Vision of Civil Engineering Department

The Department of Civil Engineering will provide quality education on par with the premier organizations of the country so that our students become leaders in education, industry and governance. Department strives to attain national recognition in research, teaching and professional service ensuring sustainability to various upcoming developments in the society at the regional and national scenario.

Mission of Civil Engineering Department

- To provide state of art education in Civil Engineering with a well balanced programme of instruction and practical experience
- To impart managerial skills for construction and sustainable development for societal needs.
- To generate research opportunities that creates synergy among faculty, students, and practicing professionals.
- To contribute to the quality of life through innovation in the knowledge generation, sharing and its use.

Program Educational Objectives

PEO I: The graduates will have analytical and experimental abilities and design capabilities in Civil Engineering career.

PEO II: The graduates will have good scientific and engineering domain to play an appropriate role in multidisciplinary professional activities with effective communicative skills to provide integrated and sustainable solutions for engineering problems.

PEO III: The graduates will have attitude for lifelong learning and pursue higher education and research. They will perform with engineering ethics and social responsibility in their professional career making use of state of art, modern tools and managerial skills.

Program Outcomes (POs)

Program Outcomes for Civil Engineering:

1. An ability to apply knowledge of science, mathematics and engineering to find integrated solutions to Civil Engineering problems.
2. Capabilities to identify, formulate, analyze and solve engineering problems.
3. Skills for optimal design of a component, system or process to meet design needs within realistic constraints related to economic, environmental and societal issues.
4. An ability to design and conduct experiments, analyze and interpret data and present output.
5. An ability to use advanced techniques, skills and engineering tools essential for civil engineering profession.
6. An ability to develop sustainable solutions to civil engineering problems.
7. An understanding of professional and ethical responsibility.
8. An ability to function in multidisciplinary teams.
9. Capability to communicate effectively with the engineering community and society.
10. Capability for assessment of contemporary issues and their impact on engineering solutions.
11. An understanding of principles of economics and management of engineering projects in a team.
12. Realization of need and ability for lifelong learning.

Department of Civil Engineering
Course Structure (effective from Academic Year 2014-15)

I/IV B. Tech - First Semester

Subject Code	Subject	Periods/Week		Marks			Credits
		Theory	Lab/ Practice	Internal	External	Total	
CE1T1	Engineering Mathematics -1	3+1*	-	30	70	100	3
CE1T2	English for Communication	3	-	30	70	100	3
CE1T3	Engineering Chemistry	3+1*	-	30	70	100	3
CE1T4	Environmental Studies	3	-	30	70	100	3
CE1T5	Engineering Drawing	2	4	30	70	100	3
CE1T6	Basic Mechanical Engineering	3+1*	-	30	70	100	3
CE1L1	Engineering Chemistry Lab	-	3	25	50	75	2
CE1L2	IT Workshop	-	3	25	50	75	2
CE1L3	English Language Communication Skills Lab	-	3	25	50	75	2
Total		**20**	**13**	**255**	**570**	**825**	**24**

I/IV B. Tech - Second Semester

Subject Code	Subject	Periods/Week		Marks			Credits
		Theory	Lab/ Practice	Internal	External	Total	
CE2T1	Engineering Mathematics –II	3+1*	-	30	70	100	3
CE2T2	Professional Ethics	3	-	30	70	100	3
CE2T3	Engineering Physics	3+1*	-	30	70	100	3
CE2T4	Engineering Mechanics	3+1*	-	30	70	100	3
CE2T5	Basic Electrical and Electronics Engineering	3+1*	-	30	70	100	3
CE2T6	C - Programming	3+1*	-	30	70	100	3
CE2L1	Engineering Physics Lab	-	3	25	50	75	2
CE2L2	Engineering Workshop	-	3	25	50	75	2
CE2L3	C – Programming Lab	-	3	25	50	75	2
Total		**23**	**9**	**255**	**570**	**825**	**24**

II/IV B. Tech - First Semester

Subject Code	Subject	Periods/Week		Marks			Credits
		Theory	Lab/ Practice	Internal	External	Total	
CE3T1	Mathematical Methods	3+1*	-	30	70	100	3
CE3T2	Building Materials and Construction	3+1*	-	30	70	100	3
CE3T3	Mechanics of Solids-I	3+1*	-	30	70	100	3
CE3T4	Engineering Geology	3+1*	-	30	70	100	3
CE3T5	Surveying	3+1*	-	30	70	100	3
CE3T6	Fluid Mechanics	3+1*	-	30	70	100	3
CE3L1	Surveying Field work	-	3	25	50	75	2
CE3L2	Engineering Geology Lab	-	3	25	50	75	2
CE3L3	Computer Aided Drawing	-	3	25	50	75	2
Total		**24**	**9**	**255**	**570**	**825**	**24**

II/IV B. Tech - Second Semester

Subject Code	Subject	Periods/Week		Marks			Credits
		Theory	Lab/ Practice	Internal	External	Total	
CE4T1	Concrete Technology	3+1*	-	30	70	100	3
CE4T2	Geotechnical Engineering-I	3+1*	-	30	70	100	3
CE4T3	Mechanics of Solids-II	3+1*	-	30	70	100	3
CE4T4	Hydraulics and Hydraulic Machinery	3+1*	-	30	70	100	3
CE4T5	Building Planning and Drawing	1	3	30	70	100	3
CE4T6	Structural Analysis – I	3+1*	-	30	70	100	3
CE4L1	Fluid Mechanics and Hydraulic Machines Lab	-	3	25	50	75	2
CE4L2	Material Testing Lab	-	3	25	50	75	2
CE4L3	Advanced Survey Practices	-	3	25	50	75	2
Total		**21**	**12**	**255**	**570**	**825**	**24**

III/IV B. Tech - First Semester

Subject Code	Subject	Periods/Week		Marks			Credits
		Theory	Lab/ Practice	Internal	External	Total	
CE5T1	Design and Drawing of Concrete Structures – I	3+1*	-	30	70	100	3
CE5T2	Environmental Engineering-I	3+1*	-	30	70	100	3
CE5T3	Water Resources Engineering-I	3+1*	-	30	70	100	3
CE5T4	Structural Analysis – II	3+1*	-	30	70	100	3
CE5T5	Transportation Engineering-I	3+1*	-	30	70	100	3
CE5T6	Geotechnical Engineering – II	3+1*	-	30	70	100	3
CE5L1	Geotechnical Engineering Lab	-	3	25	50	75	2
CE5L2	Concrete Technology Lab	-	3	25	50	75	2
CE5L3	Personality Development Course	-	2	0	-	0	0
Total		**24**	**8**	**230**	**520**	**750**	**22**

III/IV B. Tech - Second Semester

Subject Code	Subject	Periods/Week		Marks			Credits
		Theory	Lab/ Practice	Internal	External	Total	
CE6T1	Design and Drawing of Concrete Structures – II	3+1*	-	30	70	100	3
CE6T2	Design and Drawing of Steel Structures	3+1*	-	30	70	100	3
CE6T3	Water Resources Engineering –II	3+1*	-	30	70	100	3
CE6T4	Environmental Engineering-II	3+1*	-	30	70	100	3
CE6T5	Transportation Engineering –II	3+1*	-	30	70	100	3
CE6T6	Free Elective	3+1*	-	30	70	100	3
CE6L1	Transportation Engineering Lab	-	3	25	50	75	2
CE6L2	Computer Aided Building Drawing	-	3	25	50	75	2
CE6L3	Soft Skills Course	-	2	0	-	0	0
Total		**24**	**8**	**230**	**520**	**750**	**22**

Free elective

CE6T6FE1 - Building Materials and Construction, CE6T6FE2- Air Pollution and Control.

IV/IV B. Tech - First Semester

Subject Code	Subject	Periods/Week		Marks			Credits
		Theory	Lab/ Practice	Internal	External	Total	
CE7T1	Advanced Structural Engineering	3+1*	-	30	70	100	3
CE7T2	Remote Sensing and GIS Applications	3+1*	-	30	70	100	3
CE7T3	Estimation and Costing	3+1*	-	30	70	100	3
CE7T4	Elective –I	3+1*	-	30	70	100	3
CE7T5	Elective –II	3+1*	-	30	70	100	3
CE7L1	CCAD and GIS Lab	-	3	25	50	75	2
CE7L2	Environmental Engineering Lab	-	3	25	50	75	2
CE7L3	Industrial Training / Mini Project	-	3	75	-	75	2
Total		**20**	**9**	**275**	**450**	**725**	**21**

Elective - I

CE7T4A - Pre-Stressed Concrete Structures
CE7T4B - Earthquake Resistant Design
CE7T4C -Traffic Engineering
CE7T4D -Advanced Environnemental Engineering
CE7T4E - Design and Drawing of Hydraulic Structures

Elective - II

CE7T5A- Finite Element Analysis
CE7T5B- Ground Improvement Techniques
CE7T5C- Water Resources System Planning
CE7T5D- Solid Waste Management
CE7T5E- Green Buildings

IV/IV B. Tech - Second Semester

Subject Code	Subject	Periods/Week		Marks			Credits
		Theory	Lab/ Practice	Internal	External	Total	
CE8T1	Construction Technology and Project Management	2+1*	-	30	70	100	2
CE8T2	Engineering Economics and Project Appraisal	2+1*	-	30	70	100	2
CE8T3	Elective-III	3+1*	-	30	70	100	3
CE8T4	Elective-IV	3+1*	-	30	70	100	3
CE8PW	Project Work	-	12	100	200	300	9
Total		**14**	**12**	**220**	**480**	**700**	**19**

Elective III

CE8T3A – Advanced Structural Analysis
CE8T3B – Environmental Impact Assessment
CE8T3C – Ground Water Development and Management
CE8T3D – IPR and Patents
CE8T3E – Urban Transportation Planning

Elective IV

CE8T4A – Industrial Structures
CE8T4B – Pavement Analysis and Design
CE8T4C –Watershed Management
CE8T4D – Repair and Rehabilitation of Structures
CE8T4E – Advanced Foundation Engineering

1/4 B.Tech. FIRST SEMESTER

CE1T1 ENGINEERING MATHEMATICS – I Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Knowledge of mathematics up to + 2

Learning objectives:

- To achieve skills in differential, integral, vector calculus which will enable them to solve engineering problems
- To get introduction to the concepts of Laplace transforms its applications to various problems

Course outcomes:

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

1. Solve ordinary differential equations of first ,higher order and solve problems of growth and decay also find orthogonal trajectories of given family of curves..
2. Recall mean value theorems to prove inequalities and able to find maxima, minima of functions of two variables.
3. Apply double integrals to find area of the given region, triple integrals to find volume of the three dimensional objects.
4. Determine gradient of scalar point functions and curl, divergence of vector point functions. Also able to apply Stoke's theorem, Gauss divergence theorem and Green's theorem to evaluate line and surface integrals.
5. Solve improper integrals using beta, gamma functions, able to find the curve of best fit for the given data by method of least squares.

UNIT-I

Exact equations, orthogonal trajectories, applications to Newtons Law of cooling, Law of Natural growth and decay.Non-Homogeneous linear Differential equations of second and higher order with constant coefficients with RHS term of the type $?^{??}$, sinax, cosax, polynomials in X, $?^{??}$ V(x), x V(X).

UNIT-II

Differential calculus: Rolle's theorem, Lagrange's mean value theorem and Taylor's theorem (without proofs),Taylor's and Macluarin's series for functions of one variable. Maxima and Minima of functions of two variables, Lagrange's method of multipliers.

UNIT III

Multiple integrals -double and triple integrals-change of variables-Change of order of Integration.

UNIT IV

Vector Differentiation: Gradient-Divergence-Curl and their related properties of sums -products-Laplacian and second order operators (proofs of identities not included) Vector Integration -Line integral–work done–Potential function–area-surface and volume integrals.

Vector integral theorems: Greens, Stokes and Gauss Divergence Theorems (Without proof) and related problems

UNIT V

Curve Fitting- Fitting a straight line-Second degree curve- Exponential curve- power curve by method of least squares.

Gamma and Beta functions- properties- Evaluation of improper integrals (applications not included).

Learning resources:

Text books:

1. Higher Engineering mathematics by B.S. Grewal , khanna publishers

Reference books:

1. Higher Engineering Mathematics, N.P. Bali. Laxmi Publications (P) Ltd.
2. Engineering Mathematics, B. V. Ramana , Tata Mc Graw Hill

e-learning resources:

1. NPTEL,
2. JNTUCo - EeRD

1/4 B.Tech. FIRST SEMESTER
ENGLISH FOR COMMUNICATION
(Common to all branches during I B.Tech., I Semester)

Course Code(s): ME1T2, CE1T2, CS1T2, IT1T2, AE1T2, EE1T2, EC1T2 **Credits: 3**
Internal assessment: 30 marks
Lecture: 3 periods/week **Semester end examination: 70 marks**

Pre-requisites: English subject up to + 2

Learning objectives:
At the end of course the student will have:
1. Exposure to various socio-cultural contexts
2. Inculcated human values.
3. Strengthened the writing skills.
4. Enhanced communicative competence.
5. Improved vocabulary
6. Well versed in grammar.
7. Enhanced comprehensive ability.

Course outcomes:
At the end of the course the students will be able to:
1. Apply the knowledge of grammar and vocabulary for effective communication.
2. Demonstrate effective communication for interactional and transactional purposes.
3. Comprehend multi-cultural milieu

Unit –I
1. Unity of minds-Abdul Kalam.
2. Communication
   Process of communication
   Types of communication - Verbal and nonverbal communication, Listening skills.
3. Synonyms, antonyms from the prescribed syllabus.

Unit-II
1.'Next Sunday'---R.K.Narayan 2. Tenses 3. Active/passive voice

Unit III
1.'The cop and the anthem'---O.Henry 2. Direct/Indirect speech 3. Letter writing.

Unit IV
1.'Three Questions'----Leo Tolstoy 2. Degrees of comparison 3. Reading comprehension.

Unit V
1. Kalpana chawla-----Biographical sketch 2. Correction of sentences.

Reference books:
Communication skills ------Sanjay kumar&pushpa latha oxford.
Communication skills------Leena sen.(PHI)
English for engineering students-----G.V.L.N.Sharma.
An approach to communication skills----Bhanu ranjan, Dhanpat rai&co.
The craft of Business letter writing-----Mathew, Tata Mac Graw Hill.
e-learning resources:
http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

ENGINEERING CHEMISTRY

(Common to CSE, IT, CE, ECE during I B.Tech, I Semester)
(Common to EEE, AE, ME during I B.Tech, II Semester)

Course Code(s): CE1T3, CS1T3, IT1T3, EC1T4, AE2T3, EE2T3, ME2T3 **Credits: 3**
Lecture: 3 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period /week **Semester end examination: 70 marks**

Pre-requisites: Knowledge of chemistry up to +2

Learning objectives:

- To acquire knowledge about desalination of brackish water and treatment of municipal water.
- To gain the knowledge of conducting polymers, bio-degradable polymers and fiber reinforced plastics.
- To learn significance of green chemistry and green synthesis and the synthesis of nano materials.
- To understand mechanism of corrosion and preventive methods.
- To understand concept of semi conductivity, superconductivity and liquid crystal and solar energy.

Course outcomes:

At the end of this course, the students will be able to

1. Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.
2. Substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.
3. Design economically and new methods of synthesis nano materials.
4. Apply their knowledge for protection of different metals from corrosion.
5. Have the knowledge of converting solar energy into most needy electrical energy efficiently and economically to reduce the environmental pollution.

UNIT – I

WATER TECHNOLOGY

Introduction, Hardness of water, types of hardness(permanent and temporary)-
Degree of hardness-Numericals-determination of hardness by EDTA Method-softening methods (line-soda, ion exchange and zeolite process)

WATER TREATMENT

Desalination-reverse osmosis-electro dialysis. Municipal water treatment-removal of micro organisms- by irradiation of UV radiation- bleaching powder process-chlorination-break point of chlorination-By using chloramine-By using ozone.

UNIT - II POLYMERS

Introduction - Types of polymers (addition and condensation)- mechanism of addition polymerization (free radical, ionic) – Classification - Methods of polymerisation – Stereospecific polymers - Ziegler Natta catalysis - Properties of polymers – Conducting Polymers-Engineering applications – Biodegradable polymers - Individual polymers (Preparation, Properties, Uses of Poly Styrene, PVC, PTFE, Bakelite's, Cellulose derivatives, Poly Carbonate).

PLASTICS

Types –Compounding of plastics- Moulding(Injection, compression, blow film extrusion and extrusion moulding)- Fiber reinforced plastics (Glass and carbon) – Bullet Proof Plastics– Properties of plastics – Engineering applications.

UNIT - III

GREEN CHEMISTRY

Introduction – Principle of green chemistry, methods of green synthesis (aqueous phase,super critical fluid extraction method, phase transfer catalyst, micro wave induced method,ultra sound method.

NANO MATERIALS

Introduction to Nanomaterials-preparation of few Nano materials(Carbon Nano Tubes,Fullerenes etc)-Properities of Nano materials- Engineering applications.

UNIT – IV

CORROSION

Defination, causes and consequences of corrosion-mechanism of dry and wet corrosion-galvanicseries,Factors influencing rate of corrosion passivity of metal, types of corrosion (galvonic,differential Aeration,pitting,crevice and stress corrosion).

CORROSION CONTROL

Cathodic protection(sacrificial anodic protection and Impressed current cathodic protection) and Application of protective coating-metallic coatings (galvanization and tinning) organic coatings (paints (mechanism not required),varnishes,lacquers and enamels).

UNIT - V

SEMICONDUCTORS & SUPERCONDUCTIVTY

SEMICONDUCTORS-Definition –Types of semiconductors (Stiochiometric,Non Stiochiometric ,Organic, Controlled Valency Semiconductors,Doping)-applications

SUPERCONDUCTIVTY– Definition-Preparation –Properties –Engineering Applications.

LIQUID CRYSTALS & SOLAR ENERGY

LIQUID CRYSTALS-Definition –Types - applications in LCD and Engineering Applications.

SOLAR ENERGY

Introduction – harnessing solar energy – solar heaters – photo voltaic cells – solar reflection – green house concepts.

Learning Resources:

Text books:

1. A text book of Engineering chemistry – byN.KrishnaMurthy N.Y.S.Murthy, V.Anuradha.
2. A text book of Engineering chemistry–II by D.Srinivasulu, Srivastava, Roliverma.
3. A text book of Engineering chemistry by JAIN & JAIN.
4. A text book of Engineering chemistry by C.P.Murthy, C.V.Agarwal. Andra Naidu.

Reference books:

1. A text book of Engineering chemistry by S.S.DARA.
2. A text book of Engineering chemistry by Dr.C.Daniel Yesud

E-learning resources:

http://nptel.ac.in/courses.php, http://jntuk-coeerd.in/

1/4 B.Tech. FIRST SEMESTER
ENVIRONMENTAL STUDIES
(Common to EEE, CE, ME, CSE during I B.Tech., I Semester)
(Common to IT, AE, ECE during I B.Tech., II Semester)

Course Code(s): CEIT4, MEIT4, CSIT4, EE1T4, IT2T4, AE2T6, EC2T4 **Credits: 3**
Lecture: 3 periods/week **Internal assessment: 30 marks**
Semester end examination: 70 marks

Pre-requisites: Knowledge of sciences up to +2

Learning objectives:

- To develop an awareness, knowledge, and appreciation for the natural environment.
- To understand different types of ecosystems exist in nature.
- To know our biodiversity.
- To understand different types of pollutants present in Environment.
- To know the global environmental problems.

Course outcomes:

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

1. Develop an awareness, and appreciation for the natural environment.
2. Understand different types of ecosystems existing in nature.
3. Gain the knowledge of biodiversity.
4. Analyze different types of pollutants present in the Environment.
5. Identify the global environmental problems and find appropriate solutions.

UNIT – I

NATURAL RESOURCES:

FOREST RESOURCES – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people.

WATER RESOURCES - Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams - benefits and problems.

LAND RESOURCES: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

ENERGY RESOURCES: Renewable and non-renewable resources-Natural resources and associated problems growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case studies.

MINERAL RESOURCES: Use and exploitation problems, environmental effects of extracting and using mineral resources, case studies.

FOOD RESOURCES: World food problems, changes caused by agriculture and overgrazing,\effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Organic Farming, Bio fertilizers and Bio-pesticides

UNIT – II

ECOSYSTEMS: Definition, Scope and importance, Concept of an ecosystem - Structure and function of and ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem -Ecological succession. - Food chains, food webs and ecological pyramids, Flow of energy, Bio-geochemical cycles, Bio-magnification, Ecosystem values, Services and carrying capacity.

BIODIVERSITY AND ITS CONSERVATION: Introduction - Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India, India as a mega-diversity nation, Hot-sports of biodiversity, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic, option values and ecosystem service values. Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts. - Endangered and endemic species of India – Conservation of bio diversity: In-situ and Ex-situ conservation of biodiversity.

UNIT - III

ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution,
Thermal pollution, nuclear hazards

SOLID WASTE MANAGEMENT: Classification and characters of solid waste, factors affecting waste generation, collection and disposal of solid waste. E- Waste and management. Role of an individual in prevention of pollution – Pollution case studies.

UNIT – IV

GLOBAL ENVIRONMENTAL PROBLEMS AND GLOBAL EFFORTS: Green house effect, Green house gasses, Global warming, Climate change and their impacts on human environment, ozone layer depletion. International conventions / protocols: Earth summit, Kyoto protocol & Montreal protocol.

TOWARDS SUSTAINABLE FUTURE: From Unsustainable to Sustainable development, Population and its explosion, urban problems related to energy, Consumerism and waste products, Role of IT in Environment and human health. Value Education HIV/AIDS, Environmental ethics, Concept of green buildings and Clean Development Mechanism.

UNIT – V

ENVIRONMENTAL IMPACT ASSESSMENT & MANAGEMENT PLANS, ENVIRONMENTAL LAW

Definition of impact, Classification of impacts, Impacts of different components such as: human health, resources, air, water, flora & fauna. Environment management plans (EMP): Technological solutions for pollution control, Green-belt-development, Rain water harvesting, remote sensing and GIS methods.

Environmental law (Air, Water, Wild life, Forest Acts): Objectives of Acts, Institutional arrangements for Implementation and Regulation.

FIELD WORK: Visit to a local area to document environmental assets River /forest grass land/hill/mountain-Visit to a local polluted site Urban/Rural/industrial/ Agricultural Study of common plants, insects, birds. -Study of simple ecosystems pond, river, hill slopes, etc.

Learning Resources:

Text books:

1. Erach Bharucha, 2010 “Text Book of Environmental Studies”, University Grants Commission, Universities Press (India) Pvt. Ltd., Hyderabad.
2. Text Book of Environmental Sciences and Technology by M. Anji Reddy, BS Publications.

Reference books:

1. Text book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Text book of Environmental Science and Engineering by G.Tyler Miller Jr, 2006 Cengage learning
3. Text book of Environmental Studies from Crisis to Cure by R. RajaGopalan.
4. Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada

e-learning resources:

http://nptel.ac.in/courses.php,
http://jntuk-coeerd.in/

1/4 B.Tech. FIRST SEMESTER

ME1T5 **ENGINEERING DRAWING** **Credits: 3**

Lecture: 2 periods/week **Internal assessment: 30 marks**

Practice: 4 period /week **Semester end examination: 70 marks**

Pre-requisites: Mathematics and physics

Learning objectives:

- To visualize and communicate all geometrical elements and also understand the fundamentals of geometry like engineering curves, planes, solids, sections, developments & isometric views and its applications in the daily life.

Course outcomes:

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

1. Represent various conics and curves.
2. Construction of orthographic projections of Lines, Planes, and Solids, isometric projections and views.
3. Sectioning of various Solids and their representation.

UNIT-I

INTRODUCTION TO ENGINEERING DRAWING:

Use of Drawing instruments, Dimensioning, Representation of various type lines - Geometrical Constructions. Polygons-Construction of Regular Polygons using given length of a side.

SCALES: Construction and use of plain and diagonal scales.

CONIC SECTIONS: Conic sections - general construction method for ellipse, parabola and hyperbola. Special methods for conic sections.

CURVES: Curves used in Engineering practice - Cycloidal curves Cycloid, Epicycloid and Hypocycloid.

UNIT – II

PROJECTION OF POINTS AND PROJECTION OF STRAIGHT LINES:

Principles of Orthographic Projections Projections of Points and Lines inclined to both planes, True lengths, traces.

PROJECTIONS OF PLANES:

Projections of regular Planes inclined to both planes.

UNIT-III

PROJECTIONS OF SOLIDS:

Projections of simple solids such as, Cubes, Prisms, Pyramids, Cylinders and Cones with varying positions. Projections of Regular Solids inclined to both planes

UNIT – IV

SECTION OF SOLIDS:

Sections of solids such as Cubes, Prisms, Pyramids, Cylinders and Cones. True shapes of sections. (Limited to the Section Planes perpendicular to one of the
Principal Planes).

UNIT –V

ISOMETRIC PROJECTIONS AND TRANSFORMATION:

Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions – Isometric Views of Lines, Plane Figures, Conversion of Isometric Views to Orthographic Views. (treatment limited to simple objects).

Learning resources:

Text books:

1. Engineering Drawing by Bhatt, N.D. (49th edition), Anand Chartor Publications, 2007.
2. Engineering Graphics with Auto CAD 2008, (2nd edition) by Choudary, R.B., Anuradha Publishers, 2008.
3. Engineering Drawing, (2nd edition) by Narayana, K.L. and Kannaiah. Science tech publishers, 2007.

Reference books:

1. Engineering Drawing and Graphics, (1st edition) by Venugopal, K., New age Publication, 2012.
2. Engineering Drawing, (2nd edition) by Johle, D.A.,Tata Mcgraw-Hill,2008.
3. Computer Aided Engineering Drawing, (3rd edition) by Murthy Trymbaka, I.K. International, 2006.

e-learning resources:

1. http://www.youtube.com/watch?v=XCWJ_XrkWco
2. http://www.me.umn.edu/courses/me2011/handouts/drawing/blanco-tutorial.html#isodrawing

1/4 B.Tech. FIRST SEMESTER

CE1T6 BASIC MECHANICAL ENGINEERING Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Mathematics, physics and chemistry

Learning objectives:

- To acquire fundamental knowledge of mechanical engineering

Course outcomes:

At the end of the course the students have:

1. Gained fundamental knowledge about the basics of manufacturing methods.
2. Understanding of the principle of operation of different I. C. engines.
3. Knowledge to describe the performance of different types of refrigeration systems.
4. Learning about gear nomenclature, and the simple calculations in transmission of Power.

UNIT-I

Casting: Introduction, General method in making a Casting, pattern: types, materials and allowances. Moulding materials and equipment. Preparation, properties of moulding sands.
Welding: Principles of gas welding and arc welding, Soldering and Brazing;

UNIT-II

IC Engines: Introduction, Main components of IC engines, working of 4-stroke petrol engine and diesel engine, working of 2- stroke petrol engine and diesel engine, difference between petrol and diesel engine, difference between 4- stroke and 2- stroke engines.

UNIT-III

Refrigeration & Air Conditioning: Definition – COP, Unit of Refrigeration, Applications of refrigeration system, vapour compression refrigeration system, simple layout of summer air conditioning system..

UNIT-IV

Simple Stress and Strains: Elasticity and Plasticity – Types of stresses & strains – Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain- Elastic moduli & the relationship between them.
Properties of Materials: Physical properties - Mechanical properties – Electrical properties, Magnetic Properties and Chemical properties.

UNIT-V

Power Transmission: Introduction to belt and gears drives, types of gears, Difference between open belts and cross belts, power transmission by belt drives; (theoretical treatment only).
Power Plants: Introduction, working principle of hydro electric power plant and steam power plant, Alternate sources of energy – solar, wind and tidal power.

Learning resources:

Text books:

1. Fundamentals of Mechanical Engineering by Sawheny, G.S. (2^{nd} edition), Prentice-Hall Of India Pvt. Limited, New Delhi, 2009.
2. An Integrated Course in Mechanical Engineering by Rajput, R.K., (3^{rd} edition), Birla Publications, 2003.
3. I.C. Engines, (3^{rd} edition) by Ganesan,V., Tata McGraw-Hill, New Delhi, 2007.

Reference books:

1. Strength of Materials, (5th edition) by Rajput, R.K., S. Chand & Company, 2012.
2. Thermal Engineering, (6th edition) by Rajput, R.K., Lakshmi Publications, 2006.
3. Thermodynamics and Heat Engines, (7th edition) by Yadav, R. Central Book Depot, 1999.
4. Strength of Materials, (4th edition) by Bansal, R.K., Laxmi Publishers, 2009.

e-learning resources:

1. www.engiblogger.com/mechanical/mechan
2. www.indiastudychannel.com/resources/5...

