and two-dimensional elements
- Evaluation of element stiffness matrix and nodal load vector
- Assemblage of element stiffness matrices and nodal load vectors to obtain global stiffness matrix and global load vector
- To solve the simultaneous equations of equilibrium
- Solution to one - and two- dimensional problems
- To extend the method to soil / rock mechanics and inviscid and incompressible fluid flows.

Course Outcomes:

- Learn the basic principles of solid mechanics and energy methods
- Know the properties of one-and two- dimensional elements
- Can evaluate element stiffness matrices and element load vectors
- Can obtain global stiffness matrix and nodal load vector
- Able to solve the simultaneous equations of equilibrium
- Able to obtain solutions to one- and two-dimensional problems
- Able to apply the method to soil / rock mechanics and inviscid and incompressible fluid flows

UNIT -I

The standard discrete system and origins of the finite element method

Introduction; The structural element and the structural system; Assembly and analysis of a structure ; The boundary conditions; Electrical and fluid networks ; The general pattern; The standard discrete system

A direct physical approach to problems in elasticity: plane stress

Introduction; Direct formulation of finite element characteristics; Generalisation to the whole region; Displacement approach as a minimization of total potential energy; Convergence criteria; Finite element solution process; Numerical examples

UNIT -II

Generalisation of the finite element concepts : Weighted residual methods - Integral or weak statements equivalent to the differential equations ; Approximation to integral formulations ; the Galerkin method ; Partial discretisation ; Convergence Variational principles - What are variational principles ? ; Natural variational principles and their relation to governing differential equations ; Establishment of natural variational principles for linear , self-adjoint , differential equations ; Maximum, minimum or saddle point.

UNIT -III

Standard and hierarchical element shape functions : Standard and hierarchical concepts; Rectangular elements - some preliminary considerations ; Completeness of polynomials ; Lagrange family ; Serendipity family Triangular element family ; Line elements

Mapped elements and numerical integration : Use of shape functions in the establishment of coordinate transformations ; Geometrical conformity of elements; Variation of the unknown function within distorted, Curvilinear elements - continuity requirements; Evaluation of element matrices - transformation in local natural and area/volume coordinates; Order of convergence for mapped elements ; Numerical integration - One-dimensional and two-dimensional ; Required order of numerical integration

UNIT -IV

Problems in linear elasticity : Governing equations; Finite element approximation; Displacements, strains and stresses; Numerical examples.

Field problems - Heat conduction, electric and magnetic potential and fluid flow

General quasi-harmonic equation; Finite element solution process; Partial discretisation - transient problems; Numerical examples - an assessment of accuracy

NOTE :

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK

1. *The finite element method - Its basis & Fundamentals by Zienkiewicz, Taylor and Zhu , 6th Edition, Elsevier India Private Ltd, 2007.*

REFERENCE BOOKS

1. *The finite element method in engineering by S. S.Rao, Butterworth-Heinemann, New Delhi, 1999.*
2. *Introduction to the finite element method by C.S. Desai and J.F.Abel, CBS Publishers and distributors, 1987.*

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OPEN ELECTIVE

IV/IV Year B.Tech.- Seventh Semester

CE - 415 /B REMOTE SENSING AND GIS

Lectures / Tutorials	*: 4 / Periods/Week*	*Sessional Marks*	*: 40*
Semester Exam .	*: 3 Hrs*	*Semester End Exam. Marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- To develop the fundamental concepts of GIS and remote sensing including the electromagnetic Spectrum, and nature of geospatial data.
- To make the student to understand the various Civil engineering applications of remote sensing.
- To familiarize s the students in the GIS based analytical and problem solving techniques for Sustainable planning and management of civil Engineering projects.

Course Outcomes:

- Understand the importance of Remote sensing and GIS application in civil engineering
- Students are familiarize with study and identification of satellite imageries
- Students are able to learn the soft skills by using GIS technologies

UNIT - I

Introductions to remote sensing;
Applications and importance of remote sensing
Basic concepts and fundamentals of remote sensing

Elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units, over view of Indian Remote sensing satellites and sensors.

UNIT - II

Image Interpretation : Energy resources, energy interactions with earth surface features and atmosphere, resolution, visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies.

Geographic Information System: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

UNIT - III

Data representation : Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS - Advantages and disadvantages. File management, Spatial data - Layer based GIS, Feature based GIS mapping.

GIS Analysis : GIS Spatial Analysis Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT - IV

Applications of GIS : Application areas and user segments; Guide lines for preparation of GIS; Applications of GIS for land use and housing management; Assessment of physical transformation in an urban area.

Water Resources Applications: Land use/Land cover in water resources, Surface water mapping and inventory, Watershed management for sustainable development. Reservoir sedimentation, Ground Water Targeting and Identification of sites for artificial Recharge structures.

NOTE:

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS :

1. *Remote Sensing and its applications by LRA Narayana, University Press 1999.*
2. *Principals of Geo physical Information Systems - Peter A Burragh and Rachael A. Mc Donnell, Oxford Publishers 2004.*

REFERENCE BOOKS :

1. *Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yeung, Prentice Hall, 2002.*
2. *Text Book of Remote Sensing and Geographical Information systems by M.Anji Reddy, 4th Edition, B.S.Publications,2012.*
3. *Geographic information Systems by Kang- tsung Chang, McGraw-Hill,2003.*
4. *Basics of Remote sensing & GIS by S.Kumar, USP,2005.*

WEB REFERENCE:

http://www.lib.vt.edu/subjects/maps/cartographic.html

http://blogs.esri.com/esri/gisedcom/2010/01/08/using-online-resources-to-teach-remote-sensing/

http://www.tec.army.mil/gis/

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OPEN ELECTIVE

IV/IV Year B.Tech.- Seventh Semester

ME - 415/A ROBOTICS

Lectures	*: 3 periods / week*	*Sessional Marks*	*: 40*
Tutorials	*: 1 period / week*	*Semester End Exam Marks*	*: 60*
Semester Exam	*: 3 hrs*	*Credits*	*: 3*

Course Objectives:

To provide an introduction to Robotics and Automation including robot classification, design and selection, analysis and applications in industry.

To provide the details of operations for a variety of sensory devices that are used on robot , the meaning of sensing, classification of sensor, that measure position, velocity & acceleration of robot joint.

The goal of the course is to familiarize the students with the concepts and techniques in robot manipulator control.

Learning Outcomes:

At the end of the course, students will be familiarized in basic components of robotics, classification of robots, robot grippers, Robot sensory devices, and transformations and kinematics of robot joints.

An ability to apply knowledge of geometry, linear algebra, and dynamics to complex mechanical systems.

An ability to design a robot mechanism to meet kinematics requirements.

An ability to formulate, and solve complex kinematics and dynamics problems in robotics

UNIT - I

Introduction to Robotics, major component of a robot, robotic like devices, classification of robots - Classification by coordinate system and by control method, Specifications of robots, fixed versus flexible automation, economic analysis, overview of robot application. (15)

UNIT - II

Robot End Effectors: Introduction, end effectors, interfacing, types of end effectors, grippers and tools, considerations in the selection and design of remote centered devices. (15)

UNIT - III

Robotic Sensory Devices : Objective, Non-optical position sensors - potentiometers, synchros, inductocyn, optical position sensors - opto interrupters, optical encoders (absolute & incremental)

Proximity Sensors : Contact type , non contact type - reflected light scanning laser sensors.

Touch & Slip Sensors : Touch sensors - proximity rod & photo detector sensors, slip sensors - Forced oscillation slip sensor, interrupted type slip sensors, force and torque sensors. [15]

UNIT - IV

Transformations and Kinematics: Objectives, homogenous coordinates, basic transformation operations, forward solution - Denavit Hartenberg procedure. Simple problems involving planar manipulators, inverse or backward solution - problems involved, techniques. (15)

LEARNING RESOURCES

TEXT BOOKS:

1. *Robotic Engineering by Richard D.Klafter, Prentice-Hall of India Pvt Ltd, 2010*
2. *Industrial Robotics by Mikell P. Groover, Tata McGraw-Hill Int. Edition 2, 2012*

REFERENCE BOOKS:

1. *Introduction To Robotics: Mechanics And Control, John J. Craig 3rd edition, pearson ,2008*
2. *Robotics: Control, Sensing, Vision, and Intelligence, K. S. Fu, R. C. Gonzales, and C. S. G. Lee, Tata McGraw-Hill, NY, 2008.*
3. *Introduction to Robotics: Analysis, Systems, Applications, Saeed B. Niku, Prentice Hall, NJ, 2010.*
4. *Robotics and control, R.K. Mittal, TMH, 2005.*

WEB REFERENCES:

http://nptel.iitm.ac.in/courses.php?branch=Mechanical
http://academicearth.org/courses/introduction-to-robotics

VIDEO REFERENCES

http://nptel.iitm.ac.in/video.php?courseId=1052

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OPEN ELECTIVE

IV/IV Year B.Tech.- Seventh Semester

ME - 415/B OPERATIONS RESEARCH

Lectures	*: 3 periods / week*	*Sessional Marks*	*: 40*
Tutorials	*: 1 period / week*	*Semester End Exam Marks*	*: 60*
Semester Exam	*: 3 hrs*	*Credits*	*: 3*

Course Objectives :

Grasp the methodology of OR problem solving.

Understand and differentiate deterministic/probabilistic/stochastic static/dynamic problem solving situations.

Develop formulation skills in building models and finding solutions. Understand the basics in the field of and game theory

Be able to interpret solutions on project planning through networks and simulation

Learning outcomes:

Develop linear programming models that consider the key elements of the real world problem

Interpret the models' solutions and infer solutions to the real-world problems.

Recognize and solve transportation, game theory and dynamic programming problems.

Know how project planning and when simulation can be applied to real-world problems.

UNIT I

Linear Programming : Definition and Scope of Operations Research, Mathematical formulation of the problem, graphical method, Simplex method, artificial basis technique, dual Simplex method. Degeneracy, alternative optima, unbounded solution, infeasible solution. [15]

UNIT II

Transportation Problem: Introduction to the problem, LP formulation of a transportation problem. Basic feasible solution by north-west corner method, Vogel's approximation method, least cost method. Finding optimal solution by MODI method, degeneracy, unbalanced transportation matrix and Maximization in transportation model. [8]

Assignment Problem: One to one assignment problem, optimal solutions, unbalanced assignment matrix, travelling sales man problem, maximization in A.P.