1/4 B.Tech. FIRST SEMESTER
ENGNEERING CHEMISTRY LAB
(Only for CE during I B.Tech., I Semester)
(Common to AE, ME during I B. Tech., II emester) **Credits: 2**
Course Code(s): CE1L1, ME2L1, AE2L1

Lab: 3 periods/week **Internal assessment: 25 marks**
Semester end examination: 50 marks

Pre-requisites: Knowledge up to +2

Course objectives:
At the end of course the student will have:

- Familiarity with quality and parameters of water samples, useful for drinking effluent treatment and agriculture purposes.
- Awareness of preparation of some plastic material and corrosion kinetics useful in industries.
- Knowledge of measuring the properties of the lubricants which are industrially useful.

Course outcomes:
At the end of this course, the students will be able to
1. Gain knowledge of hardness, alkalinity, turbidity, Dissolved oxygen of Water sample, students can understand different methods of water treatment.
2. Analyze the nature of the soil from pH values the types of fertilizers and pesticides to be used cab be decided.
3. Apply the knowledge of preparation of Bakelite in industries.
4. Assess the Viscosity, flash and fire point saponification value and acid number of different lubricants; these parameters are useful in avoiding fire hazards in industries.

LIST OF EXPERIMENTS
ANY TEN OF THE FOLLOWING:

1. Determination of Total Hardness of water sample using EDTA.
2. Determination of Total alkalinity of water sample.
3. Determination of D.O in water.
4. Measurement of Turbidity of water sample.
5. Conduct metric titration of Acid Vs Base.
6. pH of Soil and fruits.
7. Preparation of Phenol-Formaldehyde resin.
8. Determination of Corrosion rate of mild steel in the absence and presence of an inhibitor.
9. Determination of Viscosity of heavy oil RED WOOD Viscometer.
10. Determination of Flash and Fire point of a Lubricating oil by Pen sky-martens apparatus.
11. Determination of Saponification value of Vegetable oil
12. Determination of Acid number of a Lubricant oil.

1/4 B.Tech. FIRST SEMESTER

CE1L2	**IT WORKSHOP**	**Credits: 2**
Lecture: --		**Internal assessment: 25 marks**
Lab : 3 periods/week		**Semester end examination: 50 marks**

Pre-requisites: Introduction to Computing, Basic computing Lab

Learning objectives:

- To provide students with hands-on experience in basic hardware, productivity tools and basic operating system installations.

Course outcomes:

After Completion of this Course the Student would be able to:

1. Identify the basic computer peripherals.
2. Gain sufficient knowledge on assembling and disassembling a PC.
3. Learn the installation procedure of Windows and Linux OS.
4. Acquire knowledge on basic networking infrastructure.
5. Learn productivity tools like Word, Excel and Power point.
6. Acquire knowledge on basics of internet and worldwide web.

Prerequisite: Basic Knowledge on Computers.

Task 1:

Identification of the peripherals of a computer:To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices

Task 2:

A practice on disassembling the components of a PC and assembling them.

Task 3:

Basic DOS commands, Installation of MS windows.

Task 4:

Introduction to Linux- Installation Procedure, Basic Linux Commands.

Task 5:

Hardware Troubleshooting (Demonstration): Identification of a problem and fixing the solution (improper assembly or defective peripherals).

Software Troubleshooting (Demonstration): Identification of a problem and fixing the PC for any software issues.

Task 6:

Demonstrating Importance of Networking, Transmission Media, Networking Devices Gateway, Routers, Hub, Bridge, NIC ,Bluetooth Technology, Wireless Technology, Modem, DSL, Dialup Connection.

Task 7:

MS Word Orientation: Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting ,Drop Cap , Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving

Task 8:

Creating project : Abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check , Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

Task 9:

Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations **Creating a Scheduler** - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text LOOKUP/VLOOKUP

Task 10:

Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Task 11:

Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in Power point.

Focusing on the power and potential of Microsoft power point. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides, OLE in PPT.

Task 12:

Students should get connected to their Local Area Network and access the Internet. In the process they should configure the TCP/IP setting and demonstrate how to access the websites and email, Customizing web browsers using bookmarks, search toolbars and pop up blockers, Search engines and their usage.

Learning Resources:

Reference books:

1. Computer Fundamentals, Anita Goel, Pearson
2. Information Technology Workshop,3e, G Praveen Babu, M V Narayana BS Publications.
3. Introduction to Information Technology-ITL Education Solution Limited- Pearson.
4. Fundamentals of Information Technology, 2nd Edition, Alexis Leon, Mathews Leon, (Leon Vikas).

1/4 B.Tech. FIRST SEMESTER
ENGLISH LANGUAGE COMMUNICATION SKILLS LAB
(Common to CSE, IT, EEE, CE, ECE during I B.Tech., I Semester)
(Common to ME, AE during I B.Tech., II Semester)
Course Code(s): CE1L3, CS1L1, IT1L1, EE1L1, EC1L1, ME2L2, AE2L2

Credits: 2

Lab: 3 periods/week **Internal assessment: 25 marks**

Semester end examination: 50 marks

Pre-requisites: English subject up to +2

Course objectives:

At the end of course the student will have:

- Communication ability.
- Enhanced general conversational skills in different socio-cultural contexts.
- Strengthened professional skills.
- Confidence and competitive enough to express themselves fluently.
- Exposure the students to various spoken skills.

Course outcomes:

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

1. Gain knowledge of right pronunciation and accent.
2. Develop an ability to use functional English.
3. Develop analytical skills and problem solving skills.

Task I: Phonetics

Introduction to sounds of English.
Phonetic transcription of simple words.
Word stress or accent.
Intonation.

Task II: Spoken skills

JAM
Public speaking
Debate

Task III : Conversation skills

Introducing
Extending Invitations
Apologizing
Lodging complaints.

Task IV: Describing

Describing an object
Describing a process
Describing situations

Task V: Group Discussion

Dynamics of Group Discussion
Various strategies
Discussion on various topics

Learning Resources:

Reference books:

1. Everyday dialogues in English------Robert J.Dixon.
2. Speak well------orient black swan.

1/4 B.Tech. SECOND SEMESTER
ENGINEERING MATHEMATICS –II
(Common to all branches during I B.Tech., II Semester)
Course Code(s): CE2T1, ME2T1, CS2T1, IT2T1, AE2T1, EE2T1, EC2T1

Credits: 3

Lecture: 3 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period /week **Semester end examination: 70 marks**

Pre requisites: Engineering mathematics I

Learning objectives:

- After completion of this course engineers will be able to apply the concepts of matrices, Laplace transforms, Fourier series, Fourier transforms in solving engineering problems.
- Linear algebra in the course cover material which is essential to anyone who does mathematical computation in Engineering and sciences.

Course outcomes:

At the end of the course student will be able to

1. Solve linear system of equations.
2. Determine the eigen values and eigen vectors of given square matrix and able to find inverse, power of a matrix using Cayley-Hamilton theorem.
3. Find Laplace transforms, inverse Laplace transforms of the given functions and able to apply Laplace transforms to solve differential equations with initial conditions.
4. Write given function in terms of sine and cosine terms in Fourier series and also to get knowledge in Fourier transforms.
5. Solve finite difference equations using Z-transforms.

UNIT – I
MATRICES AND LINEAR SYSTEMS OF EQUATIONS:
Rank-Echelon form, Normal form-definition of a vector, linear independence – Solution of Linear System of equations – Direct Methods- Gauss Elimination - Gauss Jordon and Gauss Seidal Methods.

UNIT – II
EIGEN VALUES - EIGEN VECTORS:
Eigen values - Eigen vectors - Properties – Cayley-Hamilton Theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem- some applications of eigen value problems- Diagonalization of a matrix.

UNIT III
LAPLACE TRANSFORMS & INVERSE LAPLACE TRANSFORMS
LAPLACE TRANSFORMS: Laplace transforms of standard functions –Shifting Theorems, Transforms of derivatives and integrals – Unit step function –Dirac's delta function.
INVERSE LAPLACE TRANSFORMS: Convolution theorem - Application of Laplace transforms to ordinary differential equations with given initial conditions.

UNIT – IV
FOURIER SERIES AND FOURIER TRANSFORMS:
FOURIER SERIES: Determination of Fourier coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval– Half-range sine and cosine series.
FOURIER TRANSFORMS: Fourier integral theorem (only statement) – Fourier sine and cosine integrals - Fourier transform – sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

UNIT – V

Z-TRANSFORMS:

Introduction, properties of Z-transforms-initial value theorem-final value theorem-inverse Z-transforms-applications to difference equations.

Learning Resources:

Text books:

1. Higher Engineering Mathematics – Khanna Publishers – B.S. Grewal – 42nd Edition.
2. Advanced Engineering Mathematics – Wiley – Erwin Kreyszig- 8th Edition.

Reference books:

1. Engineering Mathematics Vol-II, Iyengar,T.K.V, Krishna Gandhi, et.al S.Chand Co. New Delhi.

e-learning resources:

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

http://jntuk-coeerd.in/

1/4 B.Tech. SECOND SEMESTER
PROFESSIONAL ETHICS
(Common to all branches during I B.Tech., II Semester)
Course Code(s): CE2T2, ME2T2, CS2T2, IT2T2, AE2T2, EE2T2, EC2T2

Credits: 3

Lecture: 3 periods/week **Internal assessment: 30 marks**
Semester end examination: 70 marks

Pre requisites: Knowledge of civics

Learning objectives:

- To inculcate the sense of social responsibility.
- To develop a firm ethical base
- To make the students realize the significance of ethics in professional environment.

Course outcomes:

At the end of course the student will have:

1. Improved knowledge of ethics
2. High sense of responsibility
3. Environmental awareness
4. Professional outlook
5. Development of a broad culture.

Syllabus:

Unit I

Profession-----Definition, Three types of ethics, Engineering ethics, Rights and responsibilities of an engineer.

Unit II

Evolution of engineering ethics, Code of ethics, Kohlberg's theory, Gilligan's theory

Unit III

Engineering as social experimentation, Engineer's social responsibility

Unit IV

Computer ethics, Ethical hacking, Privacy

UNIT V

Environmental ethics. Livable environment, Technology assessment.

Learning Resources:

Reference books:

1. Ethics in engineering: Mike W.Martin Roland, Mac Grow Hill.Schinzinger
2. Engineerinethics-----M.Govindarajan, S.Natarajan&V.S.Senthil Kumar. Eastern economy Edn.PHI
3. Engineering ethics---Harris pitch and Rabbins, cengage.
4. Caroline whit back---Ethics in engineering practice and research-----Cambridge.

e-learning resources:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

1/4 B.Tech. SECOND SEMESTER
ENGINEERING PHYSICS
(Common to EEE, AE, ME, ECE during I B.Tech, I Semester)
(Common to CSE, IT, CE during I B.Tech, II Semester)

Course Code(s): EE1T3, AE1T3, ME1T3, EC1T3, CS2T3, IT2T3, CE2T3 **Credits: 3**
Lecture: 3 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period /week **Semester end examination: 70 marks**

Pre requisites: Physics up to +2

Learning objectives:

To make student understand

- The concepts of Quantum Physics.
- The theoretical picture about a crystal structure.
- How to determine the different crystal structures by using X-diffraction techniques.
- The properties of different types of solids and to have the knowledge about the energy-band diagram in the materials.
- The advanced topics such as lasers,fibre optics and nano- materials.

Course outcomes:

After completion of the course the student will be able to

1. Understand the basic concept of quantum physics
2. Understand the crystal structures and determine the crystal structure by applying the X-ray diffraction Techniques.
3. Comprehend free electron theories and classification of materials
4. Knowledge of semi conductors
5. Relate the basic concepts of Optical fiber and understand the communication system.

UNIT-I
QUANTUM PHYSICS

Planck's black body theory of radiation - Debroglie hypothesis – Properties of matter waves –G.P. Thomson experiment– Davison and Germer experiment – Heisenberg uncertainty principle –Time independent & Time dependent Schrödinger wave equation – physical significance of wave function – Particle in one dimensional potential box.

UNIT-II
CRYSTAL STRUCTURE & X-RAY DIFFRACTION:

Introduction – Space lattice – Basis - unit cell - Lattice parameters – Bravais lattices
– Crystal systems – Structure and packing fraction of simple , bcc , fcc crystals. Directions and planes in crystals – miller indices –Distance between successive parallel planes- Diffraction of X rays – Bragg's law –Laue method- Powder method.

UNIT-III
PHYSICS OF SOLIDS-I

Classical free electron theory-Quantum free electron theory- Fermi Dirac distribution function-Bloch theorem- Kronig penny model (qualitative treatment)- Classification of materials .
Dielectric constant – electronic, ionic and orientation polarizations–internal fields in solids – Clausius Mossotti relation –causes of dielectric breakdown.

UNIT-IV
PHYSICS OF SOLIDS-II

Introduction – intrinsic semiconductor and carrier concentration- Fermi level in intrinsic

semiconductor conductivity in intrinsic semiconductor– extrinsic semiconductor –carrier concentration- Fermi level in extrinsic semiconductor – Drift and diffusion current – Einstein's relations – Direct and Indirect band gap semiconductors.
Origin of magnetic moment – classification of magnetic materials – Hysteresis curve – soft and hard magnetic materials- applications.

UNIT-V
ADVANCED PHYSICS
Lasers Characteristics of lasers – spontaneous and stimulated emission of radiation – population inversion – pumping – Ruby, Helium-Neon & Semiconductor lasers-Applications of lasers.
Fiber optics Principle of optical fiber – Acceptance angle and numerical aperture – Attenuation in optical fibers – applications of optical fibers.
Introduction – Surface to volume ratio- Quantum confinement effect- properties and preparation of nanomaterial – nanotubes – SWNT- MWNT- Applications of nanomaterials.

Learning Resources:
Text books:
1. Solid state Physics by S.O.Pillai. (New Age International Publications)
2. Engineering physics by M.R.Srinivasan (New Age International Publications).

Reference books:
1. Engineering physics by D.K.Bhattacharya and A.Bhaskaran. (Oxford Publications).
2. Engineering physics by R.K Gaur and S.L. Gupta, Dhanpat Rai Publication

e-learning resources:
http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

1/4 B.Tech. SECOND SEMESTER

CE2T4 ENGINEERING MECHANICS Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre requisites: Engineering mathematics and physics

Learning objectives:

- To understand the basic principles, fundamental concepts and theory with adequate problems of static and dynamics of rigid bodies.
- To gain an appropriate knowledge of centroid, moment of inertia, friction and principle of virtual work.

Course outcomes:

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

1. Analyze system of forces and moments to equivalent systems and solve systems with friction.
2. Locate centroid and determine moment of inertia for composite areas.
3. Determine the mass moment of inertia of rigid bodies and analyze motion of particles & rigid bodies using the principle of virtual work.
4. Analyze kinematics and kinetics of rectilinear motion.
5. Analyze curvilinear motion and rotation of rigid bodies.

UNIT – I

SYSTEM OF FORCES:

Principles of statics, Composition and resolution of forces, Free body diagram, Equilibrium of Coplanar Concurrent in a plane, Equilibrium of concurrent forces in a plane, Method of projections, Moment of a force, Method of moments.

FRICTION:

Introduction, Classification of friction, Laws of dry friction, Co-efficient of friction, Angle of friction, Angle of repose, Cone of friction, Wedge friction.

UNIT – II

CENTROID:

Determination of centroid of simple figures by integration method, Centroid of composite plane figures, Pappus theorem,

AREA MOMENT OF INERTIA:

Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of composite figures, Products of Inertia, Transfer Formula for Product of Inertia

UNIT – III

MASS MOMENT OF INERTIA:

Mass Moment of inertia of a rigid body – Mass Moment of inertia of laminas- slender bar, rectangular plate, Circular plate, circular ring, Mass Moment of inertia of 3D bodies- cone, solid cylinder, sphere & parallelepiped.

PRINCIPLE OF VIRTUAL WORK:

Equilibrium of Ideal systems, Potential energy and stability: Stable and Unstable Equilibrium, Application on the principle of virtual work.

UNIT – IV

KINEMATICS OF RECTILINEAR MOTION:

Introduction to dynamics, Principles of Dynamics, Kinematics of rectilinear Motion with Uniform and Variable acceleration, Differential equation of rectilinear motion.

KINETICS OF RECTILINEAR MOTION:
Equations of rectilinear motion. Equations of Dynamic Equilibrium: D'Alembert's Principle, Work and Energy, Conservation of energy, Impulse and Momentum, Impact- Direct central Impact.

UNIT – V
CURVILINEAR MOTION:
Kinematics of curvilinear motion, Differential equations of curvilinear motion, Motion of a projectile, D'Alembert's Principle, Moment of momentum, Work and energy.
ROTATION OF RIGID BODIES:
Kinematics of rotation, Equation of motion for a rigid body rotating about fixed axis, Rotation under action of a constant moment, Angular momentum in rotation.

Learning Resources:
Text books:
1. Engineering Mechanics, (4th edition) by Timoshenko, S. and Young, D.H., Tata McGraw-Hill, 1956.(For Concepts and symbolic Problems).
2. Engineering Mechanics Statics and dynamics, (14th edition) by Tayal, A.K., Umesh Publication, Delhi, 2012.

Reference books:
1. Vector Mechanics for Engineers Statics and Dynamics, (3rd edition) by Beer and Johnston., Tata McGraw-Hill, New Delhi, 1997.
2. Engineering Mechanics by Bhavikatti, S.S. and Rajasekharappa, J.G., New Age International Publications, 2009.
3. Singer's Engineering Mechanics Statics and Dynamics, (3rd Edition) by Vijaya Kumar Reddy, K. and Suresh Kumar. J.,BS Publications, 2012.

e-learning resources:
1. http://openlibrary.org/books/OL22136590M/Basic_engineering_mechanics
2. http://en.wikibooks.org/wiki/Engineering_Mechanics
3. http://nptel.iitm.ac.in/video.php?courseId=1048
4. http://imechanica.org/node/1551
5. http://emweb.unl.edu/
6. http://ebooks-freedownload.com/2009/11/engineering-mechanics statics12.html
7. http://www.ebookee.com/Engineering-Mechanics-Statics_37859.html
8. http://nptel.ac.in/courses.php, http://jntuk-coeerd.in/

1/4 B.Tech. SECOND SEMESTER

CE2T4 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre requisites: Engineering mathematics and physics

Learning Objectives:

- To impart the basic knowledge about the Electric circuits
- To understand the working of various Electrical Motors and Transformers
- To know about working of various Electronic devices and operation
- To impart the basic knowledge about methods of electric power generation

Course outcomes:

At the end of the course the students will have:

1. Basic knowledge about different methods of electric power generation
2. Basic knowledge about the Electric circuits
3. Understanding about the working of various Electrical Motors
4. Understanding about the construction and operation of Transformers
5. Understanding about the operation of Diode and Transistors

UNIT I

GENERATION OF ELECTRIC POWER

Sources for generating electric power – conventional and non conventional

CONVENTIONAL SOURCES Hydel stations, thermal stations and gas turbine stations - general layout of hydro electric plant and function of each component – thermal power station – layout of modern thermal plant – brief description of each component - layout of gas turbine power station – components of gas turbine power plant –

NON CONVENTIONAL SOURCES Solar energy – solar constant – layout of solar thermal power plant – photovoltaic cell **–** power from solar modules - PV system design **–** power generation using wind energy

UNIT II

ELECTRICAL CIRCUITS

Basic definitions, Types of elements, Classification of different sources, Ohm's Law, Kirchhoff's Laws, Resistive networks, Inductive networks, capacitive networks, Series, Parallel circuits and Star-delta and delta star transformations. (simple problems)

UNIT – III

ELECTRICAL MOTORS

THREE PHASE AC MOTORS

Construction and principle of operation of a 3 phase induction motor, Types of Rotors- Torque equation- Slip Torque Characteristics, Types of starters. (descriptive treatment only)

SINGLE PHASE AC MOTORS

Construction and principle of operation of single phase induction motor viz: capacitor start, capacitor start and run, split phase, shaded pole and universal motor – speed torque characteristics and their industrial applications

UNIT IV

TRANSFORMERS

Classification of transformers based on construction, Principle of operation of single phase transformers – emf equation – losses – efficiency and regulation

WELDING TRANSFORMERS

Introduction to Arc welding - construction and principle of single phase welding transformer – and DC welding generator and their application – comparison between AC and DC welding

UNIT V

DIODES AND TRANSISTORS:

Semiconductors, Types, Construction and working of P-N junction diode, symbol, Diode Applications, Rectifiers – Half wave, Full wave and Bridge rectifiers (Descriptive treatment only), Principle of Zener diode and application.

Construction and working P-N-P and N-P-N Junction transistor, Transistor as a switch and amplifier, Single stage CE Amplifier, Frequency response of CE amplifier. (descriptive treatment only)

Learning resources:

Text books:

1. A course in Power systems by JB Gupta, Kataria publications
2. Principles of Electrical and Electronics Engineering, (1st edition) by Mehta, V.K., S. Chand & Co, 2012.

Reference books:

1. Introduction to Electrical Engineering by Naidu, M.S. and Kamakshaiah, S., Tata McGraw-Hill, 1995.
2. Basic Electrical Engineering, (3rd Edition) by Kothari and Nagarath., Tata McGraw-Hill, 2009.

e-learning resources:

www.jntuk-coerd.in ,
www.nptel.ac.in

1/4 B.Tech. SECOND SEMESTER

CE2T6 **C PROGRAMMING** **Credits: 3**

Lecture: 3 periods/week **Internal assessment: 30 marks**

Tutorial: 1 period /week **Semester end examination: 70 marks**

Pre requisites: Introduction to Computing, Basic computing Lab, mathematics

Learning objectives:

- Learn the structure, syntax and semantics of C programming.
- Learn different control structures like decision control, loop control and arrays.
- Learn the modular programming concepts and storage classes.
- Learn the limitations of basic data types and learn the concepts of derived data types and user defined data types.
- Learn how to perform various FILE I/O.

Course outcomes:

After completion of this course the student would be able to:

1. Understand the fundamentals of C programming.
2. Choose the decision making statements, loops and arrays to solve the problem.
3. Use functions to solve the given problem.
4. Allocate dynamic memory using pointers.
5. Apply the structures, unions and files Operations in a specific need.

UNIT –I

TOPIC LEVEL OBJECTIVE: Notion of Computer Languages, algorithm, computational procedure, editing and executing programs and C Declarations.

BASICS AND INTRODUCTION TO C:

Basics of Computer, Introduction to C, About ANSI C Standard, Machine, Assembly and High-level Language, Assembler, Compiler and Interpreter, Structure of a C program, Programming Rules, Executing the C Program, Standard Directories, Advantages of C, Header Files, Flow Chart, Algorithm, Analyzing Algorithm, Classification Algorithms.

THE C DECLARATIONS: The C-Character set, Delimiters, Types of Tokens, The C keywords, Identifiers, Constants, Variables, C Data types, dynamic initialization, type modifiers, type conversions, constant and volatile variables. Properties of Operators, Operator Priority ,comma and conditional operators, arithmetic, relational, assignment operators and expressions, logical , bitwise operators. Input and output in c: Formatted and Unformatted functions.

UNIT-II

Topic Level Objective: Understanding branching, iteration, data representation using arrays and strings.

DECISION STATEMENTS:

The if statement, if-else, nested if else, if-else-if ladder, break, continue, goto, Switch statement, nested switch case, Switch case and nested ifs.

LOOP CONTROL: for loop, nested for loop, while, do-while, do-while statement with while loop.

ARRAYS:

Array initialization, array terminology, characteristics of an array, 1-D array and its operations, predefined streams, 2-D arrays and operations, Multi -dimensional arrays.

STRINGS: Declaration and initialization of string, string standard functions, string conversion functions, memory functions, application of strings.

UNIT-III

Topic Level Objective: Modular programming and recursive solution formulation and storage classes.

FUNCTIONS:
Basics, function definition, return statement, types of functions, call by value ,call by reference, function as an argument, Functions with operators, Function and Decision Statements, Functions and loop Statements, Functions with arrays and Pointers, Recursion-Types of Recursion, Rules for Recursive Function, Recursion versus Iterations, Advantages and Disadvantages of Recursion, Efficiency of Recursion, Library Functions.
STORAGE CLASS: Variable Lifetime, Automatic Variables, External Variables, Static Variables, Register Variables.

UNIT-IV
Topic Level Objective: Understanding pointers, dynamic memory allocation and Preprocessor Directives.
POINTERS:
Features of pointers, pointers and address, pointer declaration, void pointers, arithmetic operations with pointers, pointers and arrays, array of pointers, pointers to pointers, pointers and strings. Dynamic memory allocation, memory models, memory allocation functions.
PREPROCESSOR DIRECTIVES:
The #define Directive, Undefining a Macro, Token Pasting and Stringizing Operators, The #include Directive, Conditional Compilation, The Predefined Macros in ANSI and Turbo-C, Standard I/O Predefined Streams in stdio.h, The Predefined Macros in ctype.h.

UNIT V
Topic Level Objective: Understanding derived data types of C and basic of file operations.
STRUCTURE AND UNION: Features of Structures, Declaration and initialization of Structures, Structure within Structure, Arrays of Structure, Pointer to Structure, Structure and functions, typedef, Bit fields, Enumerated Data Type, Union, Union of Structures.
FILES: Streams and File Types, Steps for File Operations, FILE I/O, Structures Read and Write, Other file function, Command line Arguments, Application of command line arguments, Environment variables.

Learning resources:
Text book:
1. Programming in C, by Ashok N.Kamthane, (2nd edition), Pearson publications,2011.

Reference books:
1. Programming in ANSI C (5th Edition) by E.Balaguruswamy, McGraw-Hill publications.
2. A first book of ANSI C, 3rd edition, by Gray J.Brosin, cengage delmar Learning India P.ltd publications.
3. Problem Solving with C by M.T Somashekara PHI publications.
4. C Programming Language", (2nd edition) by Brain W.Kernighan & Dennis Ritchie, ", PHI publication

e-learning resources:
http://nptel.ac.in/courses.php,
http://jntuk-coeerd.in/

1/4 B.Tech. SECOND SEMESTER
ENGNEERING PHYSICS LAB
(Common to AE, ME during I B.Tech., I Semester)
(Only for CE during I B.Tech., II Semester)

Course Code(s): ME1L1, AE1L1, CE2L1 **Credits: 2**

Internal assessment: 25 marks

Lab: 3 periods/week **Semester end examination: 50 marks**

Pre-requisites: Knowledge of physics up to +2

Course objectives:

To make student

- Learn how to determine the elastic constant.
- Knowledgeable about the resonance so as to determine the velocity of sound.
- Acquire the concept of diffraction hence determine the wavelength of monochromatic source.
- Gain the knowledge of interference and determine the radius of curvature of a lens.
- Acquainted with geometrical optics and by determining the refractive index of the prism.
- Understand the concept of electromagnetism and determining the magnetic induction.
- Learn the knowledge of electrical circuit by calculating the time constant.
- Study the characteristic curves of zener diode.
- Understand the semiconductors by determining the energy gap of a semiconductor. .
- Study the characteristic curves of thermistor and to determine the thermoelectric coefficient.
- Get the knowledge of advanced topics such as optical fibers by determining numerical aperture and attenuation.

Course outcomes:

After completion of this course, student will be able to

1. Apply practical knowledge to determine rigidity modulus.
2. Learn the concept of refraction, interference, diffraction and able to conduct experiment to determine the optical parameters such as Refractive index, wavelength and Radius of curvature.
3. Relate their knowledge of the sound for conducting experiment to verify laws of transverse waves and to determine the velocity of sound

LIST OF EXPERIMENTS
ANY TEN OF THE FOLLOWING

MECHANICS:

1. Determine the rigidity modulus of the material of the wire using torsional pendulum

SOUND

1. Determine the velocity of sound by volume resonator method.

OPTICS:

1. Determine the wavelength of a source by normal incidence method using diffraction grating
2. Determine the radius of curvature of a plano convex lens by forming Newton's rings
3. Determine the refractive index of the material of the prism (minimum deviation method) using spectrometer.

ELECTRICITY AND MAGNETISM:

1. Study the variation of magnetic field along the axis of a solenoid coil using Stewat – Gee's apparatus.

2. Determine the time constant for a C-R circuit.

ELECTRONICS:

1. Study of characteristic curves of a zener diode to determine its break down Voltage
2. Determine band gap of semiconductor using a p-n junction diode.
3. Draw the characteristic curves and determine thermoelectric coefficient of thermistor.
4. Determine the Numerical Aperture of an optical fibre.
5. Determine the attenuation in the optical fibre.

1/4 B.Tech. SECOND SEMESTER

CE2L2 **ENGINEERING WORKSHOP** **Credits: 2**

Lecture: -- **Internal assessment: 25 marks**

Lab Practice: 3 periods/week **Semester end examination: 50 marks**

Pre requisites: Knowledge of physics and mathematics

Learning objectives:

- Illustrate about basic hand tools used in various trades such as Carpentry, Tin-Smithy, Fitting House wiring, Black smithy..
- Imparting skills to prepare basic joints in Carpentry.
- Imparting skills to fabricate various objects by using sheet metal.
- Know various basic house wiring connections.
- Imparting skills to fabricate various shapes by using black smithy.

Course outcomes:

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

1. Prepare basic joints used in carpentry
2. Prepare edges for better joint for fitting
3. Perform basic house wiring connections
4. Prepare various shapes and objects by using Tin smithy and Black smithy.

TRADE:

CARPENTRY	1. T-Lap Joint 2. Cross Lap Joint 3. Dovetail Joint 4. Mortise and Tennon Joint
FITTING	1. Vee Fit 2. Square Fit 3. Half Round Fit 4. Dovetail Fit
BLACK SMITHY	1. Round rod to Square 2. S-Hook 3. Round Rod to Flat Ring 4. Round Rod to Square headed bolt
HOUSE WIRING	1. Parallel / Series Connection of three bulbs 2. Stair Case wiring 3. Florescent Lamp Fitting 4. Measurement of Earth Resistance
TIN SMITHY	1. Taper Tray 2. Square Box without lid 3. Open Scoop 4. Funnel

1/4 B.Tech. SECOND SEMESTER

CE2L3 COMPUTER PROGRAMMING LAB Credits: 2

Lecture: -- Internal assessment: 25 marks

Lab : 3 periods/week Semester end examination: 50 marks

Pre-requisites: Introduction to Computing, Basic computing Lab, Knowledge on C Programming

Learning objectives:

- To make the student learn a programming language.
- To learn problem solving techniques.
- To teach the student to write programs in C and to solve the problems.

Course outcomes:

After Completion of this course the student would be able to:

1. Read, understand and trace the execution of programs written in C language.
2. Write the C code for a given algorithm.
3. Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
4. Write programs that perform operations using derived data types.

Exercise 1: Basics

1. Write a program to print sample strings like "hello world", "Welcome to C Programming" with different formats using escape sequences.
2. Write a Program to print different data types in 'C' and their ranges.
3. Write a Program to initialize, assignment & printing variables of different data types.

Exercise 2: Operators

1. Write a Program to demonstrate arithmetic operators. (+,-,*,/,%)
2. Write a Program to demonstrate logical operators.(logical AND, logical OR)
3. Write a Program to read radius value from the keyboard and calculate the area of circle and print the result in both floating and exponential notation.
4. Write a Program to calculate simple interest.
5. Write a Program to convert temperature. (Fahrenheit –Centigrade and vice-versa)

Exercise 3: Operators

1. Write a Program to demonstrate relational operators.(<,>,<=,>=,==,!=)
2. Write a program to check equivalence of two numbers using conditional operator.
3. Write a Program to demonstrate pre increment and post increment.(++a, a++ where a is a value to be initialized)
4. Write a Program to demonstrate pre decrement and post decrement.(--a, a--where a is a value to be initialized)
5. Write a program for computing the volume of sphere, cone and cylinder assume that dimensions are integer's use type casting where ever necessary.

Exercise 4: Decision Statements

1. Write a Program to read marks of a student in six subjects and print whether pass or fail (using if-else).
2. Write a Program to calculate roots of quadratic equation (using if-else).
3. Write a Program to calculate electricity bill. Read starting and ending meter reading. The charges are as follows.

No. of Units Consumed	Rate in(Rs)
1-100	1.50 per unit
101-300	2.00 per unit for excess of 100 units
301-500	2.50 per unit for excess of 300 units
501-above	3.25 per unit for excess of 500 units

Exercise 5: Switch operations

1. Write a Program to perform arithmetic operations using switch case.
2. Write a Program to display colors using switch case (VIBGYOR).
3. Write a Program to display vowels and consonants using switch case.
4. Write a Program to display names of days in a Week using switch case.

Exercise 6: Basic Loop operations

Do the Following Programs Using for, while, do-while loops.

1. Write a program to calculate sum of individual digits of a given number.
2. Write a program to check whether given number is palindrome or not.
3. Write a program to print prime numbers in the given range.
4. Write a program to display multiplication tables from 1 to 10 except 3 and 5.

Exercise 7: Advanced loops

1. Write a program to print the Fibonacci series for given 'N' value.
2. Write a program to check whether a given number is a Fibonacci number or not.
3. Write a program to read 2 numbers x and n then compute the sum of the Geometric Progression. $1+x+x^2+x^3+ \text{- - - - - - - } +x^n$
4. Write a program to print the following formats.

1	*
1 2	* *
1 2 3	* * *
1 2 3 4	* * * *

Exercise 8: 1-D arrays

1. Write a program to store 10 elements in the 1-D array and print sum of the array.
2. Write a program to print minimum and maximum elements in the 1-D array.
3. Write a program to count no. of positive numbers, negative numbers and zeros in the array.
4. Write a program to search the given element by using linear search.
5. Write a program to sort the given elements using bubble sort technique.

Exercise 9: 2-D arrays

1. Write a program to perform matrix addition and matrix subtraction.
2. Write a program to perform matrix multiplication by checking the compatibility.
3. Write a program to print the transpose of a matrix.

Exercise 10: Strings

1. Write a program to perform various string manipulations using built-in functions.
2. Write a program to print the given strings in ascending order.
3. Write a program to verify the given string is palindrome or not (without built-in functions, with using built-in functions).
4. Write a program to concatenate two strings using arrays.

Exercise 11: Math Functions and I/O Funtions

1. Write a program to read values from keyboard and find the values using abs(),sqrt(),floor(),ceil()and pow().
2. Write a program to read and display a value using getch() and putch().
3. Write a program to read and display a value using getchar(), putchar(),gets() and puts().

Exercise 12: Functions

1. Write a program to find sum of two numbers using functions.
2. Write a program to find product of two numbers using functions without arguments, without return type.
3. Write a program to find difference of two numbers using functions without arguments, with return type.
4. Write a program to find sum of two numbers using functions with arguments & without return type.
5. Write a program to find product of two numbers using functions with arguments, with return type.

Exercise13: Functions and Recursion

1. Write a program to swap two numbers using
   a) Call By Value B) Call By Reference.
2. Write a program to calculate factorial, gcd using recursion and non-recursion functions.
3. Write program to perform arithmetic operations using pointer.
4. Write a program matrix addition using pointers.

Exercise14: Structures

1. Write a program to create structure for an account holder in a bank with following Fields: name, account number, address, balance and display the details of five account holders.
2. Write a program to find total marks of individual student and average marks for 10 students using structures.
3. Write a program to create structure called traveler and members of structure are train no, coach no, seat no, source ,destination , gender, age, name and departure date.
4. Write a program to illustrate passing an entire structure to a function.

Exercise15: File operations using command line arguments

1. Write a program which copies the contents of one file to another file using command line arguments.
2. Write a program to reverse the first n characters in a file use command line arguments.

Learning Resources:

Text books:

1. Problem Solving and Program Design in C, Jeri R. Hanly, Ellot B. Koffman, 5th Edition, Pearson.
2. Programming in C by P.Dey & M. Ghosh, Oxford University Press.

Reference books:

1. Problem Solving and Program Design in C, 4th edition, by jeri R. Hanly and Elli B. Koffman.
2. Programming in C by Pradip Dey, Manas Ghosh 2nd edition Oxford University Press.
3. E.Balaguruswamy, Programming in ANSI C 5th Edition McGraw-Hill
4. A first book of ANSI C by Gray J.Brosin 3rd edition Cengagedelmer Learning India P.Ltd
5. AL Kelly, Iraphol,Programming in C,4th edition Addison-Wesley –professional
6. Brain W.Kernighan & Dennis Ritchie, C Programming Language, 2nd edition, PHI

2/4 B.Tech. THIRD SEMESTER

CE3T1 **MATHEMATICAL METHODS** **Credits: 3**

Lecture: 3 periods/week **Internal assessment: 30 marks**

Tutorial: 1 period /week **Semester end examination: 70 marks**

Pre-requisites: Engineering Mathematics

Learning objectives:

Students learn to find approximate root of algebraic and transcendental equations and get familiarity with interpolation. They get good exposure to numerical solution of Ordinary differential equation. Interpret ideas of random variables, population, sample, sampling distributions. Demonstrate skills in test of hypothesis concerning mean, proportions, difference of means and proportions.

Course Outcomes:

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

1. Determine approximate root of algebraic and transcendental equations and apply different interpolating methods to calculate value of interpolating polynomial at given point.
2. Solve ordinary differential equations with given initial condition by Taylor's, Picard, Euler's, R.K methods.
3. Demonstrate basic principles of probability, and sample spaces, Baye's theorem, random variables and their distributions.
4. Comprehend the concept of population and sampling and able to determine mean, variance of sampling distribution of means. Also calculate point and interval estimations of means, proportions.
5. Analyze null hypothesis of parameters corresponding to mean, proportion for large and small samples.

UNIT - I

SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS

Introduction – Bisection method – Method of false position – Iteration method – Newton - Raphson's method

INTERPOLATION

Introduction- Errors in polynomial interpolation – finite differences- forward differences- backward differences – central differences – Symbolic relations -Differences of a polynomial - Newton's formulae for interpolation – Interpolation with unevenly spaced points - Lagrange's Interpolation formula.

UNIT - II

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

Solution by Taylor's series method - Picard's Method of successive approximations - Euler's Method - Runge-Kutta Methods – Predictor - Corrector Methods - Milne Thompsons's method.

UNIT - III

PROBABILITY Binomial sample space and events- probability – the axioms of probability- some elementary theorems- conditional probability- Baye's theorem.

RANDOM VARIABLES Discrete and continuous distributions – Distribution function.

DISTRIBUTIONS Binomial, Poisson, Normal distribution – related properties.

UNIT - IV

POPULATION AND SAMPLES Sampling distribution of mean with known and unknown variance, proportion, variances, - Sampling distribution of sums and differences.

ESTIMATION Point and interval estimators for means, variances, proportions.

UNIT - V

STATISTICAL HYPOTHESIS Errors of Type I and Type II errors. one tail, two-tail tests. Testing hypothesis concerning means, proportions and their differences using Z-test, t- test.

Learning resources:

Text books:

1. A Textbook on Mathematical Methods - Himalaya Publishing House- V. Ravindranath, P. Vijayalaxmi- 1st Revised Edition: 2011.
2. Higher Engineering Mathematics – Khanna Publishers – B.S. Grewal – 42nd Edition: 2012, June.
3. Engineering Mathematics (Volume – II) - S. Chand - T. K. V. Iyengar, B. Krishna Gandhi, S. Ranganatham, M.V.S.S.N. Prasad- 9th Revised Edition: 2012.
4. A Text Book of Probability & Statistics –Lakshmi publications- P.Tirupati Rao

Reference books:

1. Advanced Engineering Mathematics – Wiley – Erwin Kreyszig- 8th Edition:2006
2. A Text Book of Engineering Mathematics – Tata McGraw Hill - B. V. Ramana- 3rd Edition: 2008.

e-learning resources:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

2/4 B.Tech. THIRD SEMESTER

CE3T2 BUILDING MATERIALS AND CONSTRUCTION Credits: 3

Lecture: 3 periods/week **Internal assessment: 30 marks**

Tutorial: 1 period /week **Semester end examination: 70 marks**

Pre-requisites: Engineering chemistry, engineering geology and physics

Learning objectives:

- To learn the availability, types, uses and various tests for building materials.
- To know about activities in building construction.

Course outcomes:

At the end of course the student will be able to

1. Understand the process of making quality stones and bricks with their applications.
2. Assess quality of timber and steel in a detailed manner on the usage in the present-day construction.
3. Acquire the knowledge about paints, varnishes, distempers and acoustics of buildings.
4. Understand types of foundation and stone, brick & block masonry for the different construction activities in the building construction
5. Comprehend floors & roofs and application of damp proofing, scaffolding, shoring, underpinning and formwork.

BUILDING MATERIALS

UNIT – I

STONES

Qualities of a good building stone; Stone quarrying; Tools for blasting; Materials for blasting; Process of blasting; Precautions in blasting; Dressing of stones; Common building stones of India.

BRICKS

General; Composition of good brick earth; Harmful ingredients in brick earth; Classification of brick earth; Manufacture of bricks; Comparison between clamp burning and kiln burning; Qualities of good bricks; Tests for bricks; Classification of bricks; Substitutes for bricks.

UNIT – II

TIMBER

Definition; Classification of trees; Structure of a tree; Felling of trees; Defects in timber; Qualities of good timber; Decay of timber; Preservation of timber; Fire resistance of timber; Seasoning of timber; Market forms of timber; Industrial timber; Advantages of timber construction; Use of timber; Indian timber trees.

STEEL

General; Manufacture of steel; Uses of steel; Factors affecting physical properties; Defects in steel; Market forms of steel; Properties of mild steel; Properties of hard steel; Corrosion of ferrous metals.

UNIT – III

PAINTS, VARNISHES AND DISTEMPERS

General; Painting; Varnishing; Distempering; Wall paper; White washing; Colour washing.

ACOUSTICS OF BUILDINGS

Important Technical terms; Requirements of sound effects; Factors to be considered in Acoustics of building; Sound absorbing materials; Sound insulation.

BUILDING CONSTRUCTION

UNIT – IV

FOUNDATIONS

Concept of foundations; Factors affecting selection of foundations; Types of foundations; Strip, Isolated, Strap, Combined Footings, Grillage foundations, Piles and their classification; Foundation on black cotton soils.

STONE, BRICK & BLOCK MASONRY

Technical terms; Classification of stone masonry; Types of bonds in brickwork and their suitability, Plan, elevation and section of brick bonds up to two bricks thickness; Classification of walls, Block masonry – Hollow concrete blocks – FAL- G Blocks, Hollow clay Blocks.

UNIT – V

FLOORS & ROOFS

Technical terms; Types of ground floors; Classification of roofs.

DAMP PROOFING, SCAFFOLDING, SHORING, UNDER PINNING & FORMWORK

Causes of dampness; Methods of preventing dampness; Types of scaffolding; Types of shoring; Methods of underpinning; Types of formwork;

Learning resources:

Text books:

1. Engineering Materials, (36th edition) by Rangwala, S.C., Anand Charotar Publishing House, 2009.
2. Building construction, (10th edition) by Punmia, B. C., Laxmi Publications, Bangalore, 2009.

Reference books:

1. Building construction and construction materials by Birdie, G.S. and Ahuja, T.D., Dhanpath Rai Publishing company, New Delhi, 1986.

e-learning resources:

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

http://jntuk-coeerd.in/

2/4 B.Tech. THIRD SEMESTER

CE3T3 MECHANICS OF SOLIDS – I Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Engineering mechanics

Learning objectives:

- To understand the behaviour of materials and structural bodies under the action of loads.
- To gain knowledge on the relation between the external loads, internal strength parameters and displacements, this is the basis to study the non-idealized real structures.

Course outcomes:

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

1. Assess the internal behaviour properties of materials such as simple stresses and strains.
2. Determine shear force, bending moment and deflection of statically determinate beams and frames.
3. Derive the flexure equation, and evaluate the flexural stresses, section modulus for various sections, combined direct and bending stresses subjected to eccentric loading.
4. Draw shear stress distribution for rectangular, circular, triangular, I, T and angle sections, and determine strain energy due to axial loading, bending, shear and torsion.
5. Apply the torsion equation, calculate power transmitted by the shaft and determine the deflections of closed coiled helical springs.

UNIT – I

SIMPLE STRESSES AND STRAINS

Elasticity and plasticity – Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses.

UNIT – II

SHEAR FORCE AND BENDING MOMENT

Definition of beam – Types of beams – Types of Supports - Concept of shear force and bending moment- Relation between S.F., B.M and rate of loading at a section of a beam, Point of contra flexure.

S.F and B.M diagrams for cantilever simply supported and overhanging beams subjected to point loads, UDL, UVL and combination of these loads. S.F and B.M diagrams for simple frames and beams with internal hinges.

UNIT – III

FLEXURAL STRESSES

Normal stress, Theory of simple bending – Assumptions – Derivation of bending equation, Neutral axis – Determination of bending stresses – section modulus of rectangular and circular sections, I, T, angle, triangular and Channel sections.

COMBINED DIRECT AND BENDING STRESSES

Combined direct and bending stresses, eccentric loading, kernel of a section – rectangular, circular sections.

UNIT – IV

SHEAR STRESSES

Derivation of formula – Shear stress distribution across various beam sections viz. rectangular, circular, triangular, I, T sections.

STRAIN ENERGY
Strain energy due to axial loading, bending, shear and torsion

UNIT – V
TORSION OF CIRCULAR SHAFTS
Theory of pure torsion – Derivation of Torsion equation – Assumptions – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts
SPRINGS
Introduction – Types of springs – deflection of close coiled helical springs under axial load– springs in series and parallel.

Learning resources:
Text books:
1. Mechanics of Materials – E.P. Popov - PHI Publications
2. Strength of Materials – Timoshenko
3. Mechanics of Materials – F.P. Beer and E R Johnson and JD Dewolf – Mc. Graw- hill Publications
4. Introduction to text book of Strength of materials by R.K.Bansal – Laxmi publications Pvt.Ltd. New Delhi.
5. Introduction to text book of Strength of Material by U.C. Jindal, Galgotia publications.

Reference books:
1. Strength of Materials by S. Ramamrutham and R.Narayan – Dhanpat Rai publications
2. Strength of materials by R.K.Rajput, S.Chand & Co, New Delhi.
3. Strength of Materials by A.R.Basu, Dhanpat Rai & Co, Nai Sarah, New Delhi.
4. Strength of Materials by Bhavi Katti.

e-learning resources:
http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

2/4 B.Tech. THIRD SEMESTER

CE3T4 ENGINEERING GEOLOGY Credits: 3

Lecture: 3 periods/week Internal Assessment: 30 Marks

Tutorial: 1 period /week Semester end examinations: 70 Marks

Pre-requisites: Engineering physics and chemistry

Learning objectives:

- To gain knowledge in geology and the effect of geology on the design and construction of civil engineering constructed facilities.
- To understand the engineering elements of rock and geologic processes
- To identify the seismic hazards posed at any given site

Course **outcomes**:

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

1. Understand weathering process and mass movement
2. Distinguish geological formations
3. Identify geological structures and processes for rock mass quality
4. Identify subsurface information and groundwater potential sites through geophysical investigations
5. Apply geological principles for mitigation of natural hazards and select sites for dams and tunnels

UNIT - I

INTRODUCTION

Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of physical geology, Petrology and Structural geology. WEATHERING OF ROCKS: Its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like “Granite”

MINERALOGY

Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldsper , Quartiz , Flint , Jasper, Olivine , Augite, Hornblende , Muscovite , Biotite , Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite , Magnetite, Chrorite , Galena, Pyrolusite , Graphite, Magnesite, and Bauxite.

UNIT – II

PETROLOGY

Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of igneous. Sedimentary and metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laerite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

STRUCTURAL GEOLOGY

Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints - their important types. Their importance in Insitu and drift soils, common types of soils, their origin and occurrence in India, Stabilisation of soils.

UNIT – III

GROUND WATER

Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for

building construction in seismic areas. Landslides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and landslides.

UNIT – IV

GEOPHYSICAL INVESTIGATIONS

Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc. Fundamental aspects of Rock mechanics and Environmental Geology.

UNIT - V

GEOLOGY OF DAMS AND RESERVOIRS

Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factors Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs.

TUNNELS

Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (ie. Lithological, structural and ground water) in tunneling over break and lining in tunnels.

Learning resources:

Text books:

1. Principles of Engineering Geology by Gokhale K.V.G.K., B.S Publications, 2010.
2. Engineering Geology, (2nd edition) by Chennakesavulu N., Mc-Millan, India Ltd, 2009.

Reference books:

1. Fundamentals of Engineering Geology by Bell, F.G., B.S. Publications, New Delhi, 2005.
2. Principles of Engineering Geology and Geotechnics by Krynine and Judd, CBS Publishers and Distribution, 2011.

e-learning resources:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

2/4 B.Tech. THIRD SEMESTER

CE3T5	**SURVEYING**	**Credits: 3**
Lecture: 3 periods/week		**Internal assessment: 30 marks**
Tutorial: 1 period /week		**Semester end examination: 70 marks**

Pre-requisites: Engineering mathematics

Learning objectives:

- To learn the methods of compass and plane table survey to measure the land area and prepare layout maps.
- To gain knowledge on the preparation contour and elevation maps.
- To learn various aspects of total station.

Course outcomes:

At the end of course the student will have ability to:

1. Comprehend the principles of chain, compass, plane table and distance
2. Analyze directions, levelling and contouring
3. Analyze and computation of Areas and Volumes
4. Use Theodolite and Tachometric Surveying
5. Use Curves and advanced instruments

UNIT – I

INTRODUCTION

Overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications.

DISTANCES

Distance measurement conventions and methods; use of chain and tape, Electronic distance measurements.

UNIT – II

DIRECTION

Meridians, Azimuths and Bearings, declination, computation of angle.

LEVELING AND CONTOURING

Concept and Terminology, Temporary and permanent adjustments- method of leveling. Characteristics and Uses of contours- methods of conducting contour surveys and their plotting.

UNIT – III

COMPUTATION OF AREAS

Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries.

COMPUTATION OF VOLUMES

Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

UNIT – IV

THEODOLITE

Theodolite , description, uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite. Trigonometrical leveling.

TACHEOMETRIC SURVEYING

Stadia and tangential methods of Tachometry. Distance and Elevation formulae for staff vertical position.

UNIT – V

CURVES

Types of curves, design and setting out – simple and compound curves.

GEODETIC SURVEYING

Introduction to geodetic surveying, Total Station and Global positioning system, Introduction to Geographic information system (GIS).

Learning resources:

Text books:

1. Surveying (Vol. – 1, 2 & 3) by Punmia, B.C., Jain, A.K., Laxmi Publications (P) ltd., New Delhi, 2005.
2. Surveying (Vol–1& 2), (3rd edition) Duggal, S.K., Tata McGraw-Hill, New Delhi, 2009.
3. Surveying and leveling by Subramanian R., Oxford University Press, New Delhi, 2008.

Reference books:

1. Elements of Plane Surveying by Arthur, R Benton, and Philip, J Taety., Tata McGraw-Hill, 2000.
2. Surveying Vol 1, 2 & 3, (12th edition) by Arora, K.R., Standard Book House, Delhi, 2011.
3. Plane Surveying by Chandra A.M., New Age International Pvt. Ltd Publishers, New Delhi, 2002.
4. Higher Surveying by Chandra, A.M., New Age International Pvt. Ltd Publishers, New Delhi, 2002.

e-learning resources:

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

http://jntuk-coeerd.in/

2/4 B.Tech. THIRD SEMESTER

CE3T6 FLUID MECHANICS Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Engineering mathematics, physics, engineering mechanics

Learning objectives:

- To understand the fundamental concepts in the field of fluid mechanics, pipe flow and measuring devices.
- Gain knowledge of different types of flows and flow equations.

Course outcomes:

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

1. Determine the fluid pressure and use various devices for measuring fluid pressure.
2. Calculate hydrostatic force and use of law of conservation mass to fluid flow.
3. Apply Bernoulli's equation to fluid flow problems and boundary layer theory to determine lift and drag forces on a submerged body.
4. Apply appropriate equations and principles to analyze pipe flow problems
5. Use of different fluid flow measuring devices.

UNIT I

INTRODUCTION

Dimensions and units – Physical properties of fluids specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion pressure at a point, Pascal's law, Hydrostatic law - atmospheric, gauge and vacuum pressure- measurement of pressure. Pressure gauges, Manometers: differential and Micro Manometers.

UNTI – II

HYDROSTATIC FORCES

Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure. Derivations and problems.

FLUID KINEMATICS

Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows : Steady, unsteady, uniform, nonuniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two , three dimensional flows – stream and velocity potential functions, flow net analysis.

UNIT – III

FLUID DYNAMICS

Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, (Navier – Stokes equations (Explanatory) Momentum equation and its application – forces on pipe bend.

Boundary layer – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent Boundary layers no deviations BL in transition, separation of BL, control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

UNIT – IV

LAMINAR FLOW

Reynold's experiment – Characteristics of Laminar & Turbulent flows. Flow between parallel plates, Flow through long tubes, flow through inclined tubes.

CLOSED CONDUIT FLOW

Laws of Fluid friction – Darcy's equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line. Pipe network problems, variation of friction factor with Reynold's number – Moody's Chart.

UNIT – V

MEASUREMENT OF FLOW

Pitot tube, Venturi meter and orifice meter – classification of orifices, flow over rectangular, triangular and trapezoidal and stepped notches - –Broad crested weirs.

Learning resources:

Text books:

1. Fluid Mechanics, (18th edition) by Modi, P.N. and Seth S.M., Standard book house, 2011.
2. Introduction to Fluid Machines, (2nd edition) by Som, S.K. and Biswas G., Tata McGraw-Hill, 2006.
3. Introduction to Fluid Machines by Edward,J., Jr.Shaughnessy, Ira M. Katz and James Schaffer, P., Oxford University Press, New Delhi, 2009.

Reference books:

1. Fluid Mechanics (4th edition) by Douglas, J.F., Gaserek, J.M. and Swaffirld, J.A. (Longman), Delhi Pearson Education, 2005.
2. Fluid Mechanics, (6th edition) by Frank White, Tata McGraw-Hill, 2009.
3. Fluid Mechanics, (2nd edition) by Mohanty, A.K., Prentice Hall of India Pvt. Ltd., New Delhi, 1994.
4. A text of Fluid mechanics and hydraulic machines, (7th edition) by Laxmi Publications (P) ltd., New Delhi, 2000.

e-learning resources:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

2/4 B.Tech. THIRD SEMESTER

CE3L1 **SURVEYING FIELD WORK – I** **Credits: 2**

Lecture: - **Internal assessment: 25 marks**

Lab : 3 periods/week **Semester end examination: 50 marks**

Pre-requisites: Surveying

Learning objectives:

- To have firsthand experience of applying surveying methods in practice.

Course outcomes:

After performing the experiments listed in the syllabus, the students will have skills in:

1. Use of various survey equipment like chain, compass, plain table, dumpy level, theodolite, Total Station and Geo Positional System.
2. Surveying and plotting of an area, inaccessible points of an area with Compass.
3. Traversing, fly leveling and contouring.

LIST OF EXPERIMENTS:

1. Survey of an area by chain survey (closed traverse) & Plotting
2. Chaining across obstacles
3. Determination of distance between two inaccessible points with compass.
4. Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment.
5. Radiation method, intersection methods by plane Table survey
6. Two point and three point problems in plane table survey
7. Traversing by plane table survey
8. Fly leveling (differential leveling)
9. An exercise of L.S and C.S and plotting
10. Two exercises on contouring.

LIST OF MAJOR EQUIPMENTS:

1. Chains, tapes, ranging rods, cross staff, arrows
2. Compasses and Tripods, Optical square.
3. Plane tables, Alidade, Plumbing fork, trough compasses
4. Leveling instruments and leveling staves
5. Box sextants, planimeter.

2/4 B.Tech. THIRD SEMESTER

CE3L2 ENGINEERING GEOLOGY LAB Credits: 2

Lecture: - Internal assessment: 25marks

Lab : 3 periods/week Semester end examination: 50 marks

Pre-requisites: Engineering geology

Learning objectives:

- To acquire practical Knowledge on geology and on various types of rocks and minerals.

Course outcomes:

After performing the experiments listed in the syllabus, the students will have:

1. Ability to categorize rocks and minerals by their origin and engineering properties.
2. Ability to apply geological principles to rock masses and discontinuities for use in engineering design e.g. rock slopes, foundation.

LIST OF EXPERIMENTS:

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic description and identification of rocks referred under theory.
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
4. Simple Structural Geology problems.

LAB EXAMINATION PATTERN:

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and Metamorphic rocks)
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.

2/4 B.Tech. THIRD SEMESTER

CE3L3 **COMPUTER AIDED DRAWING** **Credits: 2**

Lecture: - **Internal assessment: 25 marks**

Practice: 3 periods/week **Semester end examination: 50 marks**

Pre-requisites: Introduction to Computing, Autocad, Engineering drawing

Learning objectives:

- To gain the basic knowledge and skills in engineering drawings and the capability to read and interpret blue prints and develop an understanding of 2D and 3D computer aided drafting with the requirements of good engineering drawings.

Course outcomes:

After performing the experiments listed in the syllabus, the students will have:

1. Draw development and interpenetration of solids
2. Draw perspective projections
3. Develop the types of modeling
4. View points and view ports
5. Gain complete knowledge in computer aided solid modeling

PART A

UNIT –I

DEVELOPMENT AND INTERPENETRATION OF SOLIDS

Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid Cone and their parts. Interpenetration of Right Regular Solids – Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone.