UNIT III

Theory of Games: Introduction, rectangular two person zero sum games, solution of rectangular games in terms of mixed strategies, solution of 2x2 games without saddle point, concept of dominance to reduce the given matrix, Graphical method for 2xn and nx2 games. [9]

Dynamic Programming: Introduction, Characteristics of D.P. model, the recursive equation approach, Computational Procedure in dynamic Programming, solution of an L.P. by D.P. [6]

UNIT IV

Project Planning through Networks: Introduction, Basic steps in PERT/ CPM techniques, Network diagram presentation, Rules of drawing network diagram, Fulkerson's rule, Time estimates and Critical path in network analysis, Project evaluation and review technique, Application areas of PERT/CPM techniques. [9]

Simulation: Introduction, Monte-Carlo Simulation, Application to Inventory Control, Application to Queuing Problems. [6]

LEARNING RESOURCES

TEXT BOOKS:

1. *SD Sharma, 'Operations Research (Units I,IV) Kedarnath, Ramnath & Co.,Meerut , 11th Edition , 2002..*
2. *BSGoel &S.K.Mithal,'Operations Research'(Units II,III) 'Pragathi Prakasham, Meerut, 2001.*

REFERENCES

1. *Optimization Theory and Applications - S.S. Rao , John Wiley & Sons , 1996.*
2. *Operations Research - Gupta and Hira , S Chand Publishers , 2011 Edition*

WEB REFERENCES:

http://www2.informs.org/Resources/
http://www.mit.edu/~orc/
http://www.ieor.columbia.edu/
http://www.universalteacherpublications.com/univ/ebooks/or/Ch1/origin.htm
http://www.wolfram.com/solutions/OperationsResearch/

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OPEN ELECTIVE

IV/IV Year B.Tech. - Seventh Semester

BT- 415/A BIOSENSORS & BIOELECTRONICS

Lectures	*: 3 Periods /week*	*Sessional Marks*	*: 40*
Tutorials	*: 1 Period / Week*	*Semester Examination Marks*	*: 60*
Semester Examination:	*3 hours*	*No. of credits*	*: 3*

Course Objectives:

Understand what biosensors are, their advantages and limitations.

Acquire knowledge of types and construction of Biosensors.

Gain knowledge and understanding of various types of transducers, their principles and applications.

Understand the construction and working of biosensors and their utilities in Industry, agriculture etc.

Understand the advantages of potential biomolecular computer.

Acquire knowledge and appreciate the development of molecular arrays as memory stores.

Acquire knowledge of assembly of photonic biomolecular memory store.

Understand and appreciate information processing and prospects for biomolecular computing systems.

Learning Outcomes:

Gained understanding of biosensors, their advantages and limitations.

Acquired knowledge of types and construction of Biosensors.

Gained knowledge and understanding of various types of transducers, their principles and applications.

Developed understanding of the construction and working of biosensors and their utilities in Industry, agriculture etc.

Appreciates the advantages of potential biomolecular computer.

Acquired knowledge of the development of molecular arrays as memory stores.

Acquired knowledge of assembly of photonic biomolecular memory store.

Developed understanding of information processing and prospects for biomolecular computing systems.

UNIT- I (15)

Introduction: Introduction to Biosensors, Advantages and Their Limitations, Various components; Biocatalysis based biosensors, Bioaffinity based biosensors and Microorganisms based biosensors; Biologically active material and analyte; Types of membranes used in biosensor constructions.

UNIT- II (15)

Transducers in Biosensors and Applications of Biosensors: Various types of transducers; Principles and applications- Colorimetric, Optical, Potentiometric, Amperometric, Conductometric, Resistometric, Piezoelectric, Semiconductor, Impedimetric, Mechanical and Molecular electronic based transducers. Chemiluminiscence based biosensors. Biosensors in clinical chemistry, medicine and health care; Biosensors for veterinary, agriculture and food; Low cost biosensors for industrial processes for online monitoring; Biosensors for environmental monitoring.

UNIT- III (15)

Molecular Electronics: Potential advantages and development towards a biomolecular computer; Development of Molecular arrays as a memory stores; Molecular wires and switches; Mechanisms of Unit assembly.

UNIT- IV (15)

Design for A Biomolecular Photonic Computer: Assembly of photonic Biomolecular memory store; Information Processing; Commercial prospects for Biomolecular computing systems.

LEARNING RESOURCES

TEXT BOOKS:

1. *Biotechnology the Science and Business, Moses V, Cape RE, Academic Publishers.*
2. *Biosensors for environmental Monitoring,Bilitewski U, Turner APF, Harwood.*
3. *Biosensors for Analytical Monitoring: EPA Biosensor Group, Rogers KR, Mascini M*

WEB REFERENCES

www.wikipedia.com
NPTEL Lectures

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OPEN ELECTIVE

IV/IV Year B.Tech. - Seventh Semester

BT - 415/B BIOMEDICAL INSTRUMENTATION

Lectures	*: 3 Periods /week*	*Sessional Marks*	*: 40*
Tutorials	*: 1 Period / Week*	*Semester Examination Marks*	*: 60*
Semester Examination: 3 hours		*No. of credits*	*: 3*

Course Objectives:

Acquire knowledge of the basic anatomy and physiology of various organ systems of human body viz., circulatory, nervous, musculo-skeletal, respiratory, reproductive etc.

Understand the homeostatic mechanisms of the body like maintenance of body temperature.

Acquire knowledge and understanding of the principles underlying the design of diagnostic equipments like ECG,EEG, EMG etc.

Understand the concepts of contact impedance and effects, electrodes used and their working.

Understand the transducers - types and characteristics

Understand the physiological pre-amplifier and specialized amplifiers.

Acquire knowledge of the built and working of X-ray machines.

Develop skills in troubleshooting and maintenance of X- ray machines.

Learning Outcomes:

. Gained insight into the working of various organ systems of human body.

Developed an understanding of homeostatic mechanisms of human body.

Acquired understanding of the principles and their application in the design of diagnostic equipments.

Developed knowledge of the concepts of contact impedance and working of electrodes.

Gained knowledge of the transducers, their types and characteristics.

Developed knowledge of amplifiers and their applications.

Gained understanding of the working of X-ray machines.

Developed skills in maintenance and repair of X-ray machines.

UNIT- I

Basic Anatomy and Physiology: Elementary ideas of cell structure, heart and circulatory system, Central nervous system, body temperature, musculo-skeletal system, Respiratory system, and reproductive system.

(10)

UNIT- II

Bioelectric equipment and Bioelectric signals: Equipment - diagnostic, therapeutic and clinical laboratory; Bioelectric signals (ECG, EOG, EEG, EMG, ERG) and their characteristics; Bioelectrodes, electrodes at tissue interface, contact impedance, effects of high contact impedance, types of electrodes - Electrodes for ECG, EEG, EMG. (12)

UNIT- III

Transducers for Biomedical Applications: Resistive transducers - Muscle force and Stress (Strain gauge), Spirometry (Potentiont) humidity, (Gamstrers), Respiration (Thermistor), Inductive Transducers - Flow measurements, muscle movement (LVDT), Capacitive Transducers - Heart sound measurement; Photoelectric Transducers - Pulse transducers, Blood pressure, oxygen Analyses; Piezoelectric Transducers - Pulse pickup, ultrasonic blood flowmeter; Chemcial Transducer - Ag-Agfallas (Electrodes, PH electrode, Bioelectric Signal recording machines); Physiological pre-amplifier and specialized amplifiers, ECG lead systems details of ECG, EMG, and EEG machines. (16)

UNIT- IV

X-ray Machines and Safety aspects of Medical equipment: Basic X-Ray components and circuits, types of X-ray machines e.g. general purpose, dental image intensifier system; trouble shooting and maintenance of X- Ray machine; biological effects of X-rays and precautions. Gross current, Micro Current shock, safety standards and considerations, safety testing instruments. (8)

LEARNING RESOURCES

TEXT BOOKS

1. *Medical Instrumentation by John. G. Webster -John Wiley*
2. *Principles of Applied Biomedical Instrumentation by Goddes& Baker - John Wiley*
3. *Biomedical Instrument by Cromwell-Prentice Hall of India, New Delhi*
4. *Hand book of Medical instruments by R.S. Khandpur -TMH, New Delhi*

REFERENCE BOOKS

1. *Biomedical Instrumentation & Measurement by Carr & Brown-Pearson*
2. *Medical Electronics and Instrumentation by Sanjay Guha - University Publication*
3. *Introduction to Biomedical electronics by Edwand J. Bukstein - Sane and Co. Inc. USA*

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OPEN ELECTIVE

IV/IV Year B.Tech. - Seventh Semester

ChE - 415/A ENERGY ENGINEERING

Lectures	*: 3 periods / week*	*Sessional Marks*	*: 40*
Tutorials	*: 1 period*	*Semester End Exam Marks*	*: 60*
Semester End Exam	*: 3 hrs*	*Credits*	*: 3*

Course Objectives

To provide the knowledge about formation, classification, ranking, analysis, testing, carbonization, gasification and liquification of coal, manufacture of cock.

To provide the knowledge about design, occurrence, composition, classification, exploration and production of petroleum, refining, testing and analysis of petroleum products.

To provide knowledge about the non conventional energy courses and its storage

To provide knowledge about the energy related problems in the world and its solutions.

Learning Outcomes:

An ability to understand the importance of environment and conservation of natural resources.

An ability to succeed in the competitive exams of energy industry.

An ability to utilize the non conventional energies in place of conventional energies and its manufacture.

An ability to maintain the sustainability in the environment.

UNIT - I (15)

Conventional energy resources, the present scenario, scope for future development.

Coal: Origin, occurrence and reserves, classification, ranking, analysis and testing, coal carbonization, manufacture of coke, coal gasification, coal liquefaction.

UNIT - II (15)

Petroleum: Origin, occurrence and reserves, composition, classification, characteristics, exploration and production.

Petroleum Refining: Refinery processes, petroleum products, testing and analysis of petroleum products.

UNIT - III (15)

Non conventional energy sources: Solar energy, solar radiation, principles of heating and cooling, photo voltaic cells.

Bio gas products, bio-mass, wind energy, hydrogen energy, geothermal and ocean thermal energy, fuel cells.

UNIT - IV (15)

Energy storage, mechanical energy storage, water storage, solar pond, phase change storage, chemical storage.

Energy Conservation: Conservation methods in process industries, Theoretical analysis, practical limitations, equipment for energy saving / recovery.

LEARNING RESOURCES

TEXT BOOKS:

1. *Conventional Energy technology by S.B.Pandy, Tata McGraw Hill (1987)*
2. *Fuel Science by Harker and Allen,Ist edition , Oliver & Boyd (1972).*
3. *Principles of Energy conversion by Culp, Mc Graw Hill(1991)*

REFERENCE BOOKS:

1. *Hand book of Energy Technology by Considine D. M,McGraw Hill(1977).*
2. *Fuels and energy by Harker and Backhusst, Academic press (1981)*
3. *Solar Energy Thermal Process by John A Duffie, John Wiley & Sons Inc (1975).*

WEB REFERENCES

www.wikipedia.com
NPTEL Lectures

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OPEN ELECTIVE

IV/IV Year B.Tech.- Seventh Semester

ChE - 415/B BIOFUELS

Lectures	*: 3 periods / week*	*Sessional Marks*	*: 40*
Tutorials	*: 1 period*	*Semester End Exam Marks*	*: 60*
Semester End Exam	*: 3 hrs*	*Credits*	*: 3*

Course Objectives

To provide the knowledge about properties, composition, features of biofuels and uses of biomass and their environmental impacts.

To provide the students a substantial knowledge of biofuel production technologies.

To provide knowledge about the process of biogas production and methods of production of biodiesel and comparison of the standards to the conventional diesel.

To provide knowledge about the production of lipids, bio hydrogen from different bacteria and algae.

Learning Outcomes

An ability to describe the functional principle of biofuel technologies in small and large scale.