UNIT – II

PERSPECTIVE PROJECTIONS

Perspective View: Points, Lines, Plane Figures and Simple Solids, Vanishing Point Methods (General Method only).

PART B

UNIT – III

INTRODUCTION TO COMPUTER AIDED DRAFTING

Generation of points, lines, curves, polygons, dimensioning.

TYPES OF MODELING

Object selection commands – edit, zoom, cross hatching, pattern filling, utility commands, 2D wire frame modeling, 3D wire frame modeling.

UNIT – IV

VIEW POINTS AND VIEW PORTS

View point coordinates and view(s) displayed, examples to exercise different options like save restore, delete, joint, single option.

UNIT-V

COMPUTER AIDED SOLID MODELING

Isometric projections, orthographic projections of isometric projections, modeling of simple solids, Modeling of Machines & Machine Parts.

Learning resources:

Text books:

1. Engineering Graphics by John,K.C., PHI Publications, New Delhi, 2009.
2. Machine Drawing, (3rd edition) Narayana,K.L., Kannaiah,P. and Venkata reddy,K., New Age International Publishers, 2010.

Reference books:

1. "AutoCAD 2009", Galgotia Publications, New Delhi, 2012.
2. Text book of Engineering Drawing with Auto-CAD, (4th edition) by Venkata Reddy, K., B.S. Publications, 2009.
3. Engineering drawing, (38th edition) by Bhatt, N.D., Anand Charotar Publications, 1997.

2/4 B.Tech. FOURTH SEMESTER

CE4T1 CONCRETE TECHNOLOGY Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Building Materials and Construction, engineering chemistry

Learning objectives:

- To learn the fundamental concepts and understanding of the behavioral aspects of various materials in concrete making and special concretes.

Course outcomes:

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

1. Comprehend the properties of cement and admixtures in concrete and understand the properties of aggregates in concrete
2. Study the properties of fresh concrete and evaluate the properties of hardened concrete including strength and durability
3. Carry out the test procedures for the laboratory properties of hardened concrete and analyze the elasticity, creep and shrinkage properties of concrete
4. Design concrete mixes by using Indian Standard method
5. Study the properties of special concretes

UNIT- I

CEMENTS & ADMIXTURES

Manufacture of cement - Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrate cement – Test on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures.

AGGREGATES

Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate– Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates –Gap graded aggregate – Maximum aggregate size.

UNIT – II

FRESH CONCRETE

Workability – Factors affecting workability – Measurement of workability by different tests– Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water - Ready Mix Concrete (RMC)

HARDENED CONCRETE

Water / Cement ratio – Abram's Law – Gelspaoe ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength - Curing.

UNIT – III

TESTING OF HARDENED CONCRETE

Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Non-destructive testing (NDT) methods – code provisions.

ELASTICITY, CREEP & SHRINKAGE
Modulus of elasticity – Dynamic modulus of elasticity – Posisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

UNIT – IV
MIX DESIGN
Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design.

UNIT – V
SPECIAL CONCRETES
Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibres - Factors affecting properties of F.R.C – Applications – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete – Applications – High performance concrete – Self compacting concrete –Slurry infiltrated fibrous concrete.
NON DESTRUCTIVE TESTS
Rebound Hammer Test- RH Test, Ultrasonic Pulse Velocity- UPV Test

Learning resources:
Text books:
1. Concrete Technology by Shetty, M.S., S. Chand & Co., 2004.
2. Concrete Technology by Santha Kumar, A.R., Oxford University Press, New Delhi, 2009.

Reference books:
1. Concrete Technology,(4th edition) by Gambhir, M.L., Tata McGraw-Hill, New Delhi, 2009.
2. Properties of Concrete, (4th edition) by Neville, A.M., Low Priced Edition, 1995.

e-learning resources:
http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

2/4 B.Tech. FOURTH SEMESTER

CE4T2 GEO TECHNICAL ENGINEERING – I Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Engineering geology, fluid mechanics

Learning objectives:

- To study the soil structure, consistency limits and IS Classification of soils.
- To conduct laboratory tests on soils.
- To know the permeability, flow nets, seepage, Bousssinesq and Westergaard's analysis.
- To understand the compaction, Liquefaction, Consolidation and shear strength of soils.

Course outcomes:

At the end of course the student will be able to

1. Understand formation of soil properties and basic definition
2. Determine and classify the soil for engineering and index properties of soil & coefficient of permeability
3. Knowledge of principle of effective stress and point load different shapes
4. Determine compaction characteristics of soil and consolidation
5. Determine shear strength and compressibility of soil application.

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

Clay Mineralogy: Introduction to soil classification; 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. ;

UNIT – III

SEEPAGE THROUGH SOILS

Principle of effective stress; physical meaning of effective stress; Types of head, seepage forces and quicksand condition

STRESS DISTRIBUTION IN SOIL

Boussinesq's and Wester gaard's theories for point loads and areas of different shapes – Newmark's influence chart.

UNIT – IV

COMPACTION OF SOILS

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

COMPRESSIBILITY OF SOIL AND CONSOLIDATION

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

UNIT – V

SHEAR STRENGTH OF SOILS

Introduction; Stress at a point- Mohr Circle of stress; Mohr–coulomb Failure Criterion; Measurement of Shear Strength; Shear strength of Clayey soils; Shear Strength of Sands; Drainage conditions and Strength parameters.

Learning Resources:

Text books:

1. Basic and Applied Soil Mechanics – Gopal Ranjan and A.S.R.Rao, New Age International Publishers
2. Soil Mechanics and Foundation Engg (7^{th} edition) by Dr. Arora, K.R., Standard Publisher and Distributors, Delhi, 2010.
3. A Text book of Soil Mechanics and Foundation Engineering – B.C.Punmia Laxmi Publications

Reference books:

1. Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Co.
2. A Text book of Soil Mechanics and Foundation Engineering – P.Purushotthama Raj, Pearson Education
3. Introduction to Soil Mechanics- Braja M Das

e-learning resources:

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

http://jntuk-coeerd.in/

2/4 B.Tech. FOURTH SEMESTER

CE4T3 MECHANICS OF SOLIDS – II Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Engineering Mechanics**,** Mechanics of solids I

Learning objectives:

- To analyze a given problem in a simple and logical manner and to apply a few fundamental and well-understand principles to get the solution.
- To make use of simplified models in all necessary formulae in a rational and logical manner.
- To get clarity on the conditions under which they can be safely applied to the analysis and design of actual engineering structures.

Course outcomes:

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

Apply the differential equation of the elastic line, determine the slopes and deflections of determinate beams.

Calculate the compound and biaxial stresses, apply the Mohr's circle to determine the principal stresses and principal strains.

Determine the longitudinal and circumferential stresses in thin cylinders, and apply the theories of failure.

Calculation of crushing load, Euler's critical load, equivalent length and slenderness ration of columns.

Locate the principal axes of a section and shear centre.

UNIT I

DEFLECTION OF BEAMS

Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L and Uniformly varying load – Mohr's theorems- Moment area method, Conjugate beam method – applications to simple cases.

UNIT – II

PRINCIPAL STRESSES AND STRAINS

Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple Shear – Mohr's circle of stresses – Principal stresses and strains

UNIT – III

THIN CYLINDERS

Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in diameter and volume.

THEORIES OF FAILURE

Introduction- Theories of failure, minimum principal stress theory, maximum shear stress theory, maximum distortion energy theory – comparison of theories

UNIT – IV
COLUMNS AND STRUTS
Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns- Assumptions- derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Long columns subjected to eccentric loading – Secant formula – Empirical formulae

UNIT - V
UNSYMETRICAL BENDING
Introduction –Principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis - Shear centre

Learning Resources:
Text books:
1. A Text book of Strength of materials by R.K.Bansal –Laxmi Publications (P) ltd., New Delhi
2. Introduction to Strength of Materials by U.C. Jindal, Galgotia publications.
3. Strength of Materials by B.C. Punmia

Reference books:
1. Mechanics of Solid, by Ferdinandp Beer and others – Tata Mc.Grawhill Publications 2000.
2. Strength of Materials by Schaum's out line series – Mc. Graw hill International Editions.
3. Strength of Materials by S. Ramamrutham and R. Narayan – Dhanpat Rai publications.
4. Strength of materials by R.K.Rajput, S.Chand & Co, New Delhi.
5. Mechanics of Structures, by S.B. Junnarkar, Charotar Publishing House, Anand, Gujarat.

e-learning resources:
http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

2/4 B.Tech. FOURTH SEMESTER

CE4T4 HYDRAULICS AND HYDRAULIC MACHINERY Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Fluid mechanics, basic mechanical engineering

Learning objectives:

- To get knowledge about open channel hydraulic and the working of hydraulic machinery.

Course outcomes:

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

Solve open channel flow problems.
Use dimensional analysis in solving fluid problems and plan hydraulic similitude studies.
Apply basics of the hydro-machinery and waterpower engineering concepts.
Analyze and select suitable type of turbine
Analyze performance of centrifugal pump

UNIT – I

OPEN CHANNEL FLOW

Types of flows - Type of channels – Velocity distribution – Energy and momentum correction factors – Chezy's, Manning's; and Bazin formulae for uniform flow – Most Economical sections.
Critical flow: Specific energy-critical depth – computation of critical depth – critical sub-critical and super critical flows.
Non uniform flow-Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT - II

HYDRAULIC SIMILITUDE

Dimensional analysis-Rayleigh's method and Buckingham's pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations.

UNIT – III

BASICS OF TURBO MACHINERY

Hydrodynamic force of jets on stationary and moving flat inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle, Applications to radial flow turbines.

HYDROPOWER ENGINEERING

Layout of a typical Hydropower installation – Heads and efficiencies. Classification of Hydropower plants – Definition of terms – load factor, utilization factor, capacity factor, estimation of hydropower potential.

UNIT - IV

HYDRAULIC TURBINES

Classification of turbines- Pelton wheel - Francis turbine - Kaplan turbine-working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and function efficiency.
Governing of turbines-surge tanks-unit and specific turbines-unit speed-unit quantity-unit power-specific speed performance characteristics-geometric similarity-cavitation.

UNIT – V

CENTRIFUGAL-PUMPS

Pump installation details-classification-work done- Manometric head-minimum starting speed-losses and efficiencies-specific speed multistage pumps-pumps in parallel- performance of pumps-characteristic curves- NPSH-cavitation.

Learning resources:

Text books:

1. Open Channel flow, (3rd edition) by Subramany, K., Tata McGraw-Hill, 2009.
2. A text of Fluid mechanics and hydraulic machines, (9th edition) by Bansal. R.K., Laxmi Publications (P) ltd., New Delhi, 2008.
3. Fluid Mechanics & Fluid Power Engineering, (8th edition) by Kumar, D.S., Kataria & Sons, 2013.

Reference books:

1. Fluid Mechanics, Hydraulics and Hydraulic Machines, (18th edition) by Modi and Seth, Standard Book House, 2011.
2. Elements of open channel flow by Ranga Raju, Tata McGraw-Hill, 2013.
3. Fluid mechanics and hydraulic machines, (9th edition) by Rajput, R.K., S. Chand & Co, 2009.
4. Open Channel flow by Chow, V.T., McGraw-Hill Book Company, 2008.
5. Hydraulic Machines, (6th edition) by Banga, T.R. and Sharma, S.C., Khanna Publishers, 2001.

e-learning resources:

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http://jntuk-coeerd.in/

2/4 B.Tech. FOURTH SEMESTER

CE4T5 BUILDING PLANNING AND DRAWING Credits: 3

Lecture: 1 periods/week Internal assessment: 30 marks

Practice: 3 periods/week Semester end examination: 70 marks

Pre-requisites: Building materials and constructions, engineering drawing

Learning objectives:

- To visualize, sketch and accurately draw shapes and objects to communicate information to specific audiences
- To interpret, design, produce and evaluate a variety of graphical presentations using a range of manual based techniques
- To use graphical conventions, standards and procedures in the design.

Course outcomes:

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

Apply the building byelaws and regulations for planning a building

Plan the individual rooms in residential buildings and public buildings with reference to functional and furniture requirements

Develop the skills of drawing sign conventions and bonds

Prepare working drawings for individual components like doors and windows etc.

Develop the skills of drawing plans, sections and elevations of different houses and various buildings with the given data

Part - A

UNIT – I

BASIC ARCHITECTURE OF BUILDINGS

Aspect-Prospect - Privacy-Furniture requirement – Roominess – Grouping – Circulation – Sanitation -Lighting - Ventilation-Cleanliness-Flexibility-Elegance-Economy-Practical Considerations

BUILDING BYELAWS AND REGULATIONS

Introduction – Terminology – Objectives of building byelaws – Floor Area Ratio (FAR) – Floor Space Index (FSI) – Principles underlying building byelaws – classification of buildings – Open space requirements – built up area limitations – Height of Buildings – Wall thickness – lighting and ventilation requirement.

UNIT – II

RESIDENTIAL BUILDINGS

Minimum standards for various parts of buildings – requirements of different rooms and their grouping – characteristics of various types of residential buildings.

PUBLIC BUILDINGS

Planning of Educational institutions, hospitals, dispensaries, Office Buildings, Banks, Industrial buildings, Hotels and Motels, Buildings for Recreation.

UNIT –III

SIGN CONVENTIONS AND BONDS:

Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminum alloys, Lead, Zinc, tin, white lead, Earth, Rock, Timber and Marble.

English bond & Flemish bond; odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

Part - B

UNIT - IV

DOORS, WINDOWS, VENTILATORS AND ROOFS

Paneled Door – paneled and glazed door, glazed windows – paneled windows – Swing Ventilator – Fixed ventilator-Couple roof – Collar roof – King Post truss – Queen post truss.

UNIT – V

PLANNING OF BUILDINGS

Draw the line diagrams and plans for the following as per National Building Code.

a) Single storied residential building
b) Primary School Building
c) Primary Health Centre
d) Commercial Building

DRAWING OF BUILDINGS

Preparation of plan, elevation and section of residential buildings-single storey (load bearing structures), double storey (R.C.C.Framed structure) by using principles of planning and local building bye- laws.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. Part A consists of five questions in planning portion out of which three questions are to be answered. Part B should consist of two questions from drawing part out of which one is to be answered in drawing sheet. Weightage for Part -A is 60% and Part- B is 40%.

Learning resources:

Text books:

1. Building planning designing and scheduling, (5th Edition) by Gurucharan Singh and Jagadish Sing, Standard Publications Distributers, Delhi, 2010.
2. Building planning and drawing, (3rdedition) by Kumara Swami N., Anand Charotar Publishing House Pvt Ltd, 2010.
3. PERT and CPM, (4th edition) by Dr. Punmia, B.C. and Khandelwal, Laxmi Publications, 2009.

Reference books:

1. Building byelaws by state and Central Governments and Municipal corporations, 2011.
2. 'A' Series & 'B' Series of JNTU Engineering College, Anantapur, 2012.

e-learning resources:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in

2/4 B.Tech. FOURTH SEMESTER

CE4T6 **STRUCTUAL ANALYSIS – I** **Credits: 3**

Lecture: 3 periods/week **Internal assessment: 30 marks**

Tutorial: 1 period /week **Semester end examination: 70 marks**

Pre-requisites: Mechanics of Solids-I, Mechanics of Solids-II

Learning objectives:

- To get practice in doing the analysis of propped cantilever, fixed and cantilever beams. Knowing the application of slope deflection method for various beams.
- To draw Influence Line Diagrams (ILDs) and to know the application of ILDs for the analysis of simply supported girders.
- To understand the analysis of trusses and Castiglione's theorems

Course outcomes:

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

Analyse the trusses by method of joints and method of sections

Draw ILD for all components, calculate Max. SF and BM at a given section, Equivalent UDL and focal length

Determine the horizontal thrust, max. bending moment, normal thrust and radial shear for a 3 hinged arch

Calculate the shear forces, bending moments and deflections in a propped cantilever beam and a fixed beam.

Analyse the continuous beam by using clapayron's theorem of three moments with or without sinking of supports

UNIT – I

ANALYSIS OF PIN-JOINTED PLANE FRAMES

Determination of Forces in members of pin-jointed trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilever and simply – supported trusses.

UNIT – II

INFLUENCE LINES AND MOVING LOADS

Definition of influence line for reactions, SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a section, single point load, U.D.L longer than the span, U.D.L shorter than the span.

Maximum SF and BM at a given section and absolute maximum S.F. and absolute maximum B.M due to single concentrated load, U.D L longer than the span, U.D L shorter than the span, two point loads with fixed distance between them and several point loads Influence Lines for axial force in the members of determinate Pin – Jointed Truss

UNIT – III

THREE HINGED ARCHES

Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature.

CABLES

Analysis of cables under concentrated loads, analysis of cables under uniformly distributed loads, anchorage of suspension cables

UNIT – IV

PROPPED CANTILEVERS

Introduction to Indeterminate structures, Analysis of propped cantilevers-shear force and Bending moment diagrams

FIXED BEAMS

Introduction to statically indeterminate beams with U.D.load, central point load, eccentric point load. Number of point loads, uniformly varying load, couple and combination of loads shear force and bending moment diagrams, effect of sinking of support.

UNIT-V

CONTINUOUS BEAMS

Introduction-Clapeyron's theorem of three moments- Analysis of continuous beams with constant moment of inertia with one or both ends fixed-continuous beams with overhang, continuous beams with different moment of inertia for different spans-Effects of sinking of supports-shear force and Bending moment diagrams.

Learning resources:

Text books:

1. Analysis of Structures-Vol I & Vol II by V.N. Vazirani & M.M.Ratwani, Khanna Publications, New Delhi.
2. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi
3. Basic structural Analysis by C.S. Reddy, Tata Mcgrawhill, New Delhi

Reference books:

1. Mechanics of Structures by S.B.Junnarkar, Charotar Publishing House, Anand, Gujrat
2. Theory of Structures by Gupta, Pandit & Gupta; Tat Mc.Graw – Hill Publishing Co.Ltd., New Delhi.
3. Theory of Structures by R.S. Khurmi, S. Chand Publishers
4. Strength of Materials and Mechanics of Structures- by B.C.Punmia, Khanna Publications, New Delhi.

e-learning resources:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

2/4 B.Tech. FOURTH SEMESTER

CE4L1 FLUID MECHANICS AND HYDRAULIC MACHINES LAB Credits: 2
Lecture: - Internal assessment: 25 marks
Lab : 3 periods/week Semester end examination: 50 marks

Pre-requisites: Fluid mechanics, Hydraulics and hydraulic machinery

Learning objectives:

- To learn the calibration of various hydraulic measuring devices and determine characteristics of hydraulic machinery.

Course outcomes:
At the end of course the student will have:

1. Knowledge of the working principles, components, function of hydraulic equipments and hands-on experience in their operation and calibration.

LIST OF EXPERIMENTS:

1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of Coefficient of discharge for an external mouth piece by variable head method.
4. Calibration of contracted Rectangular Notch and /or Triangular Notch
5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli's equation.
7. Impact of jet on vanes
8. Study of Hydraulic jump.
9. Performance test on Pelton wheel turbine
10. Performance test on Francis turbine.
11. Efficiency test on centrifugal pump.
12. Efficiency test on reciprocating pump.

LIST OF EQUIPMENT:

1. Venturimeter setup.
2. Orifice meter setup.
3. Small orifice setup.
4. External mouthpiece setup.
5. Rectangular and Triangular notch setups.
6. Friction factor test setup.
7. Bernoulli's theorem setup.
8. Impact of jets.
9. Hydraulic jump test setup.
10. Pelton wheel and Francis turbines
11. Centrifugal and Reciprocating pumps

2/4 B.Tech. FOURTH SEMESTER

CE4L2 MATERIAL TESTING LAB Credits: 2

Lecture: - Internal assessment: 25 marks

Lab : 3 periods/week Semester end examination: 50 marks

Pre-requisites: Engineering mechanics, MOS - I

Learning objectives:

- To understand and perform various tests on steel, iron, wood etc..

Course outcomes:

After performing the experiments listed in the syllabus, the students will be able to:

Measure the tensile and compressive properties of materials like steel, iron etc.

Determine bending moment of various beams like SSB, Cantilever beam.

Determine various properties of materials like Hardness Number, Rigidity modulus, Shear modulus etc.

Verify the theories related to the beams.

LIST OF EXPERIMENTS:

1. Tension test
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simply support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or iron
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges
12. Continuous beam – deflection test.

LIST OF MAJOR EQUIPMENTS:

1. UTM for conducting tension test on rods
2. Steel beam for flexure test
3. Wooden beam for flexure test
4. Torsion testing machine
5. Brinnell's / Rock well's hardness testing machine
6. Setup for spring tests
7. Compression testing machine
8. Izod Impact machine
9. Shear testing machine
10. Beam setup for Maxwell's theorem verification.
11. Continuous beam setup
12. Electrical Resistance gauges.

2/4 B.Tech. FOURTH SEMESTER

CE4L3 ADVANCED SURVEY PRACTICES Credits: 2

Lecture: - **Internal assessment: 25 marks**

Lab : 3 periods/week **Semester end examination: 50 marks**

Pre-requisites: Surveying

Learning objectives:

- To survey areas, measure coordinates and elevations of points by advanced methods and instruments.

Course outcomes:

After performing the experiments listed in the syllabus, the students will be able to:

Use Total Station for field surveying to determine the distances, directions and elevations, height of the objects, area and boundaries of fields.

Set out simple curves using tape, Theodolite, Total Station, set out for building.

Mark out Plans, Sewer lines, Water supply lines, etc. using Total Station.

1. TOTAL STATION

1. Study of Instrument – Determination of Distances, Directions and Elevations
2. Determination of Boundaries of a Field and computation of area.
3. Determination of Heights of objects.

2. SETTING OUT OF CURVES & LAYOUT OF BUILDING

1. Setting of simple curve using tape or/and theodolite.
2. Setting of a simple curve using Total Station.
3. Setting out for Building.

Survey Camp is to be conducted for a minimum period of seven days

Using Total Station to train in one of the following areas:

1. Preparation of a contour Plan/ Map.
2. Earth work Computations for a high way / canal projects
3. Marking of a Sewer line/ Water supply line.
4. Any type of Execution works.

3/4 B.Tech. FIFTH SEMESTER

CE5T1 DESIGN AND DRAWING OF CONCRETE STRUCTURES–1 Credits: 3

Lecture: 3 periods/week **Internal assessment: 30 marks**

Tutorial: 1 period /week **Semester end examination: 70 marks**

Pre-requisites: Mechanics of solids, concrete technology, building planning and drawing

Learning objectives:

- To gain the knowledge about the behavior of reinforced concrete elements and load transferring system.
- To know about different loads acting on the structure and codes of practice.
- To be able to apply different design methods.
- To design RCC beams, columns and slabs.

Course outcomes:

At the end of the course the student will have:

1. Knowledge on working stress method of design.
2. Technical capability for the design of reinforced concrete structural elements by limit state method.
3. Knowledge on flexure, shear & torsion.
4. Ability to design and detailing as per code provisions for columns.
5. Ability to design and detailing as per code provisions for slabs.

UNIT –I

INTRODUCTION TO CONCEPT OF WORKING STRESS DESIGN

Recommendations of IS 456 – 2000, grades of concrete, elastic theory, design constants. modular ratio, neutral axis depth and moment of resistance, balanced, under-reinforced and over-reinforced sections, working stress method of design of singly reinforced beams.

UNIT –II

CONCEPT OF LIMIT STATE DESIGN

Concepts of limit state design – Basic statistical principles – Characteristic loads – Characteristic strength – Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design – stress - block parameters – limiting moment of resistance.

DESIGN FOR FLEXURE

Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.

UNIT – III

DESIGN FOR SHEAR, TORSION AND BOND

Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing.

UNIT –IV

DESIGN OF COLUMNS

General Requirements: Short Columns, Long Columns, Assumptions; Design of axially loaded columns; Design of axially loaded circular columns with helical reinforcement; Interaction diagrams; Design of short columns and slender columns of rectangular section in the following cases

: Axial compression and Uni-axial bending & Axial compression and bi-axial bending by using SP:16

UNIT – V
DESIGN OF SLABS
Design of one way slab, Two-way slabs, and continuous slab-IS codal provisions.

NOTE: All the designs to teach in Limit State Method
Following plates should be prepared by the students.

1. Reinforcement particulars of singly and doubly reinforced beams.
2. Reinforcement particulars of T-beams and L-beams.
3. Reinforcement detailing of continuous beams.
4. Reinforcement particulars of columns.
5. Reinforcement particulars of slabs.

FINAL EXAMINATION PATTERN

The end examination paper should consist of Part A and Part B. Part A consists of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part A is 40% and Part B is 60%.

Learning resources:

Text books:

1. Reinforced concrete design, (3rd edition) by Unni Krishna Pillai, S. and Devdas Menon, Tata McGraw-Hill, New Delhi, 2010.
2. Limit State Design, (7th edition) by Punmia, B.C., Laxmi Publications Pvt. Ltd., New Delhi, 2009.
3. Limit State Design of Reinforced concrete, (2nd edition) by Varghese P.C., PHI Learning Pvt. Ltd., New Delhi., 2008.

Reference books:

1. Design of R.C. Structural Elements, (2nd edition) by Bhavikatti S.S., 2009.
2. Fundamentals of reinforced concrete design by Gambhir, M.L., Printice Hall of India Private Ltd., New Delhi.2009.
3. Reinforced concrete structural elements by Purushotham, P., Tata McGraw-Hill, 994.
4. Reinforced concrete design, (3rd edition) by Krishna Raju, N.and Pranesh, R.N., CBS, New Delhi, 2008.
5. Design of concrete structures, (13th edition) by Arthus Nilson, H. and David Darwin., Tata McGraw-Hill, 2010.

Web Reference: NPTEL

IS CODE: IS -456 – 2000. This code is permitted in the examination.

3/4 B.Tech. FIFTH SEMESTER

CE5T2	**ENVIRONMENTAL ENGINEERING-I**	**Credits: 3**
Lecture: 3 periods/week		**Internal assessment: 30 marks**
Tutorial: 1 period /week		**Semester end examination: 70 marks**

Pre-requisites: Environmental science, fluid mechanics, hydraulics and hydraulic machinery

Learning objectives:

- To gain knowledge on various sources of water with reference to quality and quantity in a locality, their suitability for domestic application and drinking.
- To know the water quality standards and water analysis.
- To design various treatment units as per the quality of water is concern.
- To know different operation of chlorine.
- To make pipe line networking with various appurtenances including service reservoirs, various types of valves.

Course outcomes:

After the exposure to the subject, student will be able to:

1. Comphrend water supply Engineering is important professional and ethical responsibility of Civil and Environmental Engineer.
2. Assess the quality and quantity of water requirements for a city/town.
3. Design the various types of treatment units for treating the raw water
4. Classify the chlorination and disinfection of water
5. Understand the different types of appurtenances for safe disposal of drinking water.

UNIT - I

INTRODUCTION TO WATER SUPPLY ENGINEERING

Need for protected water supplies-Objectives of water supply systems -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 AND INTAKE WORKS

Classification of sources of water supply- Choice of source- Suitability with regard to quality and quantity- Lake, river, reservoir and canal intake -Types of conduits- Capacity and design- Materials for pipes- Leakages- Types of pumps- Efficiency and choice of pumps.

UNIT-II

QUALITY OF WATER

Impurities in water- Routine water analysis - physical, chemical and bacteriological tests -Standards for drinking water- Methods of purification of water- Sequence of treatment for ground water and surface water sources- Water borne diseases.

PLAIN SEDIMENTATION AND COAGULATION

Theory of sedimentation; Stoke's law; Sedimentation tanks; Design aspects; Principle of coagulation; Chemicals used for coagulation; Units of coagulation plant; Optimum dose of coagulant

UNIT-III

FILTRATION OF WATER

Theory of filtration; Filter materials; slow sand and rapid sand filters; Construction and operation; Troubles in rapid sand filters; Pressure filters

DISINFECTION OF WATER

Different methods of disinfection; Chlorination; Types of chlorination; Testing of chlorine. -Chlorine demand; Break point chlorination; Application of gaseous chlorine; liquid chlorine;

UNIT-IV

WATER SOFTENING

Methods of removing temporary hardness; Methods of removing permanent hardness; Lime soda process; Base exchange process; Demineralization process; Removal of colour, odour and taste from water; Defluoridation.

DISTRIBUTION SYSTEM

General requirements; Classification; Methods of supply; Available pressure in the distribution system; Layouts of distribution networks; Hardy cross method-equivalent pipe method; Distribution reservoirs; Functions; Types; Capacity of balancing tank; Analysis of distribution system; Methods of analysis.

UNIT-V

APPURTENANCES IN THE DISTRIBUTION SYSTEM

Position of valves; site location; Sluice valves; Check valve; Air valve; Drain valve; Hydrants; Meters.