An ability to describe the main steps and components in bioethanol, biodiesel and biogas production.

An ability to Participate actively in teamwork and work with case related problem solving.

An ability to work with professional problem solving in an industrial environment.

UNIT - I (15)

Introduction:

Sources of energy, introduction of biofuels, availability of bio mass, composition of biomass, terrestrial biomass, aquatic biomass.Physical and chemical properties of biomass.useful features of biofuels, undesirable features of biofuels, energy crops, modes of utilization of biomass and their environmental impacts.

UNIT - II (15)

Biogas: The substrate, the digester, the microorganisms, the process of bio gas production, factors affecting bio gas yields, advantages, disadvantages.

Bioethanol : Bioethanol vs. Petrol, production of bio ethanol, ethanol recovery.Bio butanol.

UNIT -III (15)

Bio diesel: Sources of lipids, production of lipids, methods of production of bio diesel, comparison of bio diesel with conventional diesel.Standards of bio diesel.

UNIT - IV (15)

Bio hydrogen: Production of bio hydrogen from anaerobic bacteria, photosynthetic algae, photosynthetic-hydrogenase system.

Fuel cells: Enzymatic fuel cells, microbial fuel cells.

LEARNING RESOURCES

TEXT BOOK:

1. *Bio Technology - Expanding horizons, B.D.Sing, Kalyani Publishers, Ludhiana.*

REFERENCE BOOKS:

1. *Fundamentals of Renewable Energy Systems, D.Mukherjee, S.Chakrabarti, New Age International Publishers.*
2. *A Text Book of Biotechnology, R.C.Dubey, S.Chand & Company Ltd., New Delhi.*
3. *Non-Conventional Energy Sources, G.D.Rai, Khanna Publishers.*

WEB REFERENCES

www.wikipedia.com
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OPEN ELECTIVE

IV/IV Year B.Tech.- Seventh Semester

CS -415/A JAVA PROGRAMMING

Lectures	*: 3 periods/week*	*Internal Marks*	*: 40*
Tutorials	*: 1 period/week*	*Semester End Exam Marks*	*: 60*
Sem End Exam Duration	*: 3 hours*	*Credits*	*: 3*

Course Objectives

Understand the syntax of the java and Write simple Java applications using control statements like if, if-else etc..

Understand Object oriented Programming Principles like encapsulation, inheritance, and polymorphism in java.

Understand how to use classes, methods and objects. Learn inheritance, Interfaces and packages.

Manipulate the String & StringBuffer, Date, Collection, Enumeration, and Wrapper classes.

Understand the exception handling mechanism in java.

Understand the Threading mechanism in java and creating multiple threads, demonstrate the deadlock situation and inter thread communication.

Under stands the I/O streams in java and use the classes Streams, Byte streams, Character streams, File class, File stream.

Understand and implement Applets and use Graphics class.

Understand the event handling mechanism & difference between AWT and Swing components.

Understand the concept of database connectivity and write database applications with java.

Understand the concept of java basic networking principles.

Learning Outcomes

Familiar the syntaxes and semantics of java programming language.

Understanding the concepts of OOPs; create new classes, methods, objects.

Study the predefined packages, and define user defined packages and Interfaces.

Implement the String and String Buffer, Date, Enumerations, and wrapper classes.

Define own exception classes that may be needed in the application development.

Write multitasking applications with threads and able to detect deadlock situations.

Develop applets for internet applications

Develop applications that are based on event driven programming.

Design more efficient GUI applications with java.awt.

Develop GUI applications with javax.swing. Packages.

Ability to develop the Database Applications with java.sql.

Design Networking applications such TCP and UDP with java.net.

UNIT-I (16)

Introduction: Introduction to java, java buzzword, data types, dynamic initialization, scope and life time, operators, control statements, arrays, type conversion and casting, finals & blank finals.

Classes and Objects : Concepts, methods, constructors, usage of static, access control, this key word, garbage collection, overloading, parameter passing mechanisms, nested classes and inner classes.

Inheritance: Basic concepts, access specifiers, usage of super key word, method overriding, final methods and classes, abstract classes, dynamic method dispatch, Object class.

UNIT-II (14)

Interfaces: Differences between classes and interfaces, defining an interface, implementing interface, variables in interface and extending interfaces.

Packages: Creating a Package, setting CLASSPATH, Access control protection, importing packages.

Exception Handling: Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, Built-in exceptions, creating own exception sub classes.

UNIT-III (15)

Strings: Exploring the String class, String buffer class, Command-line arguments.

Library: Date class, Wrapper classes.

Multithreading : Concepts of Multithreading, differences between process and thread, thread life cycle, Thread class, Runnable interface, creating multiple threads, Synchronization, thread priorities, inter thread communication, daemon threads, deadlocks.

I/O Streams: Streams, Byte streams, Character streams, File class, File streams.

UNIT-IV (15)

Applets: Concepts of Applets, life cycle of an applet, creating applets, passing parameters to applets, accessing remote applet, Color class and Graphics

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling events.

AWT: AWT Components, windows, canvas, panel, File Dialog boxes, Layout Managers, Event handling model of AWT, Adapter classes, Menu, Menu bar.

LEARNING RESOURCES

TEXT BOOK:

1. *The Complete Reference Java J2SE 7th Edition, Herbert Schildt, TMH Publishing Company Ltd, NewDelhi.*

REFERENCE BOOKS :

1. *Big Java 2nd Edition, Cay Horstmann, John Wiley and Sons,Pearson Edu.(UNIT-IV)*
2. *Beginning in Java 2, Iver Horton, Wrox Publications.*
3. *Java, Somasundaram, Jaico.*
4. *Introduction to Java programming, By Y.Daniel Liang,Pearson Publication*

WEB REFERENCES

www.wikipedia.com
NPTEL Lectures

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OPEN ELECTIVE

IV/IV Year B.Tech.- Seventh Semester

CS - 415/B DATABASE MANAGEMENT SYSTEMS

Lectures	*: 3 periods/week*	*Internal Marks*	*: 40*
Tutorials	*: 1 period/week*	*Semester End Exam Marks*	*: 60*
Sem End Exam Duration : 3 hours		*Credits*	*: 3*

Course Objectives:

To understand the fundamental concepts, historical perspectives, current trends, structures, operations and functions of different components of Databases.

To understand the structural constraints of relationships

To understand the types of integrity constraints in a relational database system.

To understand the concepts provided by Relational Algebra, Relational Calculus and SQL and able to specify queries on any database using them.

To recognize the importance of data base analysis and design in the implementation of any database application.

To understand how to perform the normalization process of relations before implementation.

To understand the primary file organizations and index structures used by different database systems.

To describe the role of transaction processing in a database system

To understand various concurrency control mechanisms for a database system

To describe the roles of recovery and security in a database system.

Learning Outcomes:

An understanding of basic concepts and current trends of different database systems

An understanding of various database system architectures

An ability to enforce various integrity constraints

An ability to write relational algebra and Relational calculus expressions

An ability to use Standard Query Language and its various versions.

An ability to design and develop a database that is in specified normal form.

An understanding of the Importance of transaction processing

An ability to use different concurrency control techniques while implementing real time applications

An understanding of the importance of backup and recovery techniques.

An ability to build Database systems that can handle real world problems.

UNIT-I

Databases and Database Users: Introduction - An Example - Characteristics of the Database Approach - Actors on the Scene - Workers behind the Scene - Advantages of Using the DBMS Approach

Database System Concepts and Architecture: Data Models, Schemas, and Instances - Three-Schema Architecture and Data Independence - Database Languages and Interfaces

Data Modeling Using the Entity-Relationship (ER) Model: Using High-Level Conceptual Data Models for Database Design - An Example Database Application - Entity Types, Entity Sets, Attributes, and Keys - Relationship Types, Relationship Sets, Roles, and Structural Constraints - Weak Entity Types (15)

UNIT-II

The Relational Data Model and Relational Database Constraints: Relational Model Concepts - Relational Model Constraints and Relational Database Schemas - Update Operations, Transactions, and Dealing with Constraint Violations - Relational Database Design Using ER-to-Relational Mapping

SQL-99 : Schema Definition, Constraints, Queries, and Views: SQL Data Definition and Data Types - Specifying Constraints in SQL - Schema Change Statements in SQL - Basic Queries in SQL - More Complex SQL

Queries - INSERT, DELETE, and UPDATE Statements in SQL - Views (Virtual Tables) in SQL (15)

UNIT-III

Functional Dependencies and Normalization for Relational Databases: Informal Design Guidelines for Relation Schemas - Functional Dependencies - Normal Forms Based on Primary Keys - General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form Database Security: Introduction to Database Security Issues - Discretionary Access Control Based on Granting and Revoking Privileges - Mandatory Access Control. (15)

UNIT-IV

Introduction to Transaction Processing Concepts and Theory:

Introduction to Transaction Processing - Transaction and System Concepts - Desirable Properties of Transactions

Concurrency Control Techniques: Two-Phase Locking Techniques for Concurrency Control - Concurrency Control Based on Timestamp Ordering

Database Recovery Techniques: Recovery Concepts - Recovery Techniques Based on Deferred Update - Recovery Techniques Based on Immediate Update - Shadow Paging (15)

LEARNING RESOURCES

TEXT BOOK:

1. *Fundamentals of Database Systems, Ramez Elmasri and Navate, Pearson Education, 5th edition.*

REFERENCE BOOKS:

1. *Introduction to Database Systems, C.J.Date, Pearson Education.*
2. *Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition*
3. *Data base System Concepts, Silberschatz, Korth, McGraw hill, 5th edition.*

WEB REFERENCES

www.wikipedia.com
NPTEL Lectures

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OPEN ELECTIVE

IV/IV Year B.Tech.- Seventh Semester

EC - 415/A APPLIED ELECTRONICS

Lectures	*: 3 periods / week*	*Sessional Marks*	*: 40*
Tutorials	*: 1 period / week*	*University Exam Marks*	*: 60*
University Exam	*: 3 hrs*	*Credits*	*: 3*

Course Objectives:

To Understand about various modern electronic systems.

To provide clear explanation of the operation of all the important electronic devices and systems available.

To know about modern audio and video systems.

To knoew about various Telecommunication Systems.

Learning Outcomes:

To Know about various electronic gadgets and their operation.

Can be able to design various equipment used in the electronic systems.