PLUMBING

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

Learning resources:

Text books:

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

Reference books:

1. Water Supply and Sanitary Engineering Vol. 1 by Gurucharan Singh; Standard Publishers Distributors, Delhi
2. Water Supply and Sanitary Engineering by G.S. Birde; Dhanpat rai and sons, Delhi.
3. Manual on Water Supply & Treatment; CPH and EEO, Ministry of Urban Development; Govt. of India, New Delhi.

Web References: NPTEL

3/4 B.Tech. FIFTH SEMESTER

CE5T3 WATER RESOURCES ENGINEERING-I Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Environmental science, fluid mechanics, hydraulics and hydraulic machinery

Learning objectives:

- To become conversant with principles and practice of Irrigation engineering.
- To be aware of the occurrence, movement and augmentation of surface water and ground water.

Course outcomes:

At the end of the course the student will have:

1. Ability to determine and analyze various components of hydrologic cycle
2. Capability to apply hydrograph methods to estimate runoff and flood routing methods.
3. Ability to evaluate the groundwater yield.
4. Skill to apply the various irrigation methods to the fields and apply the irrigation management practices.
5. Capability to design irrigation canals in alluvial soils

UNIT I

HYDROLOGIC CYCLE

Engineering hydrology and its applications, Hydrologic cycle, types and forms of precipitation, rainfall measurement, types of rain gauges, and computation of average rainfall over a basin, processing of rainfall data. Abstraction from rainfall-evaporation, factors affecting evaporation, measurement of evaporation-evapotranspiration-Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices. Runoff-components of runoff, factors affecting runoff, stream gauging, effective rainfall.

UNIT-II

HYDROGRAPH

Hydrograph, separation of base flow. Unit Hydrograph, definition, and limitations of applications of Unit hydrograph, derivation of Unit Hydrograph, S-hydrograph, IUH, Synthetic Unit Hydrograph.

FLOOD ROUTING

Design Discharge, Computation of design discharge-rational formula, SCS method, flood frequency analysis-Gumbel's method, log Pearson III method, basic concepts of flood routing-hydraulic and hydrologic routing, channel and reservoir routing.

UNIT-III

GROUND WATER

Ground water Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, radial flow to wells in confined and unconfined aquifers.

UNIT-VI

IRRIGATION

Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, Indian agricultural soils, methods of improving soil fertility, preparation of land for Irrigation, standards of quality for Irrigation water.

SOIL-WATER-PLANT RELATIONSHIP
Vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, estimation of consumptive use, Duty and delta, factors affecting duty, depth and frequency of Irrigation, irrigation efficiencies

UNIT-V
CANALS
Classification of canals, design of Irrigation canals by Kennedy's and Lacey's theories, balancing depth of cutting, canal lining.

Learning resources:

Text books:
1. A text book of Engineering Hydrology, (3^{rd} edition) by Jayarami Reddy, Bangalore University Science Press, 2011.
2. Irrigation and water power engineering, (16^{th} edition) by Punmia, B.C. Laxmi Publications pvt. Ltd., New Delhi, 2010.

Reference books:
1. Elementary hydrology by Singh V.P., PHI Publications, 2012.
2. Irrigation and Water Resources & Water Power, (7^{th} edition) by Modi, P.N., Standard Book House, 2008.
3. Irrigation Water Management by Majundar, D.K., Prentice Hall of India, 2009.

Web references : NPTEL

3/4 B.Tech. FIFTH SEMESTER

CE5T4 **STRUCTUAL ANALYSIS – II** **Credits: 3**

Lecture: 3 periods/week **Internal assessment: 30 marks**

Tutorial: 1 period /week **Semester end examination: 70 marks**

Pre-requisites: Mechanics of solids- I, Mechanics of solids- II and Structural analysis- I

Learning objectives:

- To learn classical methods for analyzing indeterminate structures and special structures and
- To solve indeterminate structures by influence lines. To learn classical methods for analyzing indeterminate structures and special structures and
- To solve indeterminate structures by influence lines. To learn classical methods for analyzing indeterminate structures and special structures and
- To solve indeterminate structures by influence lines.

Course outcomes:

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

1. Analyse a continuous beam and frame by using slope deflection method with or without side sway.
2. Analyse a continuous beam and frame by using moment distribution method with or without side sway
3. Analyse a continuous beam and frame by using Kani's method with or without side sway
4. Determine the deflections in beams, frames and trusses from strain energy theorems
5. Calculate the horizontal thrust, max. bending moment, normal thrust and radial shear for a 2 hinged arch

UNIT I

SLOPE-DEFLECTION METHOD

Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports, Analysis of frames with and without sway.

UNIT – II

MOMENT DISTRIBUTION METHOD

Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports –portal frames, single bay, single storey with and without sway - Substitute frame analysis by two cycles.

UNIT-III

KANIS' METHOD

Analysis of continuous beams – including settlement of supports and single bay, single storey, portal frames with and without sway

UNIT – IV

ENERGY METHODS

Reciprocal deflection theorem, Betti's theorem, Castigliano's theorems, Muller- Breslau principle – analysis of indeterminate beams and rigid jointed frames – problems on first degree of indeterminacy.

REDUNDANT PIN JOINTED FRAMES

Analysis of redundant pin jointed frames for axial forces, problems on first degree of redundancy.

UNIT – V

DEFLECTIONS USING ENERGY METHODS

Determinate pin jointed frames and determinate rigid jointed frames

TWO HINGED ARCHES

Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, tied arches.

Learning resources:

Text books:

1. Analysis of Structures – Vol. I & II by Bhavikatti, Vikas publications
2. Analysis of structures by Vazrani & Ratwani – Khanna Publications.
3. Strength of Materials and mechanics of solids Vol-2 by B.C. Punmia, Laxmi Publications, New Delhi
4. Comprehensive Structural Analysis-Vol.I&2 by Dr. R. Vaidyanathan & Dr. P.Perumal- Laxmi publications pvt. Ltd., New Delhi

Reference books:

1. Theory of structures Vol. I and Vol. II – Pandit and Gupta
2. Structural Analysis by C.S. Reddy, Tata Macgrawhill, New Delhi

e-learning resources:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

3/4 B.Tech. FIFTH SEMESTER

CE5T5 TRANSPORTATION ENGINEERING – I Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Building Materials, Concrete technology

Learning objectives:

- To know about highway planning, alignment and route selection
- To design the geometric elements of highways and highway pavements
- To study about highway materials and construction procedure of various types of pavements

Course outcomes:

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

1. Comprehend the highway development and planning in India
2. Perform geometric design of highway alignment and management of traffic
3. Design traffic intersection and choose material for highway
4. Deal with the design procedures of flexible and rigid pavements
5. Understand the constructional and maintenance issues related to highways

UNIT I

HIGHWAY DEVELOPMENT

Highway development in India–Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

HIGHWAY PLANNING

Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Planning Surveys.

UNIT – II

HIGHWAY GEOMETIC DESIGN

Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements-Sight Distance Elements-Stopping sight Distance, Overtaking Sight Distance and Intermediate Sight Distance- Design of Horizontal Alignment-Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.

TRAFFIC ENGINEERING AND MANAGEMENT

Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies- Data Collection and Presentation-Speed studies- Data Collection and Presentation- Parking Studies - Road Accidents-Causes and Preventive measures - Road Traffic Signs – Types – Road markings-Need for Road Markings-Types of Road Markings.

UNIT – III

INTERSECTION DESIGN

Types of Intersections – Types of At-Grade Intersections-Channelization: Objectives –Traffic Islands and Design criteria- Design of Traffic Signals –Webster Method –IRC Method. Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria-Advantages and Disadvantages of Rotary Intersection.

HIGHWAY MATERIALS

Subgrade soil: classification – Subgrade soil strength – California Bearing Ratio – Modulus of Subgrade Reaction. Stone aggregates: Desirable properties – Tests for Road Aggregates – Bituminous Materials: Types – Desirable properties – Tests on Bitumen – Bituminous paving mixes: Requirements – Marshall Method of Mix Design.

UNIT – IV

DESIGN OF FLEXIBLE PAVEMENTS

Objects & Requirements of pavements – Types – Functions of pavement components – Design factors – Flexible Pavement Design Methods – CBR method – IRC method – Burmister method – Mechanistic method

DESIGN OF RIGID PAVEMENTS

Design Considerations – wheel load stresses – Temperature stresses – Frictional stresses – Combination of stresses – Design of Joints – IRC method – Continuously Reinforced Cement Concrete Pavements

UNIT – V

HIGHWAY CONSTRUCTION

Types of Highway Construction – Earthwork – Proportion of Sub grade – Construction of Earth Roads – Construction of Gravel Roads – Construction of Water Bound Macadam Roads – Construction of Bituminous Pavements – Construction of Cement Concrete Pavements.

ADVANCES IN HIGHWAY CONSTRUCTION

Soil stabilisation, Soil-Cement Stabilisation, Soil-Lime Stabilisation, Specific equipments for road construction.

Learning resources:

Text books:

1. Highway Engineering, (9th edition) by Khanna, S.K. and Justo ,C.E.G., Nem Chand Bros, Roorkee, 2010.
2. Traffic Engineering and Transportation Planning, (7th edition) by Kadiyali, L.R., Khanna Publishers, New Delhi, 2010.
3. Specifications for Roads and Bridges - Manual for Maintenance of roads, Most publications, 1976.

Reference books:

1. Fundamentals of Transportation Engineering, (3rd edition) by Papacostas, C.S., Prentice Hall of India Pvt.Ltd, New Delhi, 2009.
2. Principles of Highway Engineering by Kadiyali, L.R., Khanna Publishers, New Delhi, 2012.
3. Traffic Planning and Design by Saxena, Dhanpat Rai Publishers, New Delhi, 2010.
4. Transportation Engineering - An Introduction, (3rd edition) by Jotin Khisty. C, Prentice Hall, Englewood Cliffs, New Jersey, 2012.

Web resources :

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

http://jntuk-coeerd.in/

3/4 B.Tech. FIFTH SEMESTER

CE5T6 GEO TECHNICAL ENGINEERING – II Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Geo-Technology

Learning objectives:

- To know the soil exploration, field tests involved in assessing the quality of soils
- To calculate the earth pressures and check the stability of stability of slopes and retaining walls.
- To calculate the Safe Bearing Capacity (SBC) of soils and to understand about the importance and suitability of pile and well foundations.

Course outcomes:

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

1. Determine collection of soil sample below ground surface disturbed and undisturbed the soil exploration and earth pressure theory
2. Apply principles and design of retaining walls & slope stability of soil
3. Design of various types shallow foundation and bearing capacity of soil
4. Understand allowable settlement analysis
5. Understand various types of files and design of well foundation

UNIT – I

SUB–SOIL INVESTIGATION AND SAMPLING

Introduction; Methods of exploration; 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; Penetrometer tests;

LATERAL EARTH PRESSURE

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 graphical method for active earth pressure;

UNIT – II

RETAINING WALLS

Types of retaining walls; Design considerations for retaining walls; Stability of retaining walls;

STABILITY OF SLOPES

Introduction; Infinite slopes and translational slides; Definitions of factor of safety; Finite slopes forms of slip surface; Method of slices; Location of most Critical Circle; Stability of Earth Dam Slopes; Friction Circle Method; Taylor's Stability Number;

UNIT –III

BEARING CAPACITY OF SHALLOW FOUNDATION

Concept of foundations; Types of foundations and their applicability; General requirements of foundations; Location and Depth of foundation. Terminology relating to bearing 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;

UNIT – IV

SETTLEMENT ANALYSIS

Settlement of Shallow foundation – types; Methods to reduce differential settlements; Allowable Bearing Pressure; Immediate settlement –Terzaghi's Method; Allowable Bearing pressure of Granular Soils based on Standard Penetration Test Value – Terzaghi and IS methods;

UNIT – V

PILE FOUNDATIONS

Introduction; Uses of Piles; Types of Piles; Cast- in-situ Pile construction; Selection of Pile type; Pile driving; Pile load carrying capacity in compression – Static Pile Load formula, Load tests, Dynamic Pile formulae; Correlations with Penetration test data; Group action of Piles – load carrying capacity and settlement; Negative skin friction;

WELL FOUNDATIONS

Types of wells; Components of well foundation; Shapes of wells; Forces acting on well foundation; Construction and Sinking of wells;

Learning Resources:

Text nooks :

1. Basic and Applied Soil Mechanics – Gopal Ranjan and A.S.R.Rao, New Age International Publishers
2. Soil Mechanics and Foundation Engg. (7^{th} edition) by Dr. Arora, K.R., Standard Publisher and distributors, Delhi, 2010.
3. A Text book of Soil Mechanics and Foundation Engineering – B.C.Punmia Laxmi Publications

Reference books:

1. Foundation Engineering by B. J. Kasmalkar; Pune Vidyarthi Griha Prakashan, Pune Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Company.
2. Foundations of Expansive Soils, F.H. Chen. Elsevier Publications.
3. Geotechnical Engineering by SK Gulati & Manoj Datta, Tata McGraw- Hill Publishing Company Limited.
4. Principles of Foundation Engineering(1999), B.M. Das., PWS Publishing Company, 4th edition, Singapore
5. Geotechnical Engineering, - Codutu, Pearson Education

Web Resources: NPTEL

3/4 B.Tech. FIFTH SEMESTER

CE5L3 PERSONALITY DEVELOPMENT COURSE Credits: 0

Lecture: -- Lab : 2 periods/week

Pre-requisites: Nil

Learning objectives:

- To develop attitudes conducive for effective cultural communication
- Enables to set goals and gives clarity of vision and mission.
- Interpersonal and group skills.
- To inculcate the need to lead a healthy lifestyle and manage time and stress
- To improve leadership quality
- To improve physical aspects of personality/posture
- To attain personality development skills for improved placement opportunities and to work with a team spirit.

Course outcomes:

At the end of the course, the student will have:

1. Understanding of the importance of interpersonal skills
2. Ability to present oneself in effective manner on the basis of his strengths and weakness.
3. Understanding of group dynamics; team building activity; cooperation.
4. Communication with other members in team taking accountability.
5. Leadership qualities

UNIT I

Introduction to Soft skills, need for soft skills for higher education and career.

UNIT II

Know thy self in the form of SWOT analysis, Goal Setting – Framing vision & Mission

UNIT III

Importance of Team Work - value of being a team player.

UNIT IV

Time Management, Leadership Vs Managerial Skills.

UNIT V

Communication, Barriers in communication, Presentation Skills

Reference books:

Personality Development – Harold.R.Wallace &L.Ann Masters.
Personality Development and Career Management-A pragmatic perspective –R.M.Onkar
Personality Development and Communication Skills I&II –Dr.C.B.Gupta.
The Dynamics of Personality Development and Projection –J.R.Bhatti.
Bussiness Communication and Personality Development-lesson for paradigm change in personality –Biswajit Das&Ipseeta Satpathy.
Education and Personality Development –Dr.T.Ramasami.

3/4 B.Tech. FIFTH SEMESTER

CE5L1 GEOTECHNICAL ENGINEERING LAB Credits: 2

Lecture: -- Internal assessment: 25 marks

Lab : 3 periods/week Semester end examination: 50 marks

Pre-requisites: Geo technology

Learning objectives:

- To calculate the physical and mechanical properties of soils and to identify their suitability for construction.
- To conduct various field tests on soils for getting the accurate results and avoid approximately.

Course outcomes:

After performing the experiments listed in the syllabus, the students will have skills:

1. To determine basic soil properties and classify the soil for Engineering application
2. To investigate the engineering properties of the soil such as Strength, Compressibility and permeability and apply the same to the engineering problems

LIST OF EXPERIMENTS:

Any 12 of the following experiments are to be completed.

1. Determination of water content by oven drying method.
2. Determination of specific gravity by
   (a) Density bottle method
   (b) Pycnometer method.
3. Gradation analysis
   a) Mechanical Sieve analysis
   b) Hydrometer analysis.
4. Determination of Atterberg limits
5. Determination of free swell index
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.
14. Consolidation test.

LIST OF EQUIPMENTS:

1. Determination of specific gravity by
   (a) Density bottle method
   (b) Pycnometer method.
2. Casagrande's liquid limit apparatus.
3. Apparatus for plastic and Shrinkage limits
4. Sieve analysis
   a) Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 0.15mm, and 0.075mm.
   b) Hydrometer
5. Field Density apparatus for
   a) Core cutter method
   b) Sand Replacement method
6. Permeability Apparatus for
   a) Constant Head test
   b) Variable Head test
7. Box shear test apparatus
8. Laboratory vane shear apparatus.
9. Apparatus for CBR test
10. Sampling tubes and sample extractors.
11. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
12. One dimensional consolation test apparatus with all accessories.
13. Tri-axial cell with provision for accommodating 38 mm dia specimens.
14. Universal Auto compactor for I.S light and heavy compaction tests.
15. Hot Air ovens (Range of Temperature 50-1500C
16. Electronic balances of 500 g capacity with 0.01g least count and 5 kg capacity with least count of 1gm

Learning Resources:

Text books:

1. Basic and Applied Soil Mechanics – Gopal Ranjan and A.S.R.Rao, New Age International Publishers
2. Soil Mechanics and Foundation Engg (7^{th} edition) by Dr. Arora, K.R., Standard Publisher and Distributors, Delhi, 2010.

3/4 B.Tech. FIFTH SEMESTER

CE5L2 CONCRETE TECHNOLOGY LAB Credits: 2

Lecture: -- Internal assessment: 25 marks

Lab : 3 periods/week Semester end examination: 50 marks

Pre-requisites: Concrete technology

Learning objectives:

- To test the quality of concrete in various parameters and materials used in concrete

Course outcomes:

After performing the experiments listed in the syllabus, the students will be able to

1. Determine the properties of the constituent materials of concrete.
2. Test and evaluate properties of fresh concrete and the properties of hardened concrete including strength and durability.

LIST OF EXPERIMENTS:

I. TESTS ON CEMENT AND AGGREGATES:

- Normal Consistency and fineness of cement.
- Initial setting time and final setting time of cement.
- Specific gravity and soundness of cement.
- Compressive strength of cement.
- Sieve analysis, Specific gravity and Bulking of sand.
- Tests on Coarse aggregate: Flakiness index, elongation index, specific Gravity and sieve analysis.

II. TESTS ON FRESH CONCRETE:

Workability test on concrete by

- compaction factor,
- slump ,
- Vee-bee.

III. TESTS ON HARDENED CONCRETE:

- compressive strength,
- Split tensile strength of concrete.

IV. NON-DESTRUCTIVE TESTING ON CONCRETE (for demonstration):

- Rebound Hammer test
- Pulse Velocity test

LIST OF EQUIPMENTS:

1. Length and elongation gauges
2. Vicat’s apparatus
3. Specific gravity bottle.
4. Lechatlier’s apparatus.
5. Slump and compaction factor setups
6. Longitudinal compresso meter
7. Rebound hammer, Pulse velocity machine

3/4 B.Tech. SIXTH SEMESTER

CE6T1 DESIGN AND DRAWING OF CONCRETE STRUCTURES–II Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Design and drawing of concrete structures I

Learning objectives:

- To design different types of footings, also design of some advanced conditions like, earthquake resistance.
- To have fundamental design concepts of Pre stressed concrete design.

Course outcomes:

At the end of course the student will be able to

1. Design reinforced concrete structural elements like footings and retaining walls
2. Design reinforced concrete elements like flat slabs and grid slabs.
3. Understanding the basics of ductility in earthquake resistant design.
4. Understanding the pre stressed concrete methods
5. Design and detailing of pre stressed concrete members for flexure and shear..

UNIT – I

ISOLATED AND COMBINED FOOTINGS

Different types of footings – Design of isolated, square, rectangular and circular Footings. Combined slab footing – combined beam and slab footing.

RETAINING WALLS

Types, stability of retaining walls, design of cantilever and counter fort retaining walls.

UNIT – II

FLAT SLABS

Introduction-Proportioning-Bending moment-Shear-Direct design method-Slab reinforcement-IS code provisions.

GRID SLABS

Introduction-Method of design as per IS 456 -Reinforcement detailing.

UNIT – III

DUCTILITY IN EARTHQUAKE RESISTANT DESIGN

Importance of ductility in seismic design-concepts, computation of ductility, factors affecting ductility, design principles & code provisions.

INTRODUCTION TO PRESTRESSED CONCRETE

General principles of pre stressing, pre tensioning and post tensioning,- Advantages and limitations of pre stressed concrete,- Materials,- High strength concrete and high tensile steel, their characteristics.

UNIT – IV:

METHODS OF PRE STRESSING

IS code provisions, Methods and systems of pre stressing, pre tensioning and post tensioning methods, systems of pre stressing like Hoyer system, Magnel system, Fressinet system , Gifford and Udall system. Different losses in Pre stressed concrete.

UNIT – V:

ANALYSIS OF PRE STRESSED CONCRETE FOR FLEXURE

Elastic analysis of concrete beams pre stressed with straight, concentric, bent and parabolic tendons.

DESIGN FOR FLEXURE AND SHEAR

Allowable stresses, Design criteria as per code, elastic design of simple rectangular and I- sections for flexure, shear and principal stresses, design for shear in beams.

Learning resources:

Text books:

1. Reinforced Concrete Design, (3rd edition) by Unni Krishna Pillai S. and Devdas Menon, Tata McGraw-Hill, 2012.
2. Reinforced Concrete (Limit State Method) Ashok Jain K., Nemchand & Bros., Roorkee, 2007.
3. Prestressed concrete by Krishna raju N, (4th edition), Tata Mc Graw-Hill Education Pvt. Ltd., New Delhi.
4. Advanced Reinforced.Concrete Design, (2nd edition) by Varghese P.C., PHI Learning Pvt. Ltd., New Delhi., 2008.

Reference books:

1. Limit State theory and Design of reinforced concrete by Karve, S. R. and Dr. Shah V. L., Pune Vidyarthi Griha Prakasan, Pune, 2012.
2. Limit State Design of Foundations, (2nd edition) by Varghese P.C., PHI Learning Pvt. Ltd., New Delhi, 2008.
3. Advanced design of R.C. Structures, (2nd edition) by Bhavikatti S.S., 2009.
4. Design of concrete structures, (13th edition) by Arther Nilson H., Tata Mc Graw-Hill, 2010.

Web Reference books: NPTEL

IS CODE: IS: 456 –2000, IS:1343 -1980 and IS: 1893 (Part1)-2002
codes are permitted in the examination

3/4 B.Tech. SIXTH SEMESTER

CE6T2 DESIGN AND DRAWING OF STEEL STRUCTURES Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Structural Analysis – I, Structural Analysis – II

Learning objectives:

- To learn the design philosophies of limit state design.
- To develop knowledge in designing of structural elements in steel.

Course outcomes:

At the end of course the student will have:

1. Knowledge of the properties of steel and design basics with different types of connections
2. Capability to design steel members subjected to tension and compression.
3. Ability to design beams by limit state method.
4. Capability to design built up columns and column foundations.
5. Ability to design purlin and plate girder.

UNIT – I

PRINCIPLES OF LIMIT STATE DESIGN

Design requirements, Limit states, Loads

CONNECTIONS

Riveted and bolted connections –definition, rivet/ bolt strength and capacity, welded connections, Introduction, Advantages and disadvantages of welding- Strength of welds-Butt and fillet welds: Design of fillet welds.

UNIT – II

TENSION MEMBERS

General Design of members subjected to direct tension

COMPRESSION MEMBERS

Effective length of columns. Slenderness ratio – permissible stresses. Design of compression members, struts etc.

UNIT –III

BEAMS

Allowable stresses, design requirements as per IS Code-Design of simple and compound beams-Curtailment of flange plates, Beam to beam connections, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.Design of purlins in roof trusses.

UNIT – IV

BUILTUP COLUMNS

Design of Built up compression members – Design of lacings and battens, splicing of columns.

COLUMN FOUNDATIONS

Design of slab base and gusseted bases.

UNIT – V

PLATE GIRDER

Design consideration – IS Code recommendations Design of plate girder-Welded – Curtailment of flange plates, stiffeners – splicing and connections.

Note: The students should prepare the following plates. Plate 1 Detailing of simple beams
Plate 2 Detailing of Compound beams including curtailment of flange plates. Plate 3 Detailing of Column including lacing and battens.
Plate 4Detailing of Column bases – slab base and gusseted base Plate 5 Detailing of purlins.
Plate 6 Detailing of Plate girder including curtailment, splicing and Stiffeners.

FINAL EXAMINATION PATTERN
The end examination paper should consist of Part A and Part B. Part A consists of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part A is 40% and Part B is 60%.

Learning resources:

Text books:
1. Design of Steel Structures by limit state method as per IS 800-2007 by Bhavikatti, S.S., I.K. International Publishing House Pvt. Ltd, 2009.
2. Design of Steel Structures, (3^{rd} edition) by Duggal S.K., Tata Mcgraw-Hill, New Delhi, 2012.

Reference books:
1. Steel Structures Design and Practice by Subramanian N., Oxford University Press. 2009.
2. Design of Steel Structures, (3^{rd} edition) by Raghupathi M., Tata McGraw-Hill, 2006
3. Structural design in steel by Sarwar Alam Raz, New Age International Publishers, New Delhi, 2002.

IS CODES:
1. IS -800 – 2007
2. IS – 875 – Part III
3. Steel Tables.

These codes and steel tables are permitted in the examinations.

e-learning resources:
http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

3/4 B.Tech. SIXTH SEMESTER

CE6T3 WATER RESOURCE ENGINEERING – II Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Water resources engineering I

Learning objectives:

- To learn about the water resource development projects like diversion works, dams and spill ways, their design for stability.
- To gain knowledge on the design of various canal structures.

Course outcomes:

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

1. Apply the design principles of diversion structures.
2. Assess reservoir storage requirements, best sites for reservoirs and dams and design a gravity dam.
3. To apply the design principles of earth dams and spillways.
4. Arrive at appropriate canal regulation works, falls and outlets
5. Apply the design principles of various cross drainage works.

UNIT-I

DIVERSION HEAD WORKS

Types of Diversion head works, weirs and barrages, layout of diversion head works, components. Causes and failure of hydraulic structures on permeable foundations, Bligh's creep theory, Khosla's theory, determination of uplift pressure, impervious floors using Bligh's and Khosla's theory, exit gradient, functions of U/s and d/s sheet piles.

UNIT-II

RESERVOIR PLANNING

Investigations, site selection, zones of storage, yield and storage capacity of reservoir, reservoir sedimentation.

DAMS:

Types of dams**,** selection of type of dam, selection of site for dam.

GRAVITY DAMS

Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a gravity dam, stability analysis, drainage galleries, grouting.

UNIT-III

EARTH DAMS

Types of Earth dams, causes of failure, criteria for safe design, seepage, measures for control of seepage – filters, stability analysis – stability of downstream slope during steady seepage and upstream slope during sudden drawdown conditions.

SPILLWAYS:

Types of spillways, design principles of Ogee spillways, types of spillway gates. Energy dissipation below spillways – stilling basin and its appurtenances.

UNIT-IV

CANAL FALLS:

Types of falls and their location, design principles of Sarda type fall, trapezoidal notch fall and straight glacis fall.

CANAL REGULATORS:
Head and cross regulators, design principles. Canal outlets, types of canal modules, proportionality, sensitivity and flexibility.

UNIT-V
CROSS DRAINAGE WORKS:
Types, selection, design principles of aqueduct, siphon aqueduct and super passage.

Learning resources:

Text books:
1. Irrigation engineering and hydraulic structures, (23rd edition**)** by Garg S.K., Khanna Publishers, 2010.
2. Irrigation and water power engineering. (16th edition) by Punmia B.C., Laxmi Publications Pvt. Ltd., New Delhi, 2010.
3. Irrigation engineering by Arora K.R., Delhi standards publication, 2009.
4. Irrigation Engineering, (3rd edition) by Sharma R.K. and Sharma T.K., S.Chand Publishers, 2010.

Reference books:
1. Irrigation and water resources engineering by Asawa G.L., New Age International Publishers, 2010.
2. Theory and Design of Hydraulic structures by Varshney, Gupta and Gupta, New Chand and Bros, 1982.
3. Water resources engineering, (2nd edition) by Satyanarayana Murthy Challa, New Age International Publisher, 2010.

Web Reference books: NPTEL

3/4 B.Tech. SIXTH SEMESTER

CE6T4 ENVIRONMENTAL ENGINEERING-II Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Environmental engineering I

Learning objectives:

- To know types of Sanitation, sewages, sewers and sewer appurtenances
- To design the treatment unit for domestic waste water and its disposal.
- To know the solid waste management at primary level.

Course outcomes:

After the exposure to the subject, student is able to:

1. Identify the importance of Sanitary Engineering.
2. Analyze and conduct different sewage characteristics.
3. Treat the sewage by using various treatment units before disposal.
4. Analyze the sludge characteristics and treat by different methods.
5. Evaluate existing scenario of solid waste management in India

UNIT - I

INTRODUCTION TO SANITARY ENGINEERING:

Sanitation- Conservancy and water carriage system-Sewerage systems- Relative merits Quantity of sanitary sewage- Factors- storm water sewage- factors- Determination of quantity of storm water sewage.

SEWERS, SEWER APPURTENANCES, SEWAGE PUMPING:

Types of sewers- Design of sewers- Construction- Testing- Maintenance of sewers Sewer appurtenances – Man holes -Flushing tanks- Inverted siphons-Catch basins Storm water regulators-Sewage pumping

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 TREATEMNT OF SEWAGE

Screens-Grit chamber- Grease traps- Skimming tanks- Sedimentation tanks- Septic tank- Design criteria of septic tank- Septic tank effluent disposal- soak pit Leaching cess pool- Dispersion trenches.

UNIT-III

SECONDARY TREATEMNT OF SEWAGE

Trickling filters- Principles - Filter types- low rate Trickling filter-high rate trickling filter Recirculation; Final settling tanks; Operational problems and remedies

ACTIVATED SLUDGE PROCESS

Principles- Activated sludge process vs Trickling filter process- operations- Organic loading parameters-Aeration- Diffused air system- Mechanical aeration- Combined system- Sludge bulking-Sludge volume index-

UNIT- IV

SEWAGE DISPOSAL

Methods- Disposal by dilution- Self purification process- Oxygen sag- Zones of pollution of river-Disposal by irrigation- Sewage sickness- Reuse of treated sewage

SLUDGE TREATEMENT

Characteristics of sewage sludge- Anaerobic sludge digestion process- Stages of sludge digestion- Factors affecting sludge digestion- Sludge digestion tank- High rate digestion- Sludge thickening- Sludge conditioning Methods of dewatering the sludge- Methods of sludge disposal.

UNIT - V

SOLID WASTE MANAGEMENT

Municipal Solid Wastes: Characteristics-generation- collection- Methods of collection-equipment-types of vehicles-man power requirement-collection routes.

TRANSFER AND TRANSPORTATION OF SOLID WASTE

Need for Transfer operations-Transfer Stations-Selection of Location of Transfer Station-Transport means and methods-Engineered systems for solid waste management - recycle energy recovery-treatment and disposal.

Learning resources:

Text books:

1. Elements of public health engineering by Duggal K.N., S. Chand & Company Ltd., New Delhi, 1995.
2. Environmental Engineering vol. II- Sewage disposal and air pollution engineering by Garg S. K., Khanna Publishers, Delhi, 2010.
3. Environmental pollution control engineering by Rao C. S., Wiley Eastern Limited, New Delhi, 2007.

Reference books:

1. Wastewater Engineering Treatment by Met Calf and Eddy, Disposal & Reuse, Tata McGraw – Hill, 2002.
2. Water & Wastewater Technology by Mark Hammer J., John Wiley & Sons, 2008.
3. Sewerage and sewage treatment by Shirasagar S.R., Roorkee Publishing House, Roorkee, 1968.
4. Manual on Sewerage & Sewage treatment by CPH and EEO, Ministry of Works and Housing; Govt. of India, New Delhi, 2012.

Web Reference books: NPTEL

3/4 B.Tech. SIXTH SEMESTER

CE6T5 TRANSPORTATION ENGINEERING – II Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Transportation engineering I

Learning objectives:

- To know about railway planning and design
- To study railway track construction maintenance and operation
- To study different modes of transport
- To know about the fundamental of airways, harbor and docks

Course outcomes:

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

1. Know about planning and functions of railway, railway tracks and joints
2. Study geometric design of track, sleepers, fishplates and ballast
3. Understand points, crossing and signaling system
4. Design and plan airport, air craft characteristics
5. Study harbor engineering with plan and design

UNIT-I

TRANSPORTATION SYSTEMS

Role of railways in transportation-Comparison of railway and highway transportation- Development of railway systems with particular reference to India

RAILWAY TRACK, RAILS & RAIL JOINTS

Permanent way: Gauges in Railway track-Railway track cross-sections-Coning of wheels. Functions of rails-Requirements of rails-Types of rails sections-Standard rail sections-Length of rails-Rail failures-Wear on rails. -Types of rail joints - Welding of rails.

UNIT-II

SLEEPERS, FISH PLATES & BALLAST

Functions of sleepers - Requirements of sleepers - Classification of Sleepers -Timber sleepers, Metal sleepers & Concrete sleepers - Comparison of different types of sleepers. Fish plates-section of fish plates-failure of fish plates.

Functions and requirements of ballast-Types of ballast-Renewal of ballast.

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.

UNIT-III

POINTS AND CROSSINGS

Functions of components of turnout- Crossings.

STATIONS & SIGNALLING SYSTEM

Site selection for railway station- Requirements of railway station- Classifications. Objects of signaling - Classification of signals - Controlling- absolute block system. Automatic block system.

UNIT-IV

AIRPORT PLANNING AND DESIGN

Introduction, Development of air transportation system with particular reference to India. Aero plane components- Air–craft characteristics. Selection of site; Apron-Hanger-Typical airport layouts-Airport marking-Airport lighting- Drainage systems.

AIRPORT OBSTRUCTION & RUNWAY DESIGN

Zoning laws-Classification of obstructions-Imaginary surfaces-Approach zone-Turning zone. Runway orientation-Basic runway length-Corrections for elevation-Temperature and gradient-Runway geometric design - LCN system of pavement design.

UNIT-V

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- and Apron-Container ports-Docks-Light Houses.

Learning resources:

Text books:

1. Railway Engineering by Saxena, S.C. and Arora S., Dhanpat Rai & Sons.
2. Airport Planning and Design, (6^{th} edition) by Khanna, S. K. and Arora, M. G. Nemchand and Bros, Roorkee, 1999.
3. Dock and Harbour engineering by Oza H.P. and Oza G., Anand Chartor Publishing House Pvt , Gujarat, 2010.

Reference books:

1. Railway Engineering by Agarwal M.M., Prabha & Co, New Delhi, 2012.
2. Airport Engineering by Rao G.V., Tata Mc Graw Hill, New Delhi, 1992.

e-learning resources :

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

3/4 B.Tech. SIXTH SEMESTER

CE6T6FE1 BUILDING MATERIALS AND CONSTRUCTION Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Engineering chemistry, engineering geology and physics

Learning objectives:

- To learn the availability, types, uses and various tests for building materials.
- To know about activities in building construction.

Course outcomes:

At the end of course the student will be able to

1. Understand the process of making quality stones and bricks with their applications.
2. Assess quality of lime, timber and steel in a detailed manner on the usage in the present-day construction.
3. Acquire the knowledge about paints, varnishes, distempers and acoustics of buildings.
4. Understand types of foundation and stone, brick & block masonry for the different construction activities in the building construction
5. Comprehend floors & roofs and application of damp proofing, scaffolding, shoring, underpinning and formwork.

BUILDING MATERIALS

UNIT – I

STONES

Qualities of a good building stone; Stone quarrying; Tools for blasting; Materials for blasting; Process of blasting; Precautions in blasting; Dressing of stones; Common building stones of India.

BRICKS

General; Composition of good brick earth; Harmful ingredients in brick earth; Classification of brick earth; Manufacture of bricks; Comparison between clamp burning and kiln burning; Qualities of good bricks; Tests for bricks; Classification of bricks; Substitutes for bricks

UNIT – II

LIME

General, Some definitions, sources of lime, constituents of lime stones, classification of limes, comparison between fat lime and hydraulic lime , manufacture of fat lime

TIMBER

Definition; Classification of trees; Structure of a tree; Felling of trees; Defects in timber; Qualities of good timber; Decay of timber; Preservation of timber; Fire resistance of timber; Seasoning of timber; Market forms of timber; Industrial timber; Advantages of timber construction; Use of timber; Indian timber trees.

STEEL

General; Manufacture of steel; Uses of steel; Factors affecting physical properties; Defects in steel; Market forms of steel; Properties of mild steel; Properties of hard steel; Corrosion of ferrous metals.

UNIT – III

PAINTS, VARNISHES AND DISTEMPERS

General; Painting; Varnishing; Distempering; Wall paper; White washing; Colour washing.

ACOUSTICS OF BUILDINGS

Important Technical terms; Requirements of sound effects; Factors to be considered in Acoustics of building; Sound absorbing materials; Sound insulation.

BUILDING CONSTRUCTION

UNIT – IV

FOUNDATIONS

Concept of foundations; Factors affecting selection of foundations; Types of foundations; Strip, Isolated, Strap, Combined Footings, Grillage foundations, Piles and their classification; Foundation on black cotton soils.

STONE, BRICK & BLOCK MASONRY

Technical terms; Classification of stone masonry; Types of bonds in brickwork and their suitability, Plan, elevation and section of brick bonds up to two bricks thickness; Classification of walls, Block masonry – Hollow concrete blocks – FAL- G Blocks, Hollow clay Blocks.

UNIT – V

FLOORS & ROOFS

Technical terms; Types of ground floors; Classification of roofs.

DAMP PROOFING, SCAFFOLDING, SHORING, UNDER PINNING & FORMWORK

Causes of dampness; Methods of preventing dampness; Types of scaffolding; Types of shoring; Methods of underpinning; Types of formwork;

Learning resources:

Text books:

3. Engineering Materials, (36th edition) by Rangwala, S.C., Anand Charotar Publishing House, 2009.
4. Building construction, (10th edition) by Punmia, B. C., Laxmi Publications, Bangalore, 2009.

Reference books:

1. Building construction and construction materials by Birdie, G.S. and Ahuja, T.D., Dhanpath Rai Publishing company, New Delhi, 1986.

E-learning resources:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

3/4 B.Tech. SIXTH SEMESTER

CE6T6FE2 AIR POLLUTION AND CONTROL Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Environmental studies

Learning objectives:

- To identify the pollutants and their sources and then the transport mechanisms of the pollutants followed by the affected population and respective controls.
- To learn the techniques and instrumentation of ambient air monitoring,
- Establishment of ambient air monitoring stations, stacks monitoring.
- To know the methods of analysis air and air pollutants.

Course outcomes:

After the exposure to the subject, student is able to:

1. Understand of contemporary pollution issues.
2. Analyze specific examples of various sources of air pollution.
3. Comprehend the causes and effects of key types of air pollution.
4. Classify of different pollution control strategies
5. Assess the air sampling methods for safe air quality management

UNIT - I

AIR POLLUTION

Air pollution - definitions-scope, significance - air pollutants - measurements of pollution classification –natural and artificial-primary and secondary, point and non-point.

EFFECT OF AIR POLLUTION

Effect of air pollutants on man-material and vegetation-global effects of air pollution green house effect, heat lands, acid rains and ozone.

UNIT-II

METEROLOGY AND PLUME DISPERSION

Properties of atmosphere-heat, pressure, wind forces, moisture and relative humidity influence of meteorological phenomenon on air quality- wind rose diagram.

LAPSE RATE

Lapse rate, pressure systems, wind and moistures, inversions and plume behavior plume rise models-Gaussian model for plume dispersion.

UNIT-III

METHODS OF CONTROLLING

Control of particulates-control at sources-controlling equipments-settling chamber centrifugal separators-fabric filters –dry and wet scrubbers-electrostatic precipitators.

GASEOUS POLLUTANTS

General Methods of Controlling Gaseous Emission-adsorption-absorption-combustion condensation-SO_X control- NO_X control-technologies

UNIT-IV

INPLANT CONTROL MEASURES

Process Change-Dry and Wet Methods of Removal and Recycling-Dust Collection Devices-Internal Separators-Catalyst Reduction

AIR POLLUTION CONTROL BY DILUTION

General-Meteorological Factors-Atmospheric Temperature Lapse Rate-Speed and Direction of Wind- Wind Velocity Profile-Diffusion Theories-Objects of Stack

UNIT-V

SAMPLING AT SOURCE

Flue Gases-Emission Standards-Gaseous Sampling- Proportional Sampling-Sampling Point Size-IsoKinetic Conditions-Sample Recovery Tests.

AIR QUALITY MANAGEMENT

Air Quality Management-Monitoring Of Suspended Particulate Matter, Sulphur Oxide, NO and Carbon Monoxide

Learning resources:

Text books:

1. Air Pollution and Control by Rao, M.N and Rao, H.N., Tata McGraw Hill, New Delhi, 2007.
2. Environmental Engineering and Management, (2nd Edition) by Suresh, S.K.Kartarai & Sons, 2005.

Reference books:

1. An Introduction to Air pollution by Trivedy, R.K., B.S.Publications, 2005.
2. Air pollution by Wark and Warner, Addison-Wesley Publications, 1998.

Web Reference books: NPTEL

3/4 B.Tech. SIXTH SEMESTER

CE6L1 TRANSPORTATION ENGINEERING LAB Credits: 2

Lecture: -- Internal assessment: 25 marks

Lab : 3 periods/week Semester end examination: 50 marks

Pre-requisites: Transportation engineering

Learning objectives:

- To study the properties of road materials and their suitability.
- To understand the stability requirements of the Bitumen mixes and desirable properties of the Bitumen mixes.
- To study the suitability of the foundation soil.
- To study traffic surveys and design of intersection including drawing.

Course outcomes:

After performing the experiments listed in the syllabus, the students will be able to:

1. Test the soil, road aggregate suitability in pavement construction
2. Determine the mix proportions of the Bituminous mixes.
3. To study the traffic surveys at mid block, intersection and parking study.

LIST OF EXPERIMENTS:

I. ON ROAD AGGREGATES:

1. Aggregate Crushing value test
2. Aggregate Impact value test
3. Specific Gravity and Water Absorption tests
4. Deval's Attrition value test
5. Los Angeles Abrasion value test
6. Shape tests

II. ON BITUMINOUS MATERIALS:

1. Penetration Test
2. Ductility Test
3. Softening Point Test
4. Flash and Fire point tests
5. Viscosity test

III. BITUMINOUS CONCRETE MIX DESIGN:

1. Marshall method

IV. ON SUB GRADE:

1. North Dakota cone test
2. Swell test

V. TRAFFIC SURVEYS:

1. Traffic volume study at mid blocks.
2. Studies at intersection
3. Turning movement.
4. Spot speed studies.
5. Parking study

* **At least 15 experiments should be covered.**

LIST OF EQUIPMENT:

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers
4. Los angeles Abrasion test machine
5. Deval's Attrition test machine
6. Length and thickness gauges
7. Bitumen penetration test setup
8. Bitumen Ductility test setup
9. Ring and ball apparatus
10. Penskey – Morten's apparatus
11. Tar Viscometer
12. North Dokota cone test apparatus
13. Marshal stability test apparatus
14. Balance
15. IS Sieves etc.

Learning resources:

Web Reference books: vlab.co.in

3/4 B.Tech. SIXTH SEMESTER

CE5L2 COMPUTER AIDED BUILDING DRAWING Credits: 2

Lecture: -- **Internal assessment: 25 marks**

Lab: 3 periods/week **Semester end examination: 50 marks**

Pre-requisites: Computer aided drawing, building drawing

Learning objectives:

1. To gain knowledge of fundamentals of building drawing based on national building code, enabling students to prepare them using AutoCAD.
2. To acquire skills in planning and detailing various types of buildings.

Course outcomes:

After performing the experiments listed in the syllabus, the students will have skills on:

1. Prepare working drawings for individual components like windows by auto cad software.
2. Prepare working drawings for individual components like fully paneled and paneled and glazed doors with wooden panel and RCC panel.
3. Develop the skills of create a drawing of steel roof truss, king and queen post trusses.
4. Develop the skills of drawing plans, sections and elevations of single and two stared residential building, office building, institutional building.
5. Design and draw various buildings with the given data as 3D modeling

UNIT I

Fully Paneled Window
Fully Paneled and Glazed Window

UNIT II

Fully Paneled Door with wooden panel
Fully Paneled Door with RCC frame
Paneled and glazed door with wooden panel

UNIT III

Steel roof truss
King post and Queen post trusses

UNIT IV

Single and multiple storied residential building - Plan, Elevation and Cross section
Framed office building- Plan, Elevation and Cross section
Institution building- Plan, Elevation and Cross section

UNIT V

3D view of a single floor residential building
3D view of a dog legged stair case
3D view of a spiral stair case

Learning resources:

Text books:

1. A Course in Civil Engineering Drawing, (4th edition) Sikka V.B., S.K.Kataria & Sons, New Delhi, 1998.
2. Building Drawing with an Integrated Approach to Built Environment, (4th edition) by Shah, M.G., Kale C.M. and Patki S.Y., Tata McGraw-Hill, 2008.

Reference codes:

1. IS: 962 – 1967 Code of Practical for Architectural and Building Drawing
2. IS: 4021 – 1983 Specification for Timber Door, Window and Ventilator Frames
3. IS: 6523 – 1983 Specification for Precast Reinforced Concrete Door and Window Frames
4. IS: 1003 – 1977 Part I, II Specification for Timber Panelled and Glazed Shutters
5. IS: 2191 – 1983 Part I, II Specification for Wooden Flush Door Shutters
6. IS: 6198 – 1983 Specification for Ledged, Braced and Battened Door and Window Frames.

3/4 B.Tech. SIXTH SEMESTER

CE6L3 **SOFT SKILLS** **Credits: 0**

PRACTICE: 2periods/week

Pre-requisites: Nil

Learning objective:

- To enhance holistic development of students and improve their employability skills to make them Industry ready.

Course outcomes:

By the end of the course students should be able to:

1. Develop inter & intra personal skills and be an effective goal oriented team player.
2. Develop communication and problem solving skills.
3. Develop Group and team thinking skills.
4. Develop as professionals with idealistic, practical and moral values.
5. Mould as Future Industry Leaders by improving Personal and Professional effectiveness.

UNIT I

SELF ANALYSIS Inter & Intrapersonal skills, Situation description of Interpersonal Skill. SWOT Analysis, Who am I, Attributes, Importance of Self Confidence, Self Esteem. Attitude, Factors influencing Attitude, Challenges and lessons from Attitude. Change Management Exploring Challenges, Risking Comfort Zone, Managing Change. Behavioral Styles, Being Assertive. Responsibility Vs accountability, Sense of Ownership.

UNIT II

MOTIVATION Factors of motivation, Intrinsic & Extrinsic Motivators. Self motivation techniques. Goal setting: Wish List, SMART Goals, Blue print for success, Short Term, Long Term, Life Time Goals. Time Management: Value of time, Diagnosing Time Management, Weekly Planner To do list, Prioritizing work. Creativity: Out of box thinking, Lateral Thinking, Saying No, Dealing with the Ramble, Responding to Criticism. Emotional Intelligence: What is Emotional Intelligence, emotional quotient? Why Emotional Intelligence matters, Emotion Scales. Case studies and discussions.

UNIT III

Team Work, Stages of team formation, Necessity of Team Work Personally, Socially and Educationally. Leadership Vs Management**:** Types of leadership styles, Skills to be a good manager and good Leader, Assessment of Leadership Skills, Understanding the relationship between Leadership Networking & Team work, Realizing Ones Skills in Leadership, Networking & Team Work, Stress Management: Causes of Stress and its impact, how to manage & distress, Understanding the circle of control, Stress Busters. Decision Making: Importance and necessity of Decision Making, process of Decision Making, Practical way of Decision Making, Weighing Positives & Negatives. Case studies, Situation reaction tests.

UNIT IV

PROFESSIONAL COMMUNICATION An Overview of Professional Communication, Essential Professional Communication Skills Tools of communication, levels of communication, Verbal Communication: Oral & written communication (Listening, Speaking, Reading & writing). Non verbal Communication: Body language. Activities to improvise Listening, Reading, Speaking & writing. Public Speaking: elements, Do's & Don'ts. Group discussions: Types, Skills assessed, Types of discussion topics, SPELT approach, Keyword approach, VAP. E-mail etiquette, Telephone etiquette, work etiquette. Grooming.

UNIT V

RESUME BUILDING

5Principles of Resume Building, Resume Vs Curriculum Vitae, Different Formats of Resume, Do's & Don'ts of Resume, how to face Interviews, Standard Interview questions, SRT, Mock Interviews.

PRESENTATION ASSESSMENT

A practical and activity oriented course which has a continuous assessment based on class room interaction, activities etc.,

Related Activities:

- Activity to know the importance of Inter Personal and Intra Personal Skills and its relevance in the work environment and for career.
- Analysis of Individual strengths and weaknesses, opportunities and threats with regard to employability skills.
- Assertiveness Development : Case Study and Role Plays
- Goal Setting: Success Story Case Study and Practice
- Ice Breakers: Focus on Career Needs.
- Attitude and Team Development Work out.
- Mock group discussion & assessment based on g.d evaluation sheet given by corporate
- Presentation of one's own work. Eg Corporate Information – Profile of Company.
- Self Introduction Activity (Interview Focus).
- Telephonic Interview Mock Rounds.
- Leadership Development: Situation Reaction Tests.

Reference books:

1. The ACE of softskills by Gopalaswamy Ramesh & Mahadevan Ramesh –Pearson Goal – Eliyahu Goldratt.
2. Working with Emotional Intelligence - David Goleman.
3. Developing Communication Skills by Krishna Mohan and Meera Banerji; MacMillan India Ltd., Delhi
4. Essentials of Effective Communication, Ludlow and Panthon; Prentice Hall of India.
5. Krishna Mohan and Meenakshi Raman (2000) Effective English Communication, Tata McGraw Hill, New Delhi.
6. Business Communication for managers: An advanced approach, by Penrose, Cengage learning.
7. Soft Skills: Meenakshi Raman.
8. Soft Skills : Guru Murthy.
9. Articles from popular magazines, news papers, technical journals, samples from industries and case studies.

4/4 B.Tech. SEVENTH SEMESTER

CE7T1 ADVANCED STRUCTURAL ENGINEERING Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Design and drawing of concrete structures I & II

Learning objectives:

- To be able to apply the moment distribution and strain energy methods.
- To draw the Influence Line Diagrams (ILDs) and to solve the 2 and 3 hinged arches.
- To analyze the beams, frames and trusses by using flexibility and stiffness methods.
- To use the concept of plastic theory and to do the plastic analysis for economical design.

Course outcomes:

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

1. Estimate the functional requirements such as topographical, geotechnical and navigational details, design the flood discharge
2. Design the Deck slab bridge
3. Design the T beam bridges for IRC loading by using Piguad's and Courbon's theories.
4. Design and detailing of RCC water tanks
5. Determine loads acting on tower and designing a simple tower

UNIT – I

BRIDGE ENGINEERING

Introduction - Classification of bridges - Functioning of structural elements in bridges - Investigation for major bridges, Navigational requirements, Construction resources, Traffic forecast – Design of flood discharge – Linear waterway of bridges – Loading standards. Introduction to Deck slab Bridges – Economic span length – IRC Loading and codal provisions – Design and detailing of deck slab bridges for IRC loading.

UNIT – II

T –BEAM BRIDGES

Introduction – Wheel load analysis – BM in the slab – Piguad's theory – Analysis of longitudinal girders by Courbone's theory, Design and detailing of R.C T-beam bridges for IRC loading.

UNIT-III

OVER HEAD RCC TANKS

Introduction – Design and detailing of overhead circular and intze RCC tanks including staging.

UNIT – IV

GANTRY GIRDER

Impact factors, longitudinal forces - Design of a gantry girder

UNIT – V

TOWERS

Introduction – Basic structural configurations – Loads on towers – Wind load – Design of a Communication tower.

Learning resources:

Text books:

1. Ponuswamy, S. Bridge Engineering, (2nd edition), Tata McGraw-Hill, 2007.
2. Varghees - Advanced Reinforced concrete structures, (2nd edition), Prentice Hall of India Pvt. Ltd., 2005.
3. Duggal S.K. - Design of steel structures, Tata Mc-Graw Hill Publcations, 3rd edition, New Delhi
4. Bhavikatti S.S. – Design of steel structures – IK International publishing house Pvt. Ltd.

Reference books:

1. John Victor, D. Essentials of Bridge Engineering, Oxford & IBH, 2001
2. Krishna Raju, N. Design drawing of concrete and steel structures, University Press, 2005.
3. Subramanian, N. – Steel structures design and practice, Oxford University Press,
4. Salmon, C.G. and Johnson, J.E. Steel structures- Design and behavior, Prentice-Hall,1997

e-learning resources:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

4/4 B.Tech. SEVENTH SEMESTER

CE7T2 REMOTE SENSING AND GIS APPLICATIONS Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Mathematics, Surveying

Learning objectives:

- To use the techniques of Remote Sensing and GIS Technology has opened the door for immense opportunities in large scale mapping, updating existing maps and practical planning and decision making.
- To gain the basic concepts of Remote Sensing & GIS and their applications in Civil Engineering field.

Course outcomes: At the end of course the student will have:

1. Understanding of aerial photographs, stereoscopy and remote sensing sensors and platforms, their properties and calibration.
2. Understanding of image processing sequence and its importance in Remote Sensing & Spatial Analysis and Map Projections.
3. Knowledge of Technical issues relating to the acquisition, storage, management, analysis and display of spatial data using raster data models, and vector data models.
4. Apply GIS land cover and land use management, agriculture, forestry, & disaster management.
5. Understanding of GIS urban planning, traffic management and urban change mapping.

UNIT – I

INTRODUCTION TO PHOTOGRAMMETRY & REMOTE SENSING

Principle of photogrammetry and types of Aerial photographs, stereoscopy, Map Vs Mosaic, ground control, Stereoscopic Parallax, Orthophotograph. Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation.

UNIT – II

DIGITAL IMAGE PROCESSING & GEOGRAPHICAL INFORMATION SYSTEM

Basic character of Digital Image; Pre-processing, Geometric correction methods, Atmospheric correction methods, Image Registration, Image Enhancement Techniques, Spatial Filtering Techniques, Low pass filters, high pass filters, Image Classifications, Supervised Classifications, Unsupervised Classifications. Introduction & Definition of GIS (GEOGRAPHICAL INFORMATION SYSTEM)**.** GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS, Classification of Maps, Types of Projections.

UNIT – III

GIS DATA REPRESENTATION & GIS SPATIAL ANALYSIS

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 – File management, Spatial data – Layer based GIS, Feature based GIS mapping, GIS Data File Management. Visual Analysis Methods (VAM), Data storage-vector data storage, attributes data storage, overview of the data manipulation and analysis. Buffering Techniques.

UNIT – IV
WATER RESOURCES APPLICATIONS
Water Resources Applications-I: Land use/Land cover in water resources, Surface water mapping and inventory, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics. Water Resources Management and Monitoring, Ground Water Targeting, Identification of sites for Artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

UNIT – V
APPLICATION FOR URBAN PLANNING
Urban Planning: Introduction, urban planning theory, stages of urban planning, land use/and cover mapping, base maps for urban areas, urban infrastructure & utility mapping, Remote sensing platforms and sensors application in urban studies. Aerial photography and satellite data in urban studies, traffic management, urban change detection and mapping.

Learning resources:
Text books:
1. Remote Sensing and Geographical Information systems, (2nd edition) by Anji Reddy M.B.S. Publications, JNTU Kakinada, 2008.
2. Remote Sensing and GIS, (2nd edition) By Basudeb Bhatta Oxford Higher Education.

Reference books:
1. Remote Sensing and Image Interpretation, (6th edition) by Thomas Lillesand.M and Ralph Kiefer W., 2007
2. Basics of Remote Sensing & GIS by Kumar S.Laxmi Publications, 2005.

e-learning resources:
http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

4/4 B.Tech. SEVENTH SEMESTER

CE7T3	**ESTIMATION AND COSTING**	**Credits: 3**
Lecture: 3 periods/week		**Internal assessment: 30 marks**
Practice: 1 periods/week		**Semester end examination: 70 marks**

Pre-requisites: Building planning and drawing

Learning objectives:

- To prepare estimates of buildings including R.C.C. members, roads and canals.
- To gain knowledge of rate analysis, contracts, valuation and reports.
- To get an exposure to field problems associated with roads / canals marking and estimation of roadwork quantities.

Course outcomes:

At the end of course the student will be able to

1. Understand drawings, principles of different works in civil engineering, approximate methods of estimating and standard specifications for different items of works in buildings.
2. Prepare detailed estimates for buildings using a long wall short wall method and centre line method
3. Develop the preparation of rate analysis for different works in civil engineering and understand the reinforcement bar bending schedules.
4. Understand procedures of contracts and valuation.
5. Calculate earthwork for roads & canals and prepare reports on estimates for the construction of buildings and roads

UNIT – I

INTRODUCTION TO ESTIMATION

General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating.

STANDARD SPECIFICATIONS

Standard specifications for different items of building construction

UNIT – II

LONGWALL & SHORTWALL METHOD

Detailed Estimates of Buildings using Long wall and short wall method

CENTRE LINE METHOD

Detailed Estimates of Buildings using Centre line method.