UNIT -I (Text Book1) Microphones, Headphones and Headsets, Loud Speakers, Disc Recording and Reproduction , Amplifying Systems Equalizers and Mixers,
Electronic Music Synthesizers. (15)

UNIT-II (Text Book1)
Commercial Sound, Theatre Sound System, Audio Systems , Color TV standards and Systems, Remote Controls, Video Systems. (15)

UNIT-III (Text Book1)
Electronic Gadgets and Home Appliances:
Telecommunication Systems, Switching Systems, Modulation Techniques,
Carrier Systems, Fibre Optics (15)

UNIT-IV (Text Book1)
Data Services, Mobile Systems, Facsimile fax, Xerography (15)

LEARNING RESOURCES

TEXT BOOKS:

1. *Consumer Electronics by S.P.Bali, Pearson Education, ISBN: 9788131717592.*

REFERENCE BOOKS:

1. *Consumer Electronics for Engineers by Philip Herbert Hoff, Cambridge University Press (July 28, 1998), ISBN-10: 0521582075*
2. *Digital Consumer Electronics Handbook by Ronald K.Jurgen, (Editor) by McGraw Hill Professional Publishing, 1997. ISBN-10: 0070341435*

WEB REFERENCES:

http://www.newagepublishers.com/samplechapter/000969.pdf

http://www.bits-pilani.ac.in:12354/qp1-9-10/EEE_C414_851_C_2009_1.pdf
3.http://nptel.iitm.ac.in

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OPEN ELECTIVE

IV/IV Year B.Tech.- Seventh Semester

EC - 415/B BASIC COMMUNICATION

Lectures	*: 3 periods / week*	*Sessional Marks*	*: 40*
Tutorials	*: 1 period / week*	*University Exam Marks*	*: 60*
University Exam	*: 3 hrs*	*Credits*	*: 3*

Course Objectives

To Understand an overview of communication systems.

To Understand the modulation technique,need of modulation,Amplitude modulation.

To understand fundamentals of digital communications

To understand broadband communication systems and Television fundamentals.

Course Outcomes:

Can decide the type of modulation techniques required for a specific application.

Can know about various communication systems.

Can know about the Television fundamentals.

UNIT -I (Text Book 1)

Communications: Communications systems, Information, Transmitter, Channel - noise, Receiver, Modulation, Description, Need for modulation, Bandwidth Requirements, Frequency spectra of nonsinusoidal waves.

Amplitude Modulation: Amplitude Modulation Theory, Frequency spectrum of the AM wave, Representation of AM, Power relations in the AM wave, Generation of AM, Basic requirements - comparison of levels, Grid - modulated class C amplifier, Plat - modulated class C amplifier, Modulated transistor amplifiers, System summary. (15)

UNIT -II (Text Book 1)

Digital Communications: Digital Technology, Digital fundamentals, The binary number system, Digital electronics, Fundamentals of Data

Communications Systems, The emergence of data communications systems, Characteristics of data transmission circuits, Digital codes, error detection and correction, Data Sets and Interconnection Requirements, Modem classification, Modem interfacing, Interconnection of data circuits to telephone loops, Network and Control Considerations, Network organization, Switching systems, network protocols, Summary. (15)

UNIT -III (Text Book 1)

Broadband Communications Systems: Multiplexing, Frequency division multiplex, Time - division multiplex, Short and Medium - Haul Systems, Coaxial Cables, Fiber optic links, Microwave links, tropospheric Scatter links, Long Haul Systems, Submarine cables, Satellite Communications, Elements of Long-Distance Telephony, Routing codes and signaling systems, Telephone exchanges (switches) and routing, Miscellaneous practical aspects, Introduction to traffic engineering. (15)

UNIT -IV (Text Book 1)

Television Fundamentals : Requirements and Standards, Introduction to television, Television systems and standards, Black and White Transmission, fundamentals, Scanning, Banking and synchronizing pulses, Black and white Reception, Fundamentals, Common, video and sound circuits, Synchronizing circuits, Vertical deflection circuits, Horizontal deflection circuits, Color Transmission and Reception, Introduction, Color transmission, Color reception. (15)

LEARNING RESOURCES

TEXT BOOKS:

1. George Kennedy, Tata McGraw-Hill Publishing , 3rd Edition

REFERENCE BOOKS:

1. Introduction to Analog and Digital Communication, Simon Hykin S

WEB REFERENCES:

http://web.engr.oregonstate.edu/~magana/ECE461-561/index.htm
http://www.ensc.sfu.ca/~jiel/courses/327/index.html
http://www.ece.utah.edu/~npatwari/ece5520/lectureAll.pdf
http://nptel.iitm.ac.in/syllabus/syllabus.php?subjectId=117105077

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OPEN ELECTIVE

IV/IV Year B.Tech.- Seventh Semester

IT- 415/A WEB TECHNOLOGIES

Lectures	*: 3 periods/week*	*Internal Marks*	*: 40*
Tutorials	*: 1 period/week*	*Semester End Exam Marks*	*: 60*
Sem End Exam Duration: 3 hours		*Credits*	*: 3*

Course Objectives

Describe the basic infrastructure and architecture of the Internet, including the main protocols.

Write a valid XHTML document involving a variety of element types, including hyperlinks, images, lists, tables, and forms.

Use CSS to implement a variety of presentation effects in XHTML and XML documents, including explicit positioning of elements

Understand the need of scripting language, accessing XHTML elements using DOM, dynamic styles, validating user inputs, events for user interactions.

Understand the need of XML documents, XML DTDs differ from XML schemas, discuss ways in which an XSL transform differs from processing an XML document using a DOM API.

Learning Outcomes:

After completion of the course, student posses:

Understands the basic infrastructure and architecture of the Internet, including the main protocols.

Ability to create static XHTML web pages and to apply style sheets for uniform look and feel for web pages using CSS.

Ability to write client side scripting using JavaScript, understand how to construct programs modularly with functions, concept of arrays, and understand the object-based programming terminology.

Ability to use scripting for creation of dynamic web pages, accessing elements using DOM, user interactions with events.

Ability to create valid XML documents using DTDs & XML Schemas, providing styles to XML documents using XSL, and understand the importance of RSS feeds in the modern web.

UNIT- I (13)

Fundamentals: A Brief introduction to the Internet, The World Wide Web, Web Browsers, Web Servers, Uniform Resource Locators, Multipurpose Internet Mail Extensions, The HTTP.

Introduction to XHTML: Origins and evolution of HTML, and XHTML, Basic Syntax, Standard XHTML, Document structures, Basic Text markup, images, hypertext links, lists, tables, forms, frames, syntactic differences between HTML & XHTML.

UNIT - II (17)

Cascading Style Sheets (CSS): introduction, levels of style sheets, style specification formats, selector forms, property value forms, font properties, list properties, color, alignment text, The Box model, Background images, the span and div tags.

The Basics of JavaScript: Overview of JavaScript, Object orientation and JavaScript, General Syntactic characteristics, primitives, operations and expressions, Screen output and keyboard input, control statements.

UNIT - III (15)

JavaScript : Object creation and modification, Arrays, Functions, An Example, Constructors, Pattern matching using regular expressions, Errors in scripts.

JavaScript and HTML Documents: The JavaScript Execution Environment, The Document Object Model, Element accessing in JavaScript, Events and Event Handling, Handling Events from Body elements, Handling events from Button elements, Handling Events from Text boxes and password elements, The DOM 2 Event model, The Navigator object.

UNIT - IV (15)

Dynamic Documents with JavaScript: Introduction, Element Passing, Moving Elements, Element Visibility, Changing colors and Fonts, Dynamic Content, Stacking Elements, Locating the mouse cursor, Reacting to mouse click, slow movement of elements, dragging and dropping elements.

Introduction to XML: Introduction, The syntax of XML, XML document structure, Document Type Definition, Namespaces, XML Schemas, Displaying Raw XML documents, displaying XML documents with CSS, XSLT Style sheets.

LEARNING RESOURCES

TEXT BOOKS:

1. *Robert W. Sebesta "Programming the World Wide Web", 4/e Pearson Education.*

REFERENCES:

1. *Harvey M. Deitel and Paul J. Deitel, "Internet & World Wide Web How to Program", 5/e, Pearson Education.*
2. *Jeffrey C. Jackson "Web Technologies A computer Science Perspective" Pearson Education.*
3. *Jason Cranford Teague "Visual Quick Start Guide CSS, DHTML & AJAX", "Pearson Education.*

Web References

www.wikipedia.com

NPTEL Lectures

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OPEN ELECTIVE

IV/IV Year B.Tech.- Seventh Semester

IT - 415/B SOFTWARE ENGINEERING

Lectures	*: 3 periods/week*	*Internal Marks*	*: 40*
Tutorials	*: 1 period/week*	*Semester End Exam Marks*	*: 60*
Sem End Exam Duration	*: 3 hours*	*Credits*	*: 3*

Course Objectives:

To make the students learn about the basic concepts on Software Engineering Methods and Practices and their appropriate application in Software industry.

To develop an understanding of Software Process Models and Software Development Life Cycle.

To provide an idea on Software testing techniques.

To teach an understanding role of the different aspects of Software Project Management.

To develope an approach on ethical and professional issues those are important for software Project Management.

Course Outcomes:

Capabilities to identify, formulate, and solve Software Engineering problems.

Be able to elicit, analyze and specify software requirements with various stakeholders of a software development project.

Ability to participate in design, development, deployment and maintenance of a medium scale software development project.

Knowledge to convey technical material through oral presentation and interaction with an audience.

Ability to evaluate the impact of potential solutions to software engineering problems in a global society, using the knowledge of models, tools, and techniques.

UNIT - I (15)

Introduction to Software Engineering: The Evolving Role of Software, the Changing Nature of Software, Legacy Software.

A Generic View of Process : A Layered Technology, A Process Framework.

Process Models : The Waterfall Model, Incremental Process Models, Evolutionary Models

An Agile View of Process : What is Agility? What is an Agile Process?

UNIT - II (20)

Software Engineering Practice: Software Engineering Practice, Communication Practices, Planning Practices, Modeling Practices, Construction Practice, Deployment.

System Engineering: Computer Based Systems, The System Engineering Hierarchy, Business Process Engineering: an overview, Product Engineering: an overview.

Requirements Engineering: Requirements Engineering Tasks, Initiating the Requirements Engineering Process.

UNIT - III (15)

Building the Analysis Model: Requirements Analysis, Analysis Modeling Approaches, Data Modeling Concepts, Flow-Oriented Modeling, Class Based Modeling.

Design Engineering: Design within the Context of Software Engineering, Design Process and Design Quality, Design Concepts.

UNIT - IV (15)

Software Quality Assurance: Quality Concepts, Quality Movement.

Testing Tactics : Software Testing Fundamentals, Black-Box Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, OO Testing Methods.

LEARNING RESOURCES

TEXT BOOKS :

1. *Roger S.Pressman, 'Software Engineering- A Practitioner's Approach', Sixth Edition, McGraw- Hill International.*

REFERENCE BOOKS :

1. *Ian Sommerville, 'Software Engineering', Sixth Edition, Pearson Education.*
2. *Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, 'Fundamentals of Software Engineering', Second Edition, PHI.*
3. *Rajib Mall, 'Fundamentals of Software Engineering', Second Edition, PHI.*

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OPEN ELECTIVE

IV/IV Year B.Tech.- Seventh Semester

EE - 415/A RENEWABLE ENERGY SOURCES

Lectures	*: 3 periods / week*	*Sessional Marks*	*: 40*
Tutorials	*: __ period / week*	*Semester End Exam Marks*	*: 60*
Semester End Exam	*: 3 hrs*	*Credits*	*: 3*

Course Objectives

To know the depletion rate of conventional energy resources and importance of renewable energy resources.

To know alternate viable energy sources to meet the energy requirements.

To discuss about solar energy, wind energy, tidal energy and geothermal energy as alternate resources.

Learning Outcomes:

The student will be able to

Know the National scene of energy production, utilization, consumption and reserves.