UNIT-III

STEEL ESTIMATION

Reinforcement bar bending and bar requirement schedules.

RATE ANALYSIS

Rate Analysis – Working out data for various items of work over head and contingent charges.

UNIT – IV

CONTRACTS

Contracts – Types of contracts – Contract Documents – Conditions of contract

VALUATION

Valuation of buildings.

UNIT-V

EARTH WORK FOR ROADS AND CANALS

Earthwork for Roads and Canals.

REPORTS
Reports on estimates for the construction of buildings and roads

Learning resources:
Text books:
1. Estimating and Costing, (23rd edition) by Dutta, B.N., UBS Publishers, 2010.
2. Estimating and Costing, (6th edition) by Birdie, G.S., Jain Book Depot. 2012.

Reference books:
1. Standard Schedule of rates and standard data book by Public Works Department, 2/3/2009 adopted from 1/7/2009.
2. IS:1200, Parts I to XXV – 1974 / method of measurement of building and Civil Engineering works, B.I.S.
3. Estimation, Costing and Specifications, (25th edition) by Chakraborthi M., Laxmi Publications, National Building Code, 2012.

e-learning resources:
http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

(ELECTIVE – A/I)
4/4 B.Tech. SEVENTH SEMESTER

CE7T4A PRE-STRESSED CONCRETE STRUCTURES Credits: 3
Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Design of concrete structures, Materials of solids

Learning objectives:

- To know the various prestressing methods and analysis of prestress and the resultant stresses using different concepts.
- To learn the losses in prestressed concrete & anchorage zone stresses in end block.
- To consider flexure, shear and deflection as per IS code.
- To design prestressed concrete beam & slab.

Course outcomes:

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

1. Comprehend basic concepts of pre-stressing and IS codal provisions.
2. Consider Losses of prestress and analyse prestressed beam sections.
3. Design prestressed sections subjected to flexure & shear and end blocks.
4. Comprehend composite prestressed sections and assess deflection of pre-stressed concrete beams.
5. Design prestressed one way slab and two way slab.

UNIT – I

INTRODUCTION

Historic development – General principles of prestressing, pretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

PRESTRESSING METHODS

I.S. Code provisions, Methods and Systems of prestressing; pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System.

UNIT – II

LOSSES OF PRESTRESS

In pre-tensioned and post-tensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage bending of member and frictional losses.

ANALYSIS

Analysis of sections for flexure; Elastic analysis of concrete beams, prestressed with straight, concentric, eccentric, bent and parabolic tendons.

UNIT – III

DESIGN

Design of Sections for Flexure and Shear, Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure, shear, and principal stresses – design for shear in beams – Kern – lines, cable profile.

END BLOCKS

Analysis of End Blocks by Guyon's method and Magnel method, Anchorage zone stresses – Approximate method of design – Anchorage zone reinforcement – Transfer of prestress pre-tensioned members.

UNIT – IV

COMPOSITE SECTION

Introduction – Analysis of stress – Differential shrinkage – General design considerations.

DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS

Importance of control of deflections – factors influencing deflections – short term deflections of uncracked members – prediction of long term deflections.

UNIT – V

PRESTRESSED CONCRETE ONE WAY SLAB

Introduction – Design Considerations – Design of prestressed one way slab.

PRESTRESSED CONCRETE TWO WAY SLAB

Introduction – Design Considerations – Design of prestressed two way slab.

Learning resources:

Text books:

1. Pre-stressed Concrete, (4th edition) by Krishna Raju, Tata McGraw-Hill 2009.
2 Pre-stressed Concrete by Rajagopalan N., Narosa Publications, 2013.

Reference books:

1. Pre-stressed Concrete, (5th edition) by Ramamrutham, Dhanpatrai Publications, 2010.
2. Design of Pre-stressed concrete structures, (3rd Edition) Lin T.Y. and NedBurns H., John Wiley & Sons, 2010.
3. IS 1343 Codes: BIS code on prestressed concrete,1980.

e-learning resources:

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

http://jntuk-coeerd.in/

(ELECTIVE – B/I)
4/4 B.Tech. SEVENTH SEMESTER

CE7T4B	**EARTHQUAKE RESISTANT DESIGN**	**Credits:3**
Lecture: 3 periods/week		**Internal assessment: 30 marks**
Tutorial: 1 period /week		**Semester end examination: 70 marks**

Pre-requisites: Engineering Geology, Design of concrete structures

Learning objectives:

- To estimate the lateral loads and to design the structures for lateral and gravity load combinations.
- To learn earthquake engineering concepts and design philosophies.

Course outcomes:

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

1. Understand knowledge of structural dynamics for single degree and multi degree of freedom systems.
2. Understand the earthquake engineering terminology and aseismic planning.
3. Apply the IS codal design and construction provisions in earthquake resistant structures
4. Apply proper detailing practices as per IS codal provisions and design shear walls as per building requirements.
5. Apply knowledge of Structural dynamics in view of earthquake problem and understand significance of base isolation.

UNIT – I

INTRODUCTION TO STRUCTURAL DYNAMICS

Theory of vibrations – Lumped mass and continuous mass systems – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Undamped and damped free vibration – Damping – Response to harmonic excitation – Concept of response spectrum.

MULTI-DEGREE OF FREEDOM (MDOF) SYSTEMS

Formulation of equations of motion – Free vibration – Determination of natural frequencies of vibration and mode shapes – Orthogonal properties of normal modes – Mode superposition method of obtaining response.

UNIT – II

EARTHQUAKE ENGINEERING

Engineering Seismology – Earthquake phenomenon – Causes and effects of earthquakes – Faults – Structure of earth – Plate Tectonics – Elastic Rebound Theory – Earthquake Terminology – Source, Focus, Epicenter etc - Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic Zoning Map of India – Seismograms and Accelegrams.

ASEISMIC PLANNING

Plan Configurations – Torsion Irregularities – Re-entrant corners – Non-parallel systems – Diaphragm Discontinuity – Vertical Discontinuities in load path – Irregularity in strength and stiffness – Mass Irregularities – Vertical Geometric Irregularity – Proximity of Adjacent Buildings.

UNIT – III

CODAL DESIGN PROVISIONS

Review of the latest Indian seismic code IS:1893 – 2002 (Part-I) provisions for buildings – Earthquake design philosophy – Assumptions – Design by seismic coefficient and response spectrum methods – Displacements and drift requirements – Provisions for torsion.

CODAL CONSTRUCTION PROVISIONS
Review of the latest Indian seismic code IS: 4326 provisions for buildings – General principles – Special Construction Features – Types of construction – Categories – Masonry Construction.

UNIT – IV
CODAL DETAILING PROVISIONS
Review of the latest Indian Seismic codes IS: 13920 provisions for ductile detailing of R.C buildings – Beam, column and joints
SHEAR WALLS
Types – Design of Shear walls as per IS: 13920 – Detailing of reinforcements.

UNIT – V
EARTHQUAKE RESPONSE OF BUILDINGS
Introduction – Rigid base excitation – Formulation of equations of motion for SDOF and MDOF Systems – Earthquake response analysis of single and multi-storyed buildings – Use of response spectra.
BASE ISOLATION
Classification of Isolation systems – Effectiveness and Applications of Base Isolation.

Learning resources:
Text books:
1. Dynamics of Structures, (2^{nd}edition) by Clough and Penzien, McGrawHill, 1993.
2. Earthquake Resistant Design of Structures by Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India, New Delhi,2008.

Reference books:
1. Dynamics of Structures, (2^{nd} edition) by Chopra, A.K., Pearson Education, Indian Branch, Delhi , 2001.
2. Structural Dynamics, (2^{nd} edition) by Mario Paaz. 2004.
3. Basics of Structural Dynamics and Aseismic Design by S.R. Damodarasamy & S. Kavitha, PHI Learning PVT. Ltd., Delhi, 2013.

IS CODES: IS: 1893, IS: 4326 and IS: 13920

e-learning resources:
www.nicee.org

4/4 B.Tech. SEVENTH SEMESTER

CE7T4C	**TRAFFIC ENGINEERING**	**Credits: 3**
Lecture: 3 periods/week		**Internal assessment: 30 marks**
Tutorial: 1 period /week		**Semester end examination: 70 marks**

Pre Requisites: Transportation Engineering I

Learning objectives:

- To study in detail about transportation planning and systems.
- To know about the fundamentals of the traffic flow, transport survey, trip generation, distribution methods and various techniques of evaluation of transport projects
- To design the transportation facility

Course outcomes:

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

1. Assess, evaluate and justify methods of traffic management and control
2. Understand traffic capacity and regulations
3. Evaluate traffic impacts of parking and control
4. Study the traffic impact on environment and signs
5. Asses the road marking and safety

UNIT I

TRAFFIC CHARACTERISTICS

Basic characteristics of Traffic- Volume, Speed and Density- Relationship among Traffic parameters.

TRAFFIC MEASUREMENT

Traffic Volume Studies-Objectives- Types of Volume Studies –Concept of PCU- Data Collection and Presentation – Speed Studies – Types of Speeds- Objectives of Speed Studies- Methods of Conducting speed studies- Data collection and Presentation- Statistical Methods for Analysis of Speed Data.

UNIT II

HIGHWAY CAPACITY

Definition of Capacity – Importance of capacity – Factors affecting Capacity- Concept of Level of Service- Different Levels of Service- Concept of Service Volume- Peak Hour Factor.

TRAFFIC REGULATION

Traffic laws, Regulation of speed , Regulation of vehicles , Regulation concerning driver , Regulation concerning traffic.

UNIT III

PARKING STUDIES

Types of parking facilities – On street and Off Street Parking Facilities- Parking Studies- Parking Inventory Study – Parking Survey by Patrolling Method- Analysis of Parking Data and parking characteristics-Multi Story Car Parking Facility-Design standards.

TRAFFIC CONTROL

Traffic Problems in Urban areas- Importance of Traffic Control and regulation.

UNIT-IV

TRAFFIC & ENVIRONMENT

Detrimental effect of traffic on environment – Air Pollution – Pollutants due to Traffic – Measures to reduce Air Pollution due to Traffic- Noise Pollution – Measures to reduce Noise Pollution.

TRAFFIC SIGNS
Types of Traffic Signs- cautionary, Regulatory and Informative Signs- Specifications

UNIT-V
ROAD MARKINGS
Pavement markings- Types of Markings – Lane markings and Object markings- Standards and Specifications for Road Markings.
HIGHWAY SAFETY
Problem of Highway Safety – Types of Road accidents- Causes – Engineering Measures to reduce Accidents- Enforcement Measures – Educational Measures- Road Safety Audit- Principles of Road Safety Audit.

Learning resources:
Text books:
1. Traffic Engineering and Transportation planning, (2nd edition) by Kadiyali, L.K., Khanna publishers, 1983.
2. Highway Engineering and Traffic Analysis, (3^{rd}edition) by Mannering and Kilareski, John wiley Publications, 2007.
3. Reference books:

Reference books:
1. Transportation Engineering by Khisty, C. J., Prentice Hall 1986.
2. Principles of Transportation Engineering by Partha Chakroborthy, Animesh Das.Prentice Hall, India, 2004.
3. Fundamentals of Transportation Engineering by Papacostas, C.S.,Prentice Hall, India, 1987.

e-learning resources:
http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

4/4 B.Tech. SEVENTH SEMESTER

CE7T4D ADVANCE ENVIRONMENTAL ENGINEERING Credits: 3

Lecture: 3 periods/week **Internal assessment: 30 marks**

Tutorial: 1 period /week **Semester end examination: 70 marks**

Pre-requisites: Environmental engineering

Learning objectives:

- To know about Sources, types, Composition of MSW
- To know the method of transfer and transport the solid waste after the collection from the source.
- To identify the pollutants and their sources and then the transport mechanisms of the pollutants followed by the affected population and respective controls

Course outcomes:

After the exposure to the subject, student knows:

1. Comprehend Solid Waste Management program success in a city or town.
2. Analyze existing scenario of solid waste management in India
3. Assess different techniques for solid waste processing.
4. Understand the contemporary pollution issues.
5. Evaluate different parameters of air sampling procedures.

UNIT – I

SOURCES, TYPES AND COMPOSITION OF MUNCIPAL SOLID WASTE

Sources- Types- Composition of Solid Waste- Effects of improper disposal of solid waste- public health effects-Types of materials recovered from MSW.

WASTE HANDLING, SEPARATION AND STORAGE

On- site handling and separation at solid waste-on - site storage of solid waste-options under Indian conditions.

UNIT-II

COLLECTION OF MUNCIPAL SOLID WASTE

Methods of collection-equipment- types of vehicles-man power requirement-collection routes.

TRANSFER AND TRANSPORT OF MUNCIPAL SOLID WASTE

Need for Transfer operations-Transfer Stations-Selection of Location of Transfer Station-Transport means and methods.

UNIT-III

PROCESSING TECHNIQUES

Mechanical volume reduction-Thermal volume reduction- manual component separation.

DISPOSAL OF SOLID WASTE

Disposal of Solid Waste – Sanitary land Fills- Site selection- Planning-Design and operation of Sanitary landfills- Leachate collection & treatment-composition of land fill gases.

UNIT-IV

AIR POLLUTION

Air pollution - definitions-scope, significance - air pollutants - measurements of pollution classification –natural and artificial-primary and secondary, point and non-point.

EFFECT OF AIR POLLUTION

Effect of air pollutants on man-material and vegetation-global effects of air pollution green house effect, heat lands, acid rains and ozone.

UNIT-V

METEROLOGY AND PLUME DISPERSION

Properties of atmosphere-heat, pressure, wind forces, moisture and relative humidity influence of meteorological phenomenon on air quality- wind rose diagram.

LAPSE RATE

Lapse rate, pressure systems, wind and moistures, inversions and plume behavior plume rise models-Gaussian model for plume dispersion.

Learning resources:

Text Books:

1. Integrated Solid waste management by Goerge Tchobanolous, Hilary Theisen & Samuel A. Vigil. McGraw Hill International Editions
2. Air Pollution and Control by Rao, M.N and Rao, H.N., Tata McGraw Hill, New Delhi, 2007.

Reference books:

1. CPCB Manual on solid waste Management
2. Solid waste management K.sasikumar, sanoop Gopi Krishna PHI Learning (P) Ltd.
3. An Introduction to Air pollution by Trivedy, R.K., B.S.Publications, 2005.

e-learning resources:

1. NPTEL

4/4 B.Tech. SEVENTH SEMESTER

CE7T4E DESIGN AND DRAWING OF HYDRAULIC STRUCTURES Credits: 3

Lecture: 1 periods/week **Internal assessment: 30 marks**

Drawing: 3 period /week **Semester end examination: 70 marks**

Pre-requisites: Water resources engineering, design and drawing of concrete structures, Geo-Technology

Learning objectives:

- To know the importance, location, components and types of irrigation structures
- To design various irrigation structures
- To get experience in drawing of irrigation structures.

Course outcomes:

At the end of course the student will have:

1. Capability for design and drawing of tank sluice and surplus weir.
2. Ability to design and drawing of canal regulator, fall and cross drainage structure.

LIST OF STRUCTURES:

1. Tank sluice with tower head
2. Surplus weir.
3. Canal regulator.
4. Trapezoidal notch fall.
5. Type III Syphon aqueduct.

Final Examination pattern: Any two questions of the above six designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

Learning resources:

Text books:

1. Design of minor irrigation and canal structures, (3rd edition) by Satyanarayana Murthy C., Wiley eastern Ltd, 1990.
2. Irrigation engineering and Hydraulic structures, (1st edition) by Garg S.K., Standard Book House, 2006.

e-learning resources:

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

http://jntuk-coeerd.in/

4/4 B.Tech. SEVENTH SEMESTER

CE7T5A	**FINITE ELEMENT ANALYSIS**	**Credits : 3**
Lecture: 3 periods/week		**Internal assessment: 30 marks**
Tutorial: 1 period /week		**Semester end examination: 70 marks**

Pre-requisites: Strength of Materials, Advanced Structural Analysis, Mathematics

Learning objectives:

- To know the analysis of structures through finite element method with displacement based approximation and isoparametric approximation.

Course outcomes:

At the end of course the student will have:

1. Understand the basic concepts of finite element method and theory of elasticity.
2. Understand fundamental terminology involved in displacement based approximation and analysis of 1-Dimensional FEM.
3. Analyse 2-Dimensinal and 3-Dimensional FEM through displacement based approximation.
4. Understand fundamental terminology involved in Isoparametric based approximation and axisymmetric analysis of FEM.
5. Comprehend solution techniques for utilization of FEM and Dynamic analysis of FEM.

UNIT -I

INTRODUCTION

Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation.

PRINCIPLES OF ELASTICITY

Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT –II

ELEMENT MATRICES

Displacement models – generalized coordinates – shape functions – convergent and Compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates

ONE DIMENSIONAL FEM

Stiffness matrix for bar element - shape functions for one dimensional elements – one dimensional problems.

UNIT –III

TWO DIMENSIONAL FEM

Generation of element stiffness and nodal load matrices for 3-node triangular element and four node rectangular elements, Different types of elements for plane stress and plane strain analysis.

THREE DIMENSIONAL FEM

Generation of element stiffness and nodal load matrices for Tetrahedral element and Hexahedral elements.

UNIT-IV

ISOPARAMETRIC FORMULATION

Concepts of, iso-parametric elements for 2D analysis -formulation of CST element, 4 –noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements.

AXI-SYMMETRIC ANALYSIS

Basic principles-Formulation of 4-node iso-parametric axi-symmetric element

UNIT V

SOLUTION TECHNIQUES

Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

DYNAMIC ANALYSIS FEM

Dynamic Equations of Motion, Consistent and Lumped Mass Matrices, Consistent Mass Matrices in Global Coordinate System, Free Vibration Analysis.

Learning resources:

Text books:

1. Finite Elements Methods in Engineering, (3rd edition), by Tirupati Chandrepatla,R. and Ashok Belegundu, D.,Pearson Education Publications, 2002.
2. The Finite element method in Engineering by Singresu.S.Rao, Elsevier Butterworth–Heinemann Publications, 2005
3. Finite element analysis by David Hutton, V., Tata Mcgraw-Hill, New Delhi, 2005.

Reference books:

1. Concepts and Applications of Finite Element Analysis ,(4th edition) by Robert Cook, D., David.S., Malkus and MichaelPlesha, E., Jhon Wiley & Sons, 2007.
2. Finite Element analysis by S.Md.Jalaludeen, Anuradha Publications, 2012.
3. Text book of Finite Element analysis, (4th edition) by Seshu, P., Prentice Hall of India, 2012.

e-learning resources :

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

4/4 B.Tech. SEVENTH SEMESTER

CE7T5B GROUND IMPROVEMENT TECHNIQUES Credits:3

Lecture: 3 periods/week **Internal assessment: 30 marks**

Tutorial: 1 period /week **Semester end examination: 70 marks**

Pre-requisites: Geotechnical Engineering-I and II

Learning objectives:

- To get knowledge on expansive soils, ground improvement techniques, reinforced earth retaining structures, drainage and dewatering and grouting techniques.
- To get familiarize about different methods of ground improvement in cohesive and granular soil.
- To understand the expansive soil properties and apply the same for the design of structures on expansive soils.

Course outcomes:

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

1. Design drainage, dewatering for the field problems
2. Learn grouting methods & stabilisation in Civil Engineering applications
3. Ground improvement techniques including vibro flotation and preloading including sand drains and clay
4. Design and construct reinforced earth retaining structures and geosynthetics
5. Solve the field problems related to problematic soils and solve the problems using the above ground improvement techniques

UNIT – I

DEWATERING

Methods of de-watering- sumps and interceptor ditches- single, multi stage well points - vacuum well points- Horizontal wells-foundation drains-blanket drains- criteria for selection of fill material around drains –Electro-osmosis

UNIT –II

GROUTING

Objectives of grouting- grouts and their properties- grouting methods- ascending, descending and stage grouting hydraulic fracturing in soils and rocks- post grout test.

STABILISATION

Methods of stabilization-mechanical-cement- lime-bituminous-chemical stabilization with calcium chloride, sodium silicate and gypsum

UNIT – III

IN-SITU DENSIFICATION METHODS IN GRANULAR SOILS

Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth

IN-SITU DENSIFICATION METHODS IN COHESIVE SOILS

Preloading or dewatering, Vertical drains – Sand Drains, Sand wick geodrains – Stone and lime columns – thermal methods.

UNIT – IV

REINFORCED EARTH

Principles – Components of reinforced earth – factors governing design of reinforced earth walls – design principles of reinforced earth walls.

GEOSYNTHETICS

Geotextiles- Types, Functions and applications – geogrids and geomembranes – functions and applications

UNIT – V

EXPANSIVE SOILS-PILING TECHNIQUES

Problems of expansive soils – tests for identification – methods of determination of swell pressure. Improvement of expansive soils – Foundation techniques in expansive soils – under reamed piles.

Learning resources:

Text books:

1. Engineering Principles of Ground Modification by Hausmann, M.R., McGraw-Hill International Edition, 1990.
2. Ground Improvement Techniques, (2nd edition) by Purushotham Raj., Laxmi Publications, New Delhi, 2005.

Reference books:

1. Ground Improvement by Moseley, M.P., Blackie Academic and Professional, Boca Taton, Florida, USA, 1993.
2. Ground Control and Improvemen" by Xanthakos, P.P., Abramson, L.W and Brucwe, D.A., John Wiley and Sons, New York, USA, 1994.
3. Designing with Geosynthetics, (6th edition) by Robert Koerner M., Prentice Hall New Jercy, USA, 2012.

e-learning resources:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

4/4 B.Tech. SEVENTH SEMESTER

CE7T5C WATER RESOURCES SYSTEM PLANNING Credits: 3

Lecture: 3 periods/week **Internal assessment: 30 marks**

Tutorial: 1 period /week **Semester end examination: 70 marks**

Pre-requisites: Mathematics, water resources engineering

Learning objectives:

- To get aware of the procedures and usefulness of application of linear and dynamic programming in water resources management and optimization.

Course outcomes:

At the end of course the student will have:

1. Understanding of systems approach to water resources planning and management
2. Capability to apply linear programming in water resources
3. Capability to apply dynamic programming in water resources
4. Ability to apply optimization models for water resources engineering.
5. Knowledge in water management practices

UNIT – I

INTRODUCTION

Concepts of systems analysis, definition, systems approach to water resources planning and management, role of optimization models, objective function and constraints, types of optimization techniques.

UNIT – II

LINEAR PROGRAMMING IN WATER RESOURCES

Formulation linear programming models, graphical method, simplex method, application of linear programming in water resources. Revised simplex method, duality in linear programming, sensitivity and past optimality analysis.

UNIT – III

DYNAMICS PROGRAMMING IN WATER RESOURCES

Belman's of principles of optimality forward and backward recursive dynamic programming, case of dimensionality, application of dynamic for resource allocation.

UNIT – IV

NON-LINEAR OPTIMATIZATION TECHNIQUES

Clerical of method optimization, Kuch-Tucleer, gradential based research techniques for simple unconstrained optimization.

SIMULATION

Application of simulation techniques in water resources.

UNIT – V

WATER RESOURCES MANAGEMENT

Planning of reservoir system, optimal operation of single reservoir system, allocation of water resources, optimal cropping pattern, and conjunctive use of surface and sub-surface water resources.

Learning resources:

Text books:

1. Water Resources System Analysis by Vedula and Mujumdar, Tata McGraw-Hill. 2005.
2. Water Resources Economics by James and Lee, Oxford Publishers, 2005.

Reference books:

1. Bhave, P.R. Optimal design of water distribution networks, Narosa Publishing House, 2003.

e-learning resources:

http://nptel.ac.in/courses.php, http://jntuk-coeerd.in/

4/4 B.Tech. SEVENTH SEMESTER

CE7T5D **SOLID WASTE MANAGEMENT** **Credits: 3**

Lecture: 3 periods/week **Internal assessment: 30 marks**

Tutorial: 1 period /week **Semester end examination: 70 marks**

Pre-requisites: Environmental engineering

Learning objectives:

- To know about Sources, types, Composition of MSW
- To learn how to handle, separate and store the solid waste at source of collection
- To know the method of transfer and transport the solid waste after the collection from the source.
- To learn how to separate, and transformation methods like Pyrolysis, compositing, Incineration, etc. Materials to be recycled from MSW

Course outcomes:

After the exposure to the subject, student is able to:

1. Comphrend Solid Waste Management program success in a city or town.
2. Exposure the different techniques of SWM
3. Assess different process techniques of solid waste
4. Classify different types of waste.
5. Analyze existing scenario of solid waste management in India

UNIT - I

SOURCES, TYPES AND COMPOSITION OF MUNCIPAL SOLID WASTE

Sources- Types- Composition of Solid Waste- Effects of improper disposal of solid waste- public health effects-Types of materials recovered from MSW.

WASTE HANDLING, SEPARATION AND STORAGE

On- site handling and separation at solid waste-on - site storage of solid waste-options under Indian conditions.

UNIT-II

COLLECTION OF MUNCIPAL SOLID WASTE

Methods of collection-equipment- types of vehicles-man power requirement-collection routes.

TRANSFER AND TRANSPORT OF MUNCIPAL SOLID WASTE

Need for Transfer operations-Transfer Stations-Selection of Location of Transfer Station-Transport means and methods.

UNIT-III

PROCESSING TECHNIQUES

Mechanical volume reduction-Thermal volume reduction- manual component separation.

DISPOSAL OF SOLID WASTE

Disposal of Solid Waste – Sanitary land Fills- Site selection- Planning-Design and operation of Sanitary landfills- Leachate collection & treatment-composition of land fill gases.

UNIT-IV

RECOVERY OF THERMAL AND BIOLOGICAL CONVERSION

Combustion of waste materials-incineration with heat recovery-gasification-pyrolysis

RECOVERY OF BIOLOGICAL CONVERSION

Composting- Anaerobic digestion

UNIT-V

PLASTIC WASTE MANAGEMENT

Dangers of Plastics- Types-pyrolosis-Recycling of Plastic waste-Disposal of plastic waste.

E-WASTE MANAGEMENT

Health Hazards of E- waste-sources-components-collection-segregation-E- waste management.

Learning resources:

Text books:

1. Integrated Solid waste management by Goerge Tchobanolous, Hilary Theisen & Samuel A. Vigil. McGraw Hill International Editions
2. Design of Land Fills and Integrated Solid waste management by Amalendu Bagchi , John Wiley & Sons

Reference books:

1. CPCB Manual on solid waste Management
2. Solid waste management K.sasikumar, sanoop Gopi Krishna PHI Learning (P) Ltd.
3. Solid waste management in India by Urvashi Dhamija.

e-learning resources:

NPTEL

4/4 B.Tech. SEVENTH SEMESTER

CE7T5E	**GREEN BUILDINGS**	**Credits: 3**
Lecture: 3 periods/week		**Internal assessment: 30 marks**
Tutorial: 1 period /week		**Semester end examination: 70 marks**

Pre-requisites: Building planning and drawing, environmental studies

Learning objectives:

- This course aims to highlight importance of Energy- Efficient Buildings within the
- context of Energy issues in the 21st century.
- To familiarize students with the concept of Energy efficiency, Renewable sources of
- energy and their effective adaptation in green buildings
- To give a fuller understanding of Building Form and Fabric, Infiltration, ventilation,
- Lighting, cooling and water conservation.
- To highlight the importance of Environmental Management as well as Environmental
- Impact Assessment methods in Energy efficient buildings.

Course outcomes:

Upon completion of this course, the student will be able to:

1. Understand why buildings should be made energy efficient.
2. Have a fuller grasp on Renewable Energy mechanisms such as Passive Solar heating and collection, Photovoltaics, and Ground source heat pumps, and their adaption to green building concepts.
3. Understand the concepts of Site and Climate, Building Form, Building Fabric,
4. Infiltration and ventilation, Lighting, Heating, Cooling, Energy Management and water conservation.
5. Have the necessary skills to undertake an Environmental Impact Assessment study for
6. Energy Efficient Buildings. They shall be equipped with the associated cutting-edge management strategies too.

UNIT I

Green Buildings within the Indian Context, Types of Energy, Energy Efficiency and Pollution, Better Buildings, Reducing energy consumption, Low energy design.

UNIT II

Renewable Energy sources that can be used in Green Buildings – Solar energy, Passive Solar Heating, Passive Solar collection, Wind and other renewables. A passive solar strategy, Photovoltaics, Climate and Energy, Macro and Microclimate. Indian Examples.

UNIT III

Building Form – Surface area and Fabric Heat Loss, utilizing natural energy, Internal Planning, rouping of buildings. Building Fabrics- Windows and doors, Floors, Walls, Masonry, Ecological walling systems, Thermal Properties of construction material.