Appreciate the need for non-conventional energy sources.

Understand relative advantages and disadvantage of various non-conventional energy sources.

Understand basic heat transfer principle, storage methods available, working and construction related to solar collectors.

Understand the assessment of wind energy potential, wind turbines and wind generators.

Know about ocean energy, geo thermal energy and bio energy.

UNIT-I (Text Book- 1)

Principle of Renewable Energy: Comparison of renewable and conventional energy sources - Ultimate energy sources - natural energy currents on earth - primary supply to end use - Spaghetti & Pie diagrams - energy planning - energy efficiency and management. (9)

UNIT-II (Ref. Book- 2)

Solar Radiation: Extra terrestrial solar radiation - terrestrial solar radiation - solar thermal conversion - solar thermal central receiver systems - photovoltaic energy conversion - solar cells - 4 models. (11)

UNIT-III (Text Book- 1, Ref. Book- 2)

Wind energy: Planetary and local winds - vertical axis and horizontal axis wind mills - principles of wind power - maximum power - actual power - wind turbine operation - electrical generator. (13)

UNIT-IV (Ref. Book- 1)

Energy from Oceans: Ocean temperature differences - principles of OTEC plant operations - wave energy - devices for energy extraction - tides - simple single pool tidal system.

Geothermal Energy: Origin and types - Bio fuels - classification - direct combustion for heat and electricity generator - anaerotic digestion for biogas - biogas digester - power generation. (16)

LEARNING RESOURCES

TEXT BOOKS:

1. *Renewable Energy Sources by John Twidell& Toney Weir : E&F.N. Spon*
2. *Renewable Energy Sources: Their impact on global warming and pollution by Abbasi & Abbasi -PHI*

REFERENCE BOOKS:

1. *Power plant technology by EL-Wakil, McGraw-Hill*
2. Non-Conventional Energy Sources by G.D.Rai, Khanna Pub.

WEB REFERENCES:

http://www.tn.gov.in/spc/tenthplan/CH_11_2.PD
http://bieap.gov.in/Nonconventionalenergysourses
http://www.em-ea.org/Guide%20Books/book-4/4.12App%20of%20Non%20conventional

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OPEN ELECTIVE

IV/IV Year B.Tech.- Seventh Semester

EE - 415/B UTILIZATION OF ELECTRICAL ENERGY

Lectures	*: 3 periods / week*	*Sessional Marks*	*: 40*
Tutorials	*: __ period / week*	*Semester End Exam Marks*	*: 60*
Semester End Exam	*: 3 hrs*	*Credits*	*: 3*

Course Objectives

To make students to learn the usage of electrical energy for various applications such as illumination, heating, welding etc.

To provide specific knowledge on Principles and characteristics of storage batteries

Learning Outcomes:

After completing this course, students will be able to:

Know to utilize the electrical energy for production of heat and welding process

Design heating elements such as furnaces and ovens

Know the lighting calculations for different kinds of applications Gain knowledge on storage cells

UNIT - I (Text Book- 1)

Illumination : Introduction- terms used in illumination-laws of illumination- Gas discharge lamps - Fluorescent lamps - Arc lamps - Filament lamps - comparison between filament and fluorescent lamps-square law methods of calculation - Factory lighting - flood lighting and street lighting-design of lighting schemes-introduction to Compact Fluorescent Lamps.

(12)

UNIT - II (Text Book- 1)

Electric Heating: Introduction; Modes of heat transfer - Stefan's law - classification of electric heating methods- design of heating element - Construction and working of different types of induction furnaces - resistance furnace - Dielectric heating - arc furnaces . (13)

UNIT - III (Text Book- 1)

Welding: Introduction- Types of welding - resistance and arc welding - Characteristics of Carbon and metallic arc welding - comparison

(Excluding electronic controls)- requirements of good weld-ultra sonic-electron beam-laser beam welding. (10)

UNIT - IV (Text Book - 2)

Storage batteries: Applications-rating-classification-dry cell and wet cells-primary and secondary cells-charging and discharging of lead acid cells, trickle charging-methods of charging lead acid batteries-over discharging-common troubles with lead acid batteries and remedies-Nickel cadmium batteries . (10)

LEARNING RESOURCES:

TEXT BOOKS :

1. *Utilization Electric Power and electric traction by J.B. Gupta, publishers-Katson books*
2. *Utilization, generation & conservation of electrical energy by Sunil S Rao, Khanna publishers.*

REFERENCE BOOKS:

1. *Art and Science of Utilization of Electrical Energy by Partab H Dhanpat Rai and Sons, New Delhi. Second edition*
2. *A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U. S. Bhatnagar and A Chakraborti, Dhanpat Rai & Co. Pvt. Ltd., 2001.*

WEB REFERENCES:

. http://nptel.iitm.ac.in/video.php?subjectId=108105060

http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Illumination%20Engg/New_index1.html

www.bee-india.org

www.eia.doe.gov

www.irfca.org

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ELECTIVE - II

IV/IV Year B.Tech.- Seventh Semester

CE - 416 /A
DESIGN AND DRAWING OF HYDRAULIC STRUCTURES

Lectures / Tutorials : 4 Periods/Week		*Sessional marks*	*: 40*
Semester End Exam. : 3 Hours		*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course Objectives:

The main objective of the course is to study the theory, design and drawing of the following irrigation structures:

- Irrigation canal
- Notch type canal drop
- Canal regulator
- Vertical drop weir on permeable foundations
- Direct sluice
- Surplus weir of a tank
- Type III Aqueduct and
- Ogee spillway profile

Course Outcomes:

- At the end of the course the student will be able to Design and draw the following irrigation structures with the given data:
- Irrigation canal
- Notch type canal drop
- Canal regulator
- Vertical drop weir on permeable foundations
- Direct sluice
- Surplus weir of a tank

7. Type III Aqueduct and

- Ogee spillway profile

Design and Drawing of the Following

UNIT - I

1. Irrigation canal.
2. Canal drop - Notch type.
3. Cross regulator.
4. Vertical drop weir on permeable foundations.

UNIT - II

5. Direct sluice.
6. Surplus weir of a tank.
7. Syphon Aqueduct (Type - III).
8. Profile of a Ogee spillway.

NOTE

Only elevation and section of structures need to be drawn.

Two questions of 30 marks each will be given from each unit out of which one is to be answered.

LEARNING RESOURCES

TEXT BOOK

1. *Water Resources Engineering - Principles and Practice by C. Satyanarayana Murthy; New age international publishers, New Delhi, 2003.*

REFERENCE BOOKS

1. *Irrigation and Water Power Engineering by B.C.Punmia and Pande B.B. Lal, 16th Edition, Laxmi Publications, New Delhi, 2009.*
2. *Irrigation Engineering and Hydraulic Structures by S.K. Garg, Khanna Publishers, 2011.*

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ELECTIVE-II

IV/IV Year B.Tech.- Seventh Semester

CE - 416 /B BRIDGE ENGINEERING

(Using Working Stress Method)

Lectures / Tutorials : 4 Periods/Week	*Sessional marks : 40*
Semester End Exam. : 3 Hours	*Semester End Exam. marks : 60*
	Credits : 4

Course Objectives:

- To explain various investigations to be conducted before constructing a bridge
- To introduce various types of RC bridges and IRC loadings
- To design slab culvert and T-beam bridge
- To design substructure for bridges
- To explain various types of bearings and design of elastometric bearing
- To explain various types of foundations and design of well foundation

Course Outcomes:

- Learn about the various investigations to be conducted before constructing a bridge
- Know about various types of RC bridges and IRC loadings
- Able to design slab culvert and T-beam bridge
- Able to design substructure like piers and abutments
- Know various types of bearings and able to design elastometric bearing
- Know the various types foundations used for bridges and able to design well foundation

UNIT - 1

Introduction & Investigation For Bridges : Components of a Bridge; Classification; Standard Specifications; Need for Investigation; Selection of Bridge Site; Preliminary Data to be Collected; Preliminary Drawings; Determination of Design Discharge; Economical Span; Location of Piers and Abutments; Vertical clearance above HFL; Scour depth; Traffic Projection; Choice of Bridge type; Importance of Proper Investigation.

Concrete Bridges : Various types of bridges; I. R. C. Specifications for road bridges.

UNIT - II

Culverts

Design of R. C. slab culvert.

T - Beam Bridge

Pigeaud's method for computation of slab moments; Courbon's method for computation of moments in girders; Design of simply supported T - beam bridge.

UNIT - III

Sub Structure for Bridges : Pier and abutment caps; Materials for piers and abutments; Design of pier; Design of abutment; Backfill behind abutment; Approach slab.

UNIT - IV

Bearings for Bridges : Importance of bearings; Bearings for slab bridges; Bearings for girder bridges; Expansion bearings; Fixed bearings; Design of elastomeric pad bearing.

Foundations For Bridges : Scour at abutments and piers; Grip length; Types of foundations; Design of well foundation.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK

1. *Essentials of Bridge Engineering by Dr. Johnson Victor; 6th Edition, Oxford & IBH Publishing Co. Pvt. Ltd., 2007.*

REFERENCE BOOK

1. *Design of bridge structures by Jagadeesh and Jayaram, 2nd Edition, PHI Learning, 2009.*

WEB REFERNCES:

www.iitm.ac.in

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IV/IV Year B.Tech.- Seventh Semester

CE 416 /C ADVANCED REINFORCED CONCRETE DESIGN

Lectures / Tutorials	*: 4 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam.	*: 3 Hours*	*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course objectives:

- Course is designed to shape the concrete and use the steel bars for external loads on different building elements.
- To understand the codal recommendations for methods of design
- To analyse and design of various reinforced concrete structures like water tanks.
- Analysis and design of intz tank and its staging
- Raft foundation, corbels, underground and on ground circular water tanks, intz tank, bunkers and silos
- To analyse and design of Raft Foundations.
- To analyse and design of Pile Foundations

Course Outcomes:

- Students can handle the isolated design of individual elements independently.
- Indian Standards of approach can be practiced by the student.
- Students can handle the analysis and design of rectangular and circular tanks.
- Students can handle the Raft foundation
- Students can handle the Pile Foundations

UNIT - I

Water tanks resting on ground (Working stress

method) Introduction, Circular and Rectangular tanks

UNIT - II

Elevated circular water tank (Working stress method) :
Introduction ; Design of elevated circular water tank

UNIT - III

Design of Intze tank (Working stress method): Calculation of dimensions; Design of top dome; Design of top ring beam ; Design of cylindrical wall ; Design of bottom ring beam

UINT -IV

Raft Foundations (Limit state method)

Soil design; Design of slab; Design of beams

Pile Foundations (Limit state method)

Introduction; Loads on pile groups ; Soil design of a pile; Structural design of a pile

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS

1. *Reinforced concrete , Vol.1 & 2 by H. J. Shah, Charotar publishing house Pvt. Ltd, 2011.*

REFERENCE BOOK

1. *RCC Designs by BC Punmia et.al. , 10th Edition, Laxmi Publications (P) Ltd. 2006.*

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ELECTIVE - II

IV/IV Year B.Tech.- Seventh Semester

CE - 416 /D EARTH AND EARTH RETAINING STRUCTURES

Lectures / Tutorials	*: 4 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam.	*: 3 Hours*	*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- To understand lateral earth pressure theories and pressure theories and design of retaining walls.
- To design anchored bulkheads by different methods.
- To understand pressure envelops and design of various components in braced cuts and cofferdams.
- To understand stability of earth dams and its protection and construction.

Course Outcomes:

- Students will be able to design retaining walls, anchored bulkheads, braced cuts, coffer dams and earth dams.

UNIT-I

Lateral Pressure: Basic concepts, Rankine and Coulomb earth pressure theories, graphical methods. Determining active and passive pressures: Culmanns, Rebhan's, logarithmic spiral methods, friction circle method. Consideration of surcharge, seepage, earth quake, wave effect, stratification, type of backfill, wall friction and adhesion.

Retaining walls: Uses, types, stability and design principles of retaining walls, backfill drainage, settlement and tilting.

UNIT-II

Anchored bulkheads : Classification of anchored bulkheads, free and fixed earth support methods. Rowe's theory for free earth supports and equivalent beam methods for fixed earth supports. Design of anchored rods and dead man

Braced cuts and Cofferdams: Braced excavations and stability of vertical cuts, lateral pressures in sand and clay, Braced and cellular cofferdams: uses, types, components, stability, piping and heaving. Stability of cellular cofferdams, cellular cofferdams in rock and in deep soils.

UNIT-III

Earth dams- Stability analysis : Classification, seepage control in embankments and foundations, seepage analysis, stability analysis: upstream and down stream for steady seepage, rapid draw down, end of construction, method of slices and Bishop's method.

UNIT-IV

Earth dams -Protection & Construction: Slope protection, filters, embankment construction materials and construction, quality control, grouting techniques. Instrumentation and performance observations in earth dams.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS:

1. *Basic & Applied soil mechanics - Gopal Ranjan & ASR Rao, New Age International Publishers, 2011.*
2. *Embankment Dams by Sharma Hd, Publisher: India Book House(IBH) Limited,1991.*
3. *Engineering for Embankment Dams By B. Singh & R. S. Varshney, A A Balkema Publishers,1995.*

REFERENCE BOOKS:

1. *Foundation design by W. C. Teng, Prentice Hall,1962*
2. *Analysis and design of foundations by Bowles. J. W McGraw Hill, 4th edition, 1955.*
3. *Earth and Rock-Fill Dams: General Design and Construction Considerations by United States Army Corps of Engineers, University Press of the Pacific,2004*
4. *Soil mechanics in engineering and practice by Karl Terzaghi, Ralph B. Peck, Gholamreza Mesri,3rd Edition. Wiley India Pvt Ltd,2010.*

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IV/IV Year B.Tech.- Seventh Semester

CE - 451 LABORATORY

ANALYSIS, DESIGN AND DETAILING OF STRUCTURES

Practicals	*: 3 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam	*: 3 Hrs.*	*External Exam Marks*	*: 60*

Course objectives:

- To analyse the structures like beams, frames for different loading combinations of dead, live and earthquake loading using softwares
- To design the structures like beams, columns, footings and slabs using softwares
- To learn the reinforcement and other details of various reinforced concrete and steel structural elements like beams, footings, steel structures connections, welded plate girder and steel and reinforced concrete buildings.
- To understand the code requirements and provisions for reinforcement detailing
- To draw the reinforcement and other details of various structural elements using computer software packages like Auto CAD,RIVET etc

Course Outcomes:

By the end of this course students will have the capability/knowledge of

- Analysing and designing the structures for different loading combinations Using computer software
- Reinforcement and details of various structural elements
- presenting various structural elements details for the purpose of field execution as per code requirements
- drawing each and every details of various structural elements using computer software packages

PART-A

(At least five of the following shall be done and recorded)

Students are required to analyse and design the following structures using software packages like STAAD Pro/STRUDS/STRAP etc.

1. Analysis and design of a two span continuous beam with one side fixed and other side overhang
2. Analysis and design of a single bay single storeyed plane frame with vertical legs subjected to gravity and lateral loads
3. Analysis and design of a plane frame (2D)of a four storeyed RCC residential building subjected to 1.2(DL+LL+/-EQX)
4. Analysis and design of a two storeyed RCC framed building (3D) subjected to 1.5(DL+LL)
5. Analysis and design of a steel roof truss of an industrial shed subjected to (DL+/-WL)
6. Design of one way and two way slabs
7. Design of isolated footing

PART-B

(At least five of the following)

Students are required to detail different structural elements using software packages like Auto CAD/Micro station/Rivet etc.,

8. Detailing of continuous beam with one side fixed and other side overhanging
9. Detailing of a single bay single storeyed plane frame with vertical legs
10. Detailing of a pile foundation with pile cap
11. Detailing of typical elements of a two storeyed RCC framed building
12. Detailing of industrial shed steel roof truss
13. Detailing of a steel beam to column moment resistant connection with bolts
14. Detailing of a welded plate girder

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IV/IV Year B.Tech.- Seventh Semester

CE - 452 LABORATORY
TRANSPORTATION ENGINEERING LABORATORY

Practicals	*: 3 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3 Hrs.*	*Semester End Exam. marks*	*: 60*
		Credits	*: 2*

Course Objectives:

- This course presents the major strength and shape parameters involved in selection of aggregate for various types of construction works
- This course exhibits various tests conducted on aggregate in order to propose it for suitable construction work
- This course later presents the detail investigation on sub-base course (soil) by conducting a laboratory test for evaluation of pavement thickness
- This course also deals with the various properties of bitumen and the tests required to determine them

Course Outcomes:

- At the end of the laboratory course every student can thus know the important parameters for selection of aggregate for different construction components
- Student can evaluate and conduct the required tests on the given aggregate and propose the suitable inference
- Student can evaluate the grade of bitumen by conducting the required tests and propose it for suitable region and place of pavement construction

Note: A minimum of twelve (12No) shall be done and recorded

A. Tests On Aggregates
    1. Aggregate Crushing value test.
    2. Aggregate impact value test.
    3. Los Angele's abrasion test.
    4. Deval's attrition value test.

5. Shape test
   a) Flakiness index test
   b) Elongation index test
   c) Angularity number test. .
6. Specific gravity Test.

B. Tests On Bituminous Materials

7. Penetration test.
8. Softening point test.
9. Flash and fire point test.
10. Ductility test.
11. Viscosity test.
12. Bitumen Extractions Test.
13. Specific gravity of Bitumen.

C. Test On Bituminous Mixes

14. Marshall stability test.

D. Test On Soil Subgrade

15. California bearing ratio test.

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IV/IV Year B.Tech.- Eighth Semester

CE - 421 TRANSPORTATION ENGINEERING - II

Lectures	*: 4 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3 Hours*	*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- To understand the role of railways in transportation.
- To understand various parts of a railway track. And Introduction to geometric design of a railway section.
- To emphasize on various requirements of stations
- It will present the concept airport planning, various obstruction runway and structural design of airport pavement.
- Emphasize on various facilities of a harbor and port and various controlling devices of an harbour

Course Outcomes:

- An ability to understand the importance of railway sector
- An ability to judge and select proper material and component for a railway track and to understand and deign various component of a track.
- For basic knowledge of a railway station.
- Better planning of various amenities of an airport and planning and also serves as a basic for air port pavement design and runway design.
- Creates a basic introduction of various features of a harbor and a port to enable for proper design and maintenance of various amenities.

UNIT - I

RAILWAY ENGINEERING

Introduction : Role of railways in transportation; Comparison of railway and highway transportation; Development of railway systems with particular reference to India; Classification of railways.

Railway Track :

Permanent way: Gauges in Railway track, Railway track cross - sections; Coning of wheels.

Rails & Rail Joints : Functions of rails; Requirements of rails; Types of rails sections; Standard rail sections; Length of rails; Rail failures; Wear on rails.Requirements of an ideal joint; Types of rail joints; Welding of rails.

Sleepers : Functions of sleepers; Requirements of sleepers; Classification of Sleepers - Timber sleepers, Metal sleepers & Concrete sleepers; Comparison of different types of sleepers.

Fish Plates : Fish plates, section of fish plates, failure of fish plates.

Ballast : Functions and requirements of ballast; Types of ballast; Renewal of ballast.

UNIT - II

Geometric Design Of Track : Necessity; Gradients & Gradient Compensation; Elements of horizontal alignment; Super elevation; Cant deficiency and cant excess; Negative Super elevation; Length of Transition Curve, Length of vertical curve.

Points And Crossings

Functions of components of turnout;

Crossings. Stations And Yards

Site selection for railway station; Requirements of railway station; Classifications; Station yards; Level crossing.

Signalling : Objects of signaling; Classification of signals; Controlling-absolute block system. Standards of inter locking

UNIT - III

AIRPORT PLANNING AND DESIGN

Introduction :

Development of air transportation system with particular reference to India; Aeroplane components; Air-craft characteristics.

Airport planning and layout

Selection of site; Apron; Hanger; Typical airport layouts; Airport marking; Airport lighting; Drainage systems.

Airport Obstruction : Zoning laws; Classification of obstructions; Imaginary surfaces; Approach zone; Turning zone.

Runway Design : Runway orientation; Basic runway length; Corrections for elevation; Temperature and gradient; Runway geometric design.

Specifications for Structural Design Of Airport Pavements : Design factors methods for flexible and rigid pavements; LCN system of pavement design.

UNIT - IV

DOCKS AND HARBOUR ENGINEERING

Introduction : Types of water transportation; Economics and advantages of water transportation.

Planning and Design Of Port Facilities : General layout and design considerations; Pier and wharf structures; Fender systems; Transit sheds and Apron; Container ports; Docks; Dredging; Light Houses.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS

1. *UNIT I & II: Railway Engineering by S.C.Saxena and S.Arora , Dhanpat Rai & sons.*
2. *UNITIII & IV: Airport Planning and Design by S. K. Khanna & M. G. Arora, 6th Edition, Nemchand & Bros, 1999.*

REFERENCE BOOKS

1. *Railway Engineering by M.M.Agarwal and Satish Chandra, Oxford University Press, 2007.*
2. *Airport Engineering by G.V.Rao; Tata Mc Graw Hill, 1991.*

WEB REFERENCES:

For videos refer to www.iitm.ac.in
www.iricen.gov.in

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IV/IV Year B.Tech.- Eighth Semester

CE - 422 REMOTE SENSING AND GIS

Lectures / Tutorials : 4 / Periods/Week	*Sessional Marks*	*: 40*
Semester End Exam. : 3 Hours	*Semester End Exam. Marks*	*: 60*
	Credits	*: 4*

Course Objectives:

- To develop the fundamental concepts of GIS and remote sensing including the electromagnetic Spectrum, and nature of geospatial data.
- To make the student to understand the various Civil engineering applications of remote sensing.
- To familiarize s the students in the GIS based analytical and problem solving techniques for
- Sustainable planning and management of civil Engineering projects.

Course Outcomes:

- Understand the importance of remote sensing and GIS application in civil engineering
- Students are familiarize with study and identification of satellite imageries
- Students are able to learn the soft skills by using GIS technologies

UNIT - I

Introductions to remote sensing
Applications and importance of remote sensing.

Remote Sensing - I : Basic concepts and fundamentals of remote sensing - elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units, over view of Indian Remote sensing satellites and sensors.

UNIT - II

Remote Sensing - II : Energy resources, energy interactions with earth surface features and atmosphere, resolution, visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies.

Geographic Information System: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

UNIT - III

Types of data representation : Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS - Advantages and disadvantages. File management, Spatial data - Layer based GIS, Feature based GIS mapping.

GIS Spatial Analysis : Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT - IV

Applications of GIS : Application areas and user segments; Guide lines for preparation of GIS; Applications of GIS for land use and housing management; Assessment of physical transformation in an urban area.

Water Resources Applications : Land use/Land cover in water resources, Surface water mapping and inventory, Watershed management for sustainable development. Reservoir sedimentation, Ground Water Targeting and Identification of sites for artificial Recharge structures.

NOTE : Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question

LEARNING RESOURCES

TEXT BOOKS:

1. *Remote Sensing and its applications by LRA Narayana, University Press 1999.*
2. *Principals of Geo physical Information Systems - Peter A Burragh and Rachael A. Mc Donnell, Oxford Publishers 2004.*

REFERENCE BOOKS:

1. *Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yeung, Prentice Hall, 2002.*
2. *Text Book of Remote Sensing and Geographical Information systems by M.Anji Reddy , 4th Edition,B.S.Publications,2012.*
3. *Geographic information Systems by Kang- tsung Chang, McGraw-Hill,2003.*
4. *Basics of Remote sensing & GIS by S.Kumar, USP,2005.*

bbb

IV/IV Year B.Tech.- Eighth Semester

CE - 423 PROFESSIONAL ETHICS AND HUMAN VALUES

Lectures	*: 3 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam.	*: 3 Hours*	*Semester End Exam. marks*	*: 60*
		Credits	*: 3*

Course Objectives:

- Creating awareness to deal their own inner nature for staying peacefully, utilizing energies in balanced manner, dealing activities in ethical manner and giving respect to their neighbours for making peaceful, prosperous and happier surroundings.
- Giving subject information such a way that students can be able to discriminate what is moral and what is immoral in engineering aspects. Through that students can be able to perform their knowledge time and energies for well being of people.
- Giving information regarding safety and risk and their consequences in industry and day to day life.
- Creating awareness regarding environmental loss, standards and codes fixed by professionals for smooth running of industries and meeting national and international interests.

Course Outcomes:

At the end of the course students will be able to

- Understand how to prospective engineer should behave in his field, society etc.
- Differentiate how an engineer should live in moral and immoral in his/ her profession.
- Deal product design processes and services by incorporating safety/ risk aspects.
- Know regarding various aspects of environmental standard codes.

UNIT - I

Human Values : Morals, Values And Ethics - Integrity - Work Ethics - Service Learning - Civic Virtue- Respect For Others - Living Peacefully - Caring - Sharing - Honesty - Courage - Valuing Time - Co-Operation - Commitment - Empathy - Self-Confidence - Character - Spirituality.

UNIT - II

Engineering Ethics : Senses Of Engineering Ethics - Variety Of Moral Issued - Types Of Inquiry - Moral Dilemmas - Moral Autonomy - Kohlberg's Theory - Gillian's Theory - Consensus And Controversy - Professions And Professionalism- Professional Ideals And Virtues - Theories About Right Action - Self-Interest - Customs And Religion - Uses Of Ethical Theories.

UNIT - III

Engineering As Social Experimentation : Engineering As Experimentation - Engineers As Responsible Experimenters - Codes Of Ethics - Balanced Outlook On Law .

Safety, Responsibilities And Rights : Safety And Risk - Assessment Of Safety And Risk - Risk Benefit Analysis And Reducing Risk.

Collegiality And Loyalty - Respect For Authority - Collective Bargaining - Confidentiality - Conflicts Of Interest - Occupational Crime - Professional Rights - Employee Rights - Intellectual Property Rights (IPR) - Discrimination.

UNIT - IV

Global Issues : Multinational Corporations - Environmental Ethics - Computer Ethics - Weapons Development - Engineers As Managers - Consulting Engineers - Engineers As Expert Witnesses And Advisors - Moral Leadership Sample Code Of Ethics Like ASME, ASCE, IEEE, Institution Of Engineers (India), Indian Institute Of Materials Management, Institution Of Electronics And Telecommunication Engineers (IETE), India Etc.,

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK

1. *Mike martin and Ronald Schinzinger, "Ethics in Engineering" McGraw-Hill, New York 1996*

2. *Govindarajan M, Natarajan S, Senthil Kumar V.S., "Engineering Ethics", PHI, New Delhi, 2004*

REFERENCE BOOKS

1. *Charles D,Fleddermann, "Engineering Ethics", Pearson / PHI, New Jersey 2004 (Indian Reprint).*
2. *Charles E Harris, Michael S.Protchard and Michael J Rabins, "Engineering Ethics - Concepts and Cases" Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available).*
3. *John R Boatright, "Ethics and the conduct of business" Pearson, New Delhi, 2003.*
4. *Edmund G.Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers" Oxford University Press, Oxford, 2001.*

bbb

ELECTIVE - III

IV/IV Year B.Tech.- Eighth Semester

CE - 424/A REPAIR AND REHABILITATION OF STRUCTURES

Lectures / Tutorials : 4 Periods/Week		*Sessional marks*	*: 40*
Semester End Exam. : 3 Hours		*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course objectives

- To learn various distress and damages to concrete and masonry structures
- To understand the importance of maintenance of structures
- To study the various types and properties of repair materials
- To asses the damage to structures using various tests
- To learn the importance and methods of substrate preparation
- To learn various repair techniques of damaged structures, corroded structures

Course Outcomes

By the end of this course students will have the capability/knowledge of

- various distress and damages to concrete and masonry structures
- the importance of maintenance of structures, types and properties of repair materials etc
- assessing damage to structures and various repair techniques

UNIT-I

Introduction : Maintenance, rehabilitation, repair, retrofit and strengthening, need for rehabilitation of structures.

Cracks in R.C. buildings : Various cracks in R.C. buildings, causes and effects

Maintenance : Maintenance importance of maintenance, routine and preventive maintenance.

Damages to masonry structures : Various damages to masonry structures and causes

UNIT-II

Repair materials : Various repair materials, Criteria for material selection, Methodology of selection, Health and safety precautions for handling and applications of repair materials

Special mortars and concretes : Polymer Concrete and Mortar, Quick setting compounds

Grouting materials : Gas forming grouts, Salfoalumate grouts, Polymer grouts, Acrylate and Urethane grouts.

Bonding agents : Latex emulsions, Epoxy bonding agents.

Protective coatings : Protective coatings for Concrete and Steel FRP sheets

UNIT-III

Damage diagnosis and assessment : Visual inspection, Non Destructive Testing using Rebound hammer, Ultra sonic pulse velocity, Semi destructive testing, Probe test, Pull out test, Chloride penetration test, Carbonation, Carbonation depth testing, Corrosion activity measurement

Substrate preparation : Importance of substrate/surface preparation, General surface preparation methods and procedure, Reinforcing steel cleaning

UNIT-IV

Crack repair : Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Autogenous healing, Overlays, Repair to active cracks, Repair to dormant cracks.

Corrosion of embedded steel in concrete : Corrosion of embedded steel in concrete, Mechanism, Stages of corrosion damage, Repair of various corrosion damaged of structural elements (slab, beam and columns)

Jacketing : Jacketing, Column jacketing, Beam jacketing, Beam Column joint jacketing, Reinforced concrete jacketing, Steel jacketing, FRP jacketing.

Strengthening : Strengthening, Beam shear strengthening, Flexural strengthening

NOTE : Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS

1. *Repair and protection of concrete structures by Noel P.Mailvaganam, CRC Press,1991.*
2. *Concrete repair and maintenance Illustrated by Peter.H.Emmons, Galgotia publications Pvt. Ltd., 2001.*
3. *"Earthquake resistant design of structures" by Pankaj agarwal, Manish shrikande, PHI, 2006.*

REFERANCES

1. *Failures and repair of concrete structures by S.Champion, John Wiley and Sons, 1961.*
2. *Diagnosis and treatment of structures in distress by R.N.Raikar Published by R & D Centre of Structural Designers and Consultants Pvt.Ltd, Mumbai.*
3. *Handbook on repair and rehabilitation of RCC buildings, CPWD, Government of India.*
4. *Handbook on seismic retrofit of buildings, A. Chakrabarti et.al., Narosa Publishing House, 2010.*

bbb

ELECTIVE -III

IV/IV Year B.Tech.- Eighth Semester

CE - 424/B
EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

Lectures / Tutorials :	*4 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam. :	*3 Hours*	*Semester End Exam. Marks*	*: 60*
		Credits	*: 4*

Course objectives:

- To teach the basic concepts of vibration of single degree of freedom systems
- To explain the elements of earthquake ground motion characteristics
- To calculate the lateral forces on a building using equivalent static method
- To analyse and design single storey, single bay RC framed building subjected to an earthquake
- To introduce architectural features of buildings to resist earthquakes
- To introduce Geo-technical earthquake engineering

Course outcomes :

- Learn the fundamentals vibration of single degree freedom systems
- Learn the earthquake ground motion characteristics
- Able to calculate the lateral forces on a building using equivalent static method
- Can analyse and design a single storey and single bay RC framed building
- Know the architectural features of buildings to resist earthquakes
- Understand the behavior of soil beneath a foundation during an earthquake

UNIT-I

Elements of structural dynamics : Sources of vibrations; Types of vibrations; Degrees of freedom; Spring action and damping; Free vibration of undamped system having single degree of freedom; Free vibration of

viscous damped system having single degree of freedom; Forced vibration of a viscous damped single degree freedom system subjected to harmonic excitation; Earthquake excitation (Base excitation) of a single degree freedom system.

UNIT-II

Elements of Earthquake Ground motion : Earthquake size - Intensity and magnitude; Seismic Zoning-Introduction; Strong Motion Earthquakes - Introduction; Response spectrum (elastic); Local site effect (Effect of type of soil).

Seismo-resistant building architecture : Introduction; Lateral load resisting systems- moment resisting frame, Building with shear wall or bearing wall system, building with dual system; Building configuration - Problems and solutions; Building characteristics - Mode shape and fundamental period, building frequency and ground period, damping, ductility, seismic weight, hyperstaticity/redundancy, non-structural elements, foundation soil/ liquefaction. Foundations; Quality of construction and materials - quality of concrete, construction joints, general detailing requirements

UNIT III

Analysis of single storey and single bay RCC Plane Frame (Columns vertical) : (As per IS:1893(part-I)-2002)

Calculation of lateral force due to earthquake using equivalent static method ; Analysis for different load combinations; Design forces and moments in beam and columns.

UNIT-IV

Design of single storey and single bay RCC plane frames (Columns vertical)

(As per IS:456-2000 and IS13920-1993)

Design of column; Design of beam; Design of footing ; Detailing of entire frame

Elements of Geotechnical Earthquake Engineering : Liquefaction - Definition and types, Effect of liquefaction on built environment, Evaluation of liquefaction susceptibility, Liquefaction hazard mitigation ; Seismic slope

stability - Introduction, Pseudo-static analysis, Sliding block methods.

NOTE : Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS

1. *Earthquake Resistant Design of Structures by Pankaj Agarwal, and Manish Shrikhande, PHI Learning, 2006 .*
2. *Geotechnical Engineering by S.K.Gulhati & Manoj Datta, Tata McGraw-Hill, 2010*

REFERENCE BOOKS

1. *Elements of Earthquake Engineering by Jai Krishna, A.R.Chandrasekaran and Brijesh Chandra, Second Edition, South Asian Publishers, 1994.*
2. *Dynamics of Structures by A.K.Chopra, 3rd Edition, Person Education, 2007.*

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ELECTIVE - III

IV/IV Year B.Tech.- Eighth Semester

CE - 424 /C

ADVANCED ENVIRONMENTAL ENGINEERING

Lectures / Tutorials : 4 Periods/Week		*Sessional marks*	*: 40*
Semester End Exam. : 3 Hours		*Semester End Exam. marks*	*: 60*
		Credits	*: 4*

Course Objectives:

- To explain the importance of self-purification of streams and to derive Streeter- Phelps equation and to discuss the effects of various pollutants on receiving streams.
- To introduce new concepts in biological treatment like nitrogen and phosphorous removal, anaerobic filters, RBC and U-tube aeration systems, their working principles and suitability.
- To understand the characteristics and the treatment and disposal methods of liquid wastes produced in Dairy industry, Sugar industry and Pulp & paper industry.
- To introduce various functional elements of urban solid waste management and to introduce various methods of solid waste treatment methods with special emphasis on recovery and reuse of solid waste.
- To introduce sources, global effects and the effects on human health, plants and materials of air pollution.
- To discuss about the effects of various meteorological parameters on air pollution and to explain various equipment for controlling particulate pollution and their suitability.
- To introduce sources, effects and controlling measures of noise pollution and to discuss noise rating systems and acceptable noise levels for various places.

Course Outcomes:

At the end of the course the student will be able to:

- Understand the importance of self-purification and the effects of various pollutants on receiving streams.

- Determine the critical D.O. deficit and the degree of treatment required for wastewater at the treatment plant to maintain a minimum D.O. at any point in the stream.
- Update his knowledge in biological treatment with new and more advanced treatment methods.
- Understand the characteristics and suggest suitable methods of treatment and disposal of industrial wastewater.
- Suggest suitable methods for collection, transport, recovery, reuse and treatment of urban solid waste.
- Understand global implications of air pollution and suggest suitable methods of control of particulate pollution depending on concentration and size of the particulate matter.
- Acquire knowledge on noise pollution and suggest suitable noise control techniques according to the situation.

UNIT - I

Stream Sanitation : Introduction; Self-purification in streams; factors affecting self-purification; Dissolved Oxygen Balance in streams; Streeter-Phelps's Dissolved Oxygen Model; Zones of Self-purification; Impact of pollutants on stream waters and usage of stream water with special reference to flora and fauna.

New Concepts in Biological Waste Treatment (theory only):
Introduction; Nitrogen removal by biological nitrification and de-nitrification; Phosphate removal from the activated sludge process; Rotating Disc Biological Contactor; Anaerobic filters; U-Tube aeration systems.

UNIT - II

Industrial Wastewater Treatment : Introduction to Industrial Wastewater treatment; Sugar Plant: Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal.

Dairy Industry: Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal.

Pulp and Paper Industry: Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal.

UNIT - III

Urban Solid Waste Management : Sources; Quantities and characteristics; Classification; Collection and transportation; Recovery and reuse; Treatment methods such as compositing, incineration, sanitary landfill and pyrolysis.

Sources and Classification of Air Pollution : Stationary and mobile sources; Primary and secondary pollutants; Natural contaminants; Particulate matter; Aerosols; Gaseous pollutants.

Meteorology and Air Pollution : Atmospheric stability and temperature inversions; Maximum Mixing Depth; Wind direction and speed; Plume behaviour; Gaussian Dispersion Model; Plume rise; Wind rose.

UNIT - IV

Effects of Air Pollution : Global Effects: Global warming; Ozone depletion; Acid rains; Effects of air pollutants on human health; Effects on plants; Economical effects.

Control of Air Pollution : Objectives; Types of collection equipment: Settling chamber; Inertial separators; Cyclones; Filters; Electrostatic Precipitators; Scrubbers.

Noise Pollution : Introduction; Levels of noise; Noise rating systems; Measurement of noise; Sources of noise and their noise levels; Acceptable noise levels; Effects of noise; Control of noise.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOKS

1. *Wastewater Treatment by M.N. Rao and A.K. Datta; Oxford & IBH Publishing Co. Pvt. Ltd., 2008.*
2. *Environmental Pollution Control Engineering by C.S. Rao, New Age International, 2006.*
3. *Air Pollution by M.N. Rao and H.V.N. Rao, Tata Mc Graw-Hill,1989.*

REFERENCES

1. *Wastewater Engineering : Treatment, Disposal and Reuse by Metcalf & Eddy , 3rd Edition, Mc Graw- Hill, 1991.*
2. *Water Supply and Wastewater Disposal by G.M. Fair et. al., John Wiley & Sons, 1971.*
3. *Sewage Disposal and Air Pollution Engineering by S.K. Garg; Khanna Publications, 2010.*
4. *Sewage and Sewage Treatment by S.K. Kshirasagar; Roorkee Publishing House, Roorkee.*

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ELECTIVE - III

IV/IV Year B.Tech.- Eighth Semester

CE - 424 /D

GROUND IMPROVEMENT TECHNIQUES

Lectures / Tutorials : 4 Periods/Week	*Sessional marks*	*: 40*
Semester End Exam. : 3 Hours	*Semester End Exam. marks*	*: 60*
	Credits	*: 4*

Course Objectives:

- To introduce engineering properties of soft, weak and compressible deposits, principles of treatment for granular and cohesive soils and various stabilization techniques.
- To bring out concepts of reinforced earth.
- Applications of geotextiles in various civil engineering projects.

Course Outcomes

- Will gain competence in properly devising alternative solutions to difficult and earth construction problems and in evaluating their effectiveness before, during and after construction.
- A study of the many different approaches to the ground modification broadens the mind of any engineer and inspires creativity and innovation in Geotechnical construction and related fields..

UNIT-I

Introduction : Need for engineered ground improvement, classification of ground modification techniques; suitability, feasibility and desirability of ground improvement technique; objectives of improving soil.

In-situ densification methods in granular soils : Introduction, Vibration at the ground surface, impact at the ground surface, vibration at depth, impact at depth.

UNIT-II

In-situ densification methods in cohesive soils : Introduction, preloading, sand drains, sand wicks, band drains, stone and lime columns.

Reinforced earth : Principles, components of reinforced earth, governing design of reinforced earth walls, design principles of reinforced earth walls.

UNIT-III

Geotextiles : dIntroduction, types of geotextiles, functions and their applications, tests for geotextiles, geogrids and its functions.

Dewatering: Dewatering - methods of dewatering and pressure relief, well point systems, deep well drainage, vacuum dewatering, electro osmosis, capacity of pumps and pumps design, installation and operation of dewatering systems - single line, two line, flow to a single well, multiple well systems.

Grouting: Introduction; Kinds of grout- Cementitious grouts and Chemical grouts;Grouting methods-Intrusion grouting, Permeation grouting, compaction grouting and jet grouting.

UNIT-IV

Stabization of soils: Mechanical Stabilization -Soil aggregate mixtures, properties and proportioning techniques, soft aggregate stabilization, compaction, field compaction control;

Cement Stabilization-Mechanism, factors affecting and properties, use of additives, design of soil cement mixtures, construction techniques;

Lime and Bituminous Stabilization-Type of admixtures, mechanism, factors affecting, design of mixtures, construction methods.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

LEARNING RESOURCES

TEXT BOOK

1. *Engineering Principles of ground modification by MR Hausmann, McGraw-Hill , 1990.*

REFERENCES

1. *Ground improvement Techniques, P.Purushothama Raju, USP, 1999.*
2. *Designing with Geosynthatics by Robert M. Koerner, 5th Edition, Prentice Hall,2005.*
3. *Construction and Geotechnical methods in Foundation Engineering by R.M.Koerner, McGraw-Hill , 1984.*
4. *Current Practices in Geotechnical Engineering Vol.-I, Alam Singh and Joshi, International Book Traders, 1985.*

WEB REFERENCES:

www.iitm.ac.in

IV/IV Year B.Tech.- Eighth Semester

CE - 461 LABORATORY

QUANTITY ESTIMATION & PROJECT MANAGEMENT

Practicals	*: 3 Periods/Week*	*Sessional marks*	*: 40*
Semester End Exam.	*: 3 Hrs.*	*Semester End Exam. marks*	*: 60*
		Credits	*: 2*

Course objectives:

- Quantity estimation for different civil engineering works like single storey residential building, BT road, canal etc.
- Cost estimation for different civil engineering works like single storey residential building, BT road, canal etc.
- Rate analysis for different items of work
- Quantity estimation and preparing schedule of bars of different items of RC works using software like MS Excel
- To prepare project management report for different civil engineering projects like residential building, BT road, canal etc using software packages like Primavera/MS Project etc

Course Outcomes:

By the end of this course students will have the capability/knowledge of

- Estimating quantities required for different civil engineering works like single storey residential building, BT road, canal etc.
- Cost estimation of different civil engineering works like single storey residential building, BT road, canal etc.
- of finding the unit rate of different items of work
- prepare schedule of reinforcement bars
- scheduling a project
- analysing a project and finding critical activities and hence allocate resources as per the schedule

Note: A minimum of twelve (12No) shall be done and recorded

CYCLE-1
Quantity Surveying

(At least SIX of the following using softwares like MS Excel/ Qty./Road Estimate/Super Rate analysis etc.)

1. Quantity estimation of a single storey residential building (different items).
2. Cost estimation of a single storey residential building.
3. Quantity estimation of a B.T.Road (different items).
4. Cost estimation of a B.T.Road.
5. Quantity estimation of a Canal (different items).
6. Cost estimation of a Canal.
7. Find out the labour requirement and preparing the Rate Analysis for different items of work.

   a) C.C b) R.C.C c) Brick work d) Flooring

CYCLE-2

Project Management

(Any THREE of the following using softwares like MS Project / Primavera etc.)

1. Preparing the Project management report for a single storey residential building/Road/Canal by using the Bar Chart/Mile stone chart.
2. Preparing the Project management report for a single storey residential building by using the network technique (PERT/CPM).
3. Preparing the Project management report for a B.T.Road by using the network technique (PERT/CPM).
4. Preparing the Project management report for a Canal by using the network technique (PERT/CPM).

CYCLE-3

(At least THREE of the following by using softwares like MS Excel)

1. Quantity estimation of RCC roof slab and preparing schedule of bars
2. Quantity estimation of RCC beam and preparing schedule of bars
3. Quantity estimation of RCC Column with foundation footing and preparing schedule of bars
4. Quantity estimation of RCC retaining wall and preparing schedule of bars

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