UNIT IV

Infiltration and ventilation, Natural ventilation in commercial buildings, passive cooling, odelling air flow and ventilation, Concepts of daylight factors and day lighting, daylight assessment, artificial lighting, New light sources. Cooling buildings, passive cooling, mechanical cooling. Water conservation- taps, toilets and urinals, novel systems, collection and utilization of rain water.

UNIT V

Energy awareness, monitoring energy consumption, Building Environmental Assessment - environmental criteria - assessment methods - assessment tools (e.g. LEED). Ecohomes, Sustainable architecture and urban design – principles of environmental architecture. Benefits of green buildings – Energy Conservation Building code - NBC -Case Studies – Green Buildings in Auroville and Dakshina Chitra, Tamil Nadu, India.

Learning resources:

Text Books:

1. William T. Meyer., Energy Economics and Building Design., New York: McGraw- Hill, Inc Indian Green Building Council

Reference Books:

1. Public Technology, Inc. (1996). Sustainable Building Technical Manual: Green Building Design, Construction, and Operations. Public Technology, Inc., Washington, DC.
2. Sim Van Der Ryn, Stuart Cowan, “Ecological Design”, Island Press (1996).
3. Dianna Lopez Barnett, William D. Browning,”A Primer on Sustainable Building”, Rocky Mountain Green Development Services,.
4. The HOK Guidebook to Sustainable Design, Sara Mendler and William Odell, John Wiley.
5. David A. Gottfried, Sustainable Building Technical Manual., Public Technology Inc
6. Richard D. Rush, . Building System Integration Handbook., New York: John Wiley & Sons
7. Ben Farmer & Hentie Louw., Companion to Contemporary Architectural Thought, London & New York: Routledge
8. Peter Noever (ed)., Architecture in Transition: Between Deconstruction and New Modernism., Munich: Prestel.

e-learning resources:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

4/4 B.Tech. SEVENTH SEMESTER

CE7L1	**GIS AND CAD LAB**	**Credits: 2**
Lecture:		**Internal assessment: 30 marks**
Tutorial: 3 period /week		**Semester end examination: 70 marks**

Pre-requisites: Remote sensing and GIS, Structural Analysis-I, Structural Analysis-II, DDCS- I, DDCS- II, DDSS.

Course outcomes:

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

1. Generate the thematic map from digitised map. Estimate the features and develop the digital elevation model
2. Apply GIS in Water Resource Engineering & Transportation Engineering
3. Analyse and design of a 2D frames and trusses
4. Do the analysis and design for a 3D frame
5. Analyse and design a Retaining wall and a Tower

GIS:

SOFTWARE:

1. Arc GIS 9.0
2. ERDAS 8.7
3. Map info 6.5

Any one or Equivalent.

EXCERCISES:

1. Digitization of Map/Toposheet
2. Creation of thematic maps
3. Study of features estimation
4. Developing Digital Elevation model
5. Simple applications of GIS in water Resources Engineering & Transportation Engineering

CAD:

SOFTWARE:

1. STAAD PRO or Equivalent

EXCERCISIES:

1. 2-D Frame Analysis and Design
2. Steel Tubular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple tower Analysis and Design

TEXT BOOK:

1. Concept and Techniques of GIS by C.P.L.O. Albert, K.W. Yong, Prentice Hall Publishers.

4/4 B.Tech. SEVENTH SEMESTER

CE7L2 ENVIRONMENTAL ENGINEERING LAB Credits: 2

Lecture: -- Internal assessment: 25 marks

Lab : 3 periods/week Semester end examination: 50 marks

Pre-requisites: Environmental engineering, engineering chemistry lab

Learning objectives:

- To learn the laboratory practices to estimate the total, suspended and dissolved, fixed and volatile solids, turbidity, alkalinity, acidity, hardness, chlorides, Ph value, optimum dose of coagulant, D.O, fluorides, BOD, COD, chlorine demand and residual chlorine and nitrogen present in the water and waste water samples.

Course outcomes:

After performing the experiments listed in the syllabus, the students will be able to

1. Evaluate water quality based on physical, chemical and biological analysis of water quality.
2. Understanding the BOD test determines the strength of sewage, industrial wastes of the polluted water.
3. Environmental Engineering Lab conducts experiments to analyze and interpret data, in several areas which can include air quality and resources, water and soil quality and environmental and human health impacts.
4. Environmental Engineering Lab water analysis determines water is poor, good or excellent quality.

LIST OF EXPERIMENTS:

1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids.
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination and Estimation of total solids, organic solids and inorganic solids.
6. Determination of iron.
7. Determination of Dissolved Oxygen.
8. Determination of Nitrogen.
9. Determination of total Phosphorous.
10. Determination of B.O.D
11. Determination of C.O.D
12. Determination of Optimum coagulant dose.
13. Determination of Chlorine demand.
14. Presumptive coli form test.

LIST OF EQUIPMENT:

1. pH meter,
2. Turbidity meter,
3. Conductivity meter,
4. Hot air oven,
5. Muffle furnace,
6. Dissolved Oxygen meter,
7. U – V visible spectrophotometer,
8. Reflux Apparatus,
9. Jar Test Apparatus,
10. BOD incubator.

Learning resources:

Text books:

1. Chemistry for Environmental Engineering by (4^{th} edition) by Sawyer and Mc. Carty, McGraw - Hill International Book Company, 1994.
2. Standard Methods for Analysis of water and Waste Water – APHA

e- Learning resources:

NME-ICT, MHRD, NITTTR Chennai.

4/4 B.Tech. SEVENTH SEMESTER

CE7L3 INDUSTRIAL TRAINING / MINI DESIGN PROJECT Credits: 2

Lecture: -- Internal assessment: 25 marks

Lab : 3 periods/week Semester end examination: 50 marks

Pre-requisites: Civil engineering knowledge up to end of 3rd year

Learning objectives:

- To get firsthand knowledge on various aspects of civil engineering structures including environmental and economic issues.
- The Industrial Training is to be undertaken during summer after completion of third year second semester examinations. The training is on any civil engineering project components like planning, designs, construction and management including environment management.
- A report is to be submitted by the students and present a seminar in the final year first semester.

Course outcomes:

After performing the experiments listed in the syllabus, the students will have:

1. The practical training from the Industries to understand the subject from practical experience.
2. The experience to solve the problem as a team and the skill to prepare a report.

4/4 B.Tech. EIGHTH SEMESTER

CE8T1 CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT Credits: 3
Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Building planning and drawing, estimation and costing

Learning objectives:

- To get introduction to concepts of projects formulation.
- To learn project planning and scheduling of activities.
- To gain knowledge of concepts of resource planning and allocation and control.
- To gain a bird's eye view of optimization techniques.

Course outcomes:
At the end of course the student will have:
1. Knowledge on different methods of Planning and scheduling
2. A complete idea on developing networks using PERT and CPM methods.
3. Knowledge on resource management of manpower and materials.
4. Knowledge in the usage of construction machinery.
5. An idea on various concepts of quality control and safety management

UNIT – I
INTRODUCTION
Construction projects; Project management; Main causes of project failure.
PLANNING
Steps involved in planning; Objectives; Principles; Advantages; Limitations; Stages of planning.
SCHEDULING
Scheduling, Preparation of construction schedules; Methods of scheduling; Bar charts; Mile stone charts; Controlling; Job layout; Factors affecting job layout; Project work break down; Activities involved; Assessing activity duration.

UNIT – II
PROJECT MANAGEMENT THROUGH NETWORKS
Objectives of network techniques; Fundamentals of network analysis; Events; Activities; Dummies; Types of networks; Choice of network type; Advantages of network techniques over conventional techniques.
PROGRAM EVALUATION AND REVIEW TECHNIQUE (PERT)
Introduction; Time estimates; Earliest expected time; Latest allowable occurrence time; Slack; Critical path; Probability of completion time for a project.
CRITICAL PATH METHOD (CPM)
Introduction; Difference between CPM and PERT; Earliest event time; Latest event time; Activity time; Float; Critical activities and critical path.

UNIT – III
COST CONTROL
Direct cost; indirect cost; Total project cost; Optimization of cost through networks; Steps involved in optimization of cost.
RESOURCE MANAGEMENT (MANPOWER)
Introduction; Resource smoothing; Resource leveling; establishing workers productivity.

RESOURCE MANAGEMENT (MATERIALS)
Objectives of material management; Costs; Functions of material management department; ABC classification of materials; Inventory of materials; Material procurement; Stores management.

UNIT – IV
RESOURCE MANAGEMENT (MACHINERY)
Classification of construction equipment; Earth moving equipment; Excavation equipment; Hauling equipment, Earth compaction equipment; Hoisting equipment; Concreting plant and equipment; Time and motion study; Selection of equipment– Task consideration, Cost consideration; Factors affecting the selection; Factors affecting cost owning and operating the equipment; Equipment maintenance.
CONSTRUCTION TECHNIQUES
Evaluation and selection of equipment and methods for construction of projects including earthmoving, paving, steel and concrete construction, form work and trenching,

UNIT – V
QUALITY CONTROL
Importance of quality; Elements of quality; Organization for quality control; Quality assurance techniques; Documentation; Quality control circles; Total quality management; ISO – 9000.
SAFETY MANAGEMENT
Accident prevention programme; Immediate attention in case of accident; Approaches to improve safety in construction; Safety benefits to employers, employees and customers; Prevention of fires in construction industries; Safety information system; Safety budgeting.

Learning resources:
Text books:
1. Construction Engineering and Management by Dr. Seetharaman S., Umesh Publications, Nai Sarark, Delhi, 2000.
2. Fundamentals of PERT/CPM and Project Management, (1st edition) by Bhattacharjee S.K., Khanna Publishers, Nai Sarak Delhi, 2011.

Reference books:
1. Construction Management & Planning by Sengupta,B. and Guha H., Tata McGraw – Hill, New Delhi, 1995.
2. Construction Planning, Equipment & Methods by Peurifoy R.L., McGraw – Hill International Book Company, 2006.
3. PERT & CPM Principles and applications by Srinath,L.S. Affiliated East West Press, 1971.

e-learning resources:
NPTEL

4/4 B.Tech. EIGTH SEMESTER

CE8T2 ENGINEERING ECONOMICS AND PROJECT APPRAISAL Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Mathematics, environmental studies

Learning objectives:

- To make use of economic analysis to engineering works and construction works for providing the analytical support to discuss achieving value for money and competing alternatives. Develop the ability to work collaboratively with team members of other disciplines.

Course outcomes:

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

1. Understand the nature and Scope of Engineering Economics
2. Use Economic analysis in the decision making
3. Use various cost concepts and Break-even point analysis
4. Choose best from alternative investment opportunities
5. Prepare cost sheets suitable to specific industries.

UNIT –I

INTRODUCTION TO ECONOMICS

Nature and Basic Principles of Economics, Law of Supply and Demand, Concept of Engineering Economics, type of efficiency, definition and scope of engineering economics, Micro Economics and Macro Economics.

UNIT – II

ECONOMIC ANALYSIS

Introduction, and The economic analysis process, examples for simple economic analysis, Classes of economic analyses, marginal selection for a product/ substitution of raw material, design selection for a product, building metrical selection, process planning/ process modification, Present value and discounting.

UNIT – III

COST ANALYSIS AND MARGINAL COSTING

Cost concepts, Opportunity cost, Fixed vs. Variable costs, explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEA. Marginal Costing Introduction, Application of Marginal costing in terms of cost control.

UNIT – IV

METHODS OF ECONOMIC ANALYSIS AND INVESTMENT FEASIBILITY STUDIES

General, Net present value (NPV), Savings/investment ratio (SIR), Discounted payback period (DPP), Equivalent uniform annual cost (EUAC), Benefit/cost ratio (BCR). Managing Project Resources Flow, Project Feasibility studies, Project Cost – Capital &

Operating, Forecasting Income, Estimation of Investment & ROI, Project Evaluation, Financial Sources, and Appraisal Process.

UNIT – V

PROJECT COSTING FOR SPECIFIC INDUSTRIES

Projects Procurement Process, Life – cycle Costing, Project Cost Reduction methods, Project Stores, organization & HRD issues, Computerization. Methods of Costing, Unit costing, job costing, cost sheet and tender and process costing and their variants.

Learning resources:

Text books:

1. Planning Analysis: Selection Implementation & Review by Chandra P., Tata McGraw Hill, 2009.
2.Cost and Management Accounting by Jain, S.P.and Narang K.L., Kalyani Publications, New Delhi, 2009.
3. Managerial Economics by Varshney, R.L. and Maheswari K. L., Sultan Chand and Sons, New Delhi, 2002.

Reference books:

1. Text Book of Project Management by Gopalkrishnan, P. and Ramamoorthy V.E., McMillan,2007.
2. Project Management & Control by Singh N., Himalaya, 2007.
3. Cost and Management accounting by Arora M.N., Vikas Publication, New Delhi, 2009.
4. Cost and Management Accounting by Pandit Kumar M.P., Excel Books, New Delhi,2008.

4/4 B.Tech. EIGTH SEMESTER

CE8T3A ADVANCED STRUCTURAL ANALYSIS Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Structural analysis I & II

Learning objectives:

- To gain a working knowledge on matrix analysis of elastic structures, plastic behavior of structures, buckling of elastic structures. Students will do this by building on the knowledge gained.
- To get an adequate insight of elastic, plastic, and bucking behavior of structures as well as specific structural analysis tools needed in the professional practice of modern structural engineer

Course outcomes:

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

1. Analyse a building frame by using portal method, cantilever method and substitute frame method.
2. Determine the plastic hinge, collapse moment and shape factors for various sections,
3. Calculate the degree of static and kinematic indeterminacies, formation of flexibility and stiffness matrices
4. Analyse a beam including sinking of supports by using flexibility method
5. Analyse a beam including sinking of supports by using stiffness method

UNIT - I

LATERAL LOAD ANALYSIS

Application to building frames, analysis for lateral loads (i) Portal method (ii) Cantilever method Analysis of tall buildings subjected to seismic loads

UNIT – II

PLASTIC ANALYSIS

Introduction – Idealized stress– shape factors for various sections – Moment curvature relationship – ultimate moment – Plastic hinge – lower and upper bound theorems – ultimate strength of fixed and continuous beams.

UNIT - III

FLEXIBILITY AND STIFFNESS MATRICES

Degree of static and Kinematic indeterminacies, Formation of Flexibility and Stiffness matrices up to second degree for continuous beams and rigid jointed frames.

UNIT - IV

FLEXIBILITY METHOD

Introduction to the structural analysis by flexibility matrix approach and application to continuous beams including settlement of supports and application to rigid jointed frames.

UNIT - V

STIFFNESS METHOD

Introduction to the structural analysis by stiffness matrix approach and application to continuous beams including settlement of supports and rigid jointed frames.

Learning resources:

Text books:

1. Matrix methods of Structural Analysis by Pandit and Gupta – Tata Mc.Graw Hill
2. Analysis of structures Vol. I & II by Vazrani and Ratwani. Khanna publications.
3. Comprehensive Structural Analysis Vol.1 & 2 by Dr. Vaidyanathan and Dr. P.Perumal - by Laxmi publications Pvt. Ltd.,New Delhi

Reference books:

1. Structural Analysis by D.S. Prakash Rao - Sagar books
2. Structural Analysis Vol. I & II by Bhavi Katti, Vikas Publications.
3. Matrix structural analysis by T.N.Gayl; Tata Mc.Graw Hill company

e-learning resources:

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

http://jntuk-coeerd.in/

4/4 B.Tech. EIGHTH SEMESTER

CE8T3B ENVIRONMENTAL IMPACT ASSESSMENT Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Environmental studies

Learning objectives:

- To gain knowledge on environment management of unanticipated impacts or other unforeseen changes.
- To learn methods of environmental impact assessment and the permissible Limits.
- To learn practices that maximize environmental benefits.

Course outcomes:

At the end of course the student will have:

1. Understanding of the elements of EIA and criteria for the selection of EIA methodology in different methods.
2. Assess Impacts on surface water environment, air pollution sources, suggest appropriate mitigation measures.
3. Comprehend Impact of development activities on vegetation & wildlife and prepare environmental audit report.
4. Awareness of the options to estimate environmental laws.
5. Analyze proposed development project case studies for possible environmental effects and prepare environmental impact assessment report for various industries.

UNIT – I

INTRODUCTION TO EIA & METHODOLOGIES

Basic concept of EIA, Initial environmental Examination, Elements of EIA, factors affecting the EIA, Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters. Introduction, Criteria for the selection of EIA Methodology, EIA Methods, Ad-hoc methods, Matrix methods, Network method, Environmental Media Quality Index method, Overlay methods, Cost/benefit Analysis.

UNIT – II:

PREDICTION AND ASSESSMENT OF IMPACTS ON GROUND WATER ENVIRONMENT & SURFACE WATER & SOIL & AIR POLLUTION IMPACTS

Impact of Developmental Activities and Land use, Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources. Generalized approach for Assessment of Air Pollution Impacts.

UNIT-III

DEFORESTATION & ENVIRONMENTAL AUDIT

Assessment of Impact of development Activities on Vegetation and wildlife, Environmental Impact of Deforestation – Causes and effects of deforestation. Environmental Audit and objectives & types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

UNIT – IV

POST AUDIT ACTIVITIES

The Environmental pollution Act, The water Act, The Air (Prevention & Control of pollution Act.), Mota Act, Wild life Act.

UNIT-V

EIA CASE STUDIES & MANAGEMENT REQUIREMENTS FOR THE PREPARATION OF EIA OF INDUSTRIAL PROJECTS

Case studies on Land Use/ Land Cover, Development Projects for Initial Environmental Examination, Assessment of Impacts of Traffic & Transportation, and Preparation of Environmental Impact assessment statement for various Industries.

Learning resources:

Text books:

1. Environmental Impact Assessment Methodologies by Y.Anjaneyulu, B.S. Publication, Sultan Bazar, Kakinada.
2. Environmental Science and Engineering, (2nd edition) by Glynn, J. and Gary, W. Hein Ke., Prentice Hall Publishers, 1996.

Reference books:

1. Environmental Science and Engineering by Suresh, K. Dhaneja S.K. Katania & Sons Publication, New Delhi.
2. Environmental Pollution and Control by Dr.Bhatia H.S., Galgotia Publication Pvt Ltd, Delhi, 1998.

e-learning resources:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

4/4 B.Tech. EIGHTH SEMESTER

CE8T3C GROUND WATER DEVELOPMENT AND MANAGEMENT Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Water resources engineering, hydraulics and hydraulic machinery, geology

Learning objectives:

- To know the general framework of aquifer characterization
- To get introduction to concept of a trans boundary aquifer
- To know the use of geographical information systems for ground water information sharing

Course outcomes:

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

1. Determine the ground water potential of an area
2. Analyse ground water movement and design ground water extraction structures.
3. Conduct pumping tests to determine aquifer parameters
4. Plan for ground water management including recharge of ground water and prevention of sea water intrusion.

UNIT – I

GROUND WATER MOVEMENT

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. Permeability, Darcy's law, storage coefficient. Transmissivity, differential equation governing ground water flow in three dimensions derivation, ground water flow equation in polar coordinate system. Ground water flow contours their applications.

UNIT – II

ANALYSIS OF PUMPING TEST DATA

Steady flow groundwater flow towards a well in confined and unconfined aquifers – Dupit's and Theism's equations, Assumptions, Formation constants, yield of an open well interface and well tests. Unsteady flow towards a well – Non equilibrium equations – Thesis solution – Jacob and Chow's simplifications, Leak 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.

UNIT – IV

GROUNDWATER BASIN MANAGEMENT

Concepts of conjunction use, Case studies.

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 – V

SALINE WATER INTRUSION IN AQUIFER

Occurrence of saline water intrusions, Ghyben- Herzberg relation, Shape of interface, control of seawater intrusion.

Learning resources:

Text books:

1. Ground water Hydrology, (2nd edition) by David Keith Todd, John Wiley & Sons, New York, 1977.
2. Ground water by Raghunath H.M., Wiley Eastern Ltd, Delhi, 1989.

Reference books:

1. Ground water, (2nd edition) by Bower J.A., John Wiley & Sons, 1980.
2. Groundwater System Planning & Management by Willes R. and Yeh W.W.G., Prentice Hall, 1987.
3. Applied Hydrogeology by Fetta C.W., CBS Publishers & Distributors.

e-learning resources:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in

4/4 B.Tech. EIGTH SEMESTER

CE8T3D **IPR AND PATENTS** **Credits: 3**

Lecture: 3 periods/week **Internal assessment: 30 marks**

Tutorial: 1 period /week **Semester end examination: 70 marks**

Pre-requisites: Knowledge up to +2

Learning objectives:

- To gain knowledge on intellectual property rights.
- To learn the streamlined approach in Patent Filing

Course outcomes:

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

1. Understand the role of intellectual property rights
2. Identify the main types of intellectual property rights
3. Understand the steps for successful registration and protection of intellectual property rights at national, regional and international levels
4. Search patent and trademark databases
5. Understand the legal aspects for intellectual property protection

UNIT I

INTELLECTUAL PROPERTY LAW

Introduction to Intellectual Property Law – The Evolutionary Past - The IPR Tool Kit- Para -Legal Tasks in Intellectual Property Law –- Introduction to Cyber Law.

UNIT-II

PATENTS

Introduction to Patent Law – Rights and Limitations- Rights under Patent Law – Patent requirements – Ownership – transfer – Patents Application Process – Patent Infringement – Patent Litigation

UNIT III

TRADE MARK

Introduction – Trade mark Registration Process – Post registration Procedures – Trademark maintenance - Transfer of Rights - Inter partes Proceeding – Infringement – Dilution Ownership of Trade mark.

UNIT IV

COPYRIGHTS

Introduction to Copyrights – – Principles of Copyright Principles -The subjects Matter of Copy right – The Rights Afforded by Copyright Law – Copy right Ownership, Transfer and duration – Limitations.

UNIT V

TRADE SECRET

Introduction to Trade Secret – Maintaining Trade Secret – Physical Security – Employee Limitation - Employee confidentiality agreement - Trade Secret Law - Unfair Computation – Trade Secret Litigation.

Learning resources:

Text books:

1. Intellectual Property, (3rd edition) by Debirag Bouchoux E., Cengage learning, New Delhi, 2009.
2. Intellectual Property Right by Ashok Kumar, M and Mohd Iqbal Ali, Serials Pub, 2008.
3. Cyber Law. Texts & Cases, South-Western's Special Topics Collections, 2011.
4. Intellectual Property Rights by Prabhuddha Ganguli, Tata McGraw–Hill, New Delhi, 2001.

e-learning resources:

http://nptel.ac.in/courses.php, http://jntuk-coeerd.in/

4/4 B.Tech. EIGTH SEMESTER

CE8T3E	**URBAN TRANSPORTATION PLANNING**	**Credits: 3**
Lecture: 3 periods/week		**Internal assessment: 30 marks**
Tutorial: 1 period /week		**Semester end examination: 70 marks**

Pre-requisites: Transportation Engineering

Learning objectives:

- To know about urban planning, assignment and their attributes
- To design the trip generation, distribution and mode choice characteristics
- To study about the master plans and mass transit systems

Course outcomes:

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

1. Comprehend the urban travel demand and independent variables
2. Analyze the traffic surveys and trip generations modules
3. Assess, analyze and study the trip distribution factors and mode choice analysis
4. Evaluate the traffic assignment methods and plans
5. Understand the mass transit systems and study about advance transit systems

UNIT-I

URBAN TAVEL DEMAND

Urban development - Urban transport problems - Urban travel characteristics - Need for planning urban travel demand - Trends - Overall planning process - Components of travel demand

INDEPENDENT VARIABLES

Travel Attributes - Assumptions in demand estimation - Sequential travel demand modeling - Simultaneous travel demand modeling - Study area - Cordon lines Screen lines -Zoning.

UNIT-II

TRAVEL DEMAND SURVEYS

Sampling methods - Home interview surveys - Road side interview surveys - Terminal surveys - Cordon surveys - Taxi surveys - Onboard surveys - Economic surveys - Data checking.

TRIP GENERATION

Trip characteristics - factors influencing Trip productions and attractions - Trip rates - Zonal regression models -Category analysis - Personal trip generation models.

UNIT-III

TRIP DISTRIBUTION

Factors influencing trip distribution - Growth factor methods - Trip length frequency diagram - Growth models - LP method - Opportunity models - Gravity opportunity model.

MODE CHOICE ANAYSIS

Factors influencing passenger mode choice - Zonal regression models - Utility maximization - Discrete choice situation - Binary and Multinomial Logit models - Probability curves --Probit arid nested Logit models.

UNIT – IV

TRAFFIC ASSIGNMENT

Need for Assignment - Objectives - Diversion curves - Shortest path Algorithms - All or nothing Assignment technique - Capacity Restraint Assignment technique - Multi path Assignment . technique - Link flows - Sufficiency and Deficiency analysis.

PLAN PREPARATION AND EVALUATION

Types of plans- conceptual plan, Master plan - Short term planning vs Long term planning -Corridor Identification and Evaluation - Plan preparation

UNIT- V

MASS TRANSIT SYSTEMS

Need for Mass Transit systems - Role of Mass Transit in Urban Transport - Recommendations of Committee on urbanization & Alternate systems of UT

ADVANCE TRANSIT

Characteristics & Capacities of different MT systems - LRT**,** monorail, Metro, BRTS, etc.

Learning resources:

Text books:

1. Kadiyali L.R - Traffic Engineering and Transportation Planning -Khanna Publishers, New Delhi.
2. Papacostas C.S. - Fundamentals of Transportation Engineering Prentice Hall of India Pvt. Ltd; New Delhi.
3. John Khisty C - Transportation Engineering - An Introduction, Prentice Hall, Englewood Cliffs, New Jersey.
4. Nicholas J. Garber, A. Hoel, Raju Sarkar, Cengage learning, Principles of Traffic and Highway Engineering.

Reference books:

1. Chari, S.R. UTP Lecture Notes - Regional Engg. College, Warangal.
2. Hutchinson, B.G. Introduction to Urban System Planning, McGraw Hill.
3. Mayer M and Miller E, Urban Transportation Planning: A decision oriented Approach, McGraw Hill.Bruton, Urban Transportation Planning.
4. Dicky, Metropolitan Transportation Planning, DC Script Book Co.
5. Saxena, Traffic Planning and Design, Dhanpat Rai Publishers, New Delhi.

e-learning resources:

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

http://jntuk-coeerd.in/

4/4 B.Tech. EIGTH SEMESTER

CE8T4A	**INDUSTRIAL STRUCTURES**	**Credits: 3**
Lecture: 3 periods/week		**Internal assessment: 30 marks**
Tutorial: 1 period /week		**Semester end examination: 70 marks**

Pre-requisites: Building planning and drawing, DDCS- I, DDCS- II and DDSS.

Learning objectives:

- To be familiar with the basic types of industrial structures and their role in the process of an industrial plant.
- To know the specific loads and typical types of structures used in construction

Course outcomes:

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

1. Draw the plan and layout of buildings, understand acoustics, fire safety and requirements for industries
2. Design the crane girders, bunkers and siloss
3. Understand the principles of folded plates and shells and design chimneys
4. Analyze and design a single storey shed
5. Determine the functional requirements and principles for precast concrete units

UNIT I
PLANNING AND FUNCTIONAL REQUIREMENTS

Classification of Industries and Industrial structures – General requirements for industries like cement, chemical and steel plants – Planning and layout of buildings and components. Lighting – Ventilation – Acoustics – Fire safety – Guidelines from factories act

UNIT II
DESIGN OF STEEL STRUCTURES

Industrial roofs – Design of Bunkers and Silos

UNIT III
DESIGN OF R.C. STRUCTURES

Chimneys – Principles of folded plates and shell roofs

UNIT IV
ANALYSIS AND DESIGN OF SHEDS

Analysis and design of single storey shed, knee braced truss column structure

UNIT V
PREFABRICATION

Principles of prefabrication – Prestressed precast roof trusses- Functional requirements for Precast concrete units

Learning resources:

Text books:

1. Purushothaman, P. Reinforced Concrete Structural Elements, Tata MacGraw-Hill,1984.
2. Pasala Dayaratnam. Design of Steel Structure, London Hill Books,1995.

Reference books:

1. Henn, W. Buildings for Industry, vols .I and II, London Hill Books, 1995.
2. SP32 – 1986. Handbook on Functional requirements of Industrial buildings, Bureau of Indian Standards, New Delhi 1990.
3. Koncz, J. Course Notes on Modern Developments in the Design and Construction of Industrial Structures, Structural Engineering Research Centre, Madras, 1982.

4. Manual of Precast Construction Vol I & II Bauverlay GMBH, 1971.

e-learning resources:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

4/4 B.Tech. EIGHTH SEMESTER

CE8T4B PAVEMENT DESIGN AND ANALYSIS Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period/week Semester end examination: 70 marks

Pre-requisites: Transportation engineering, design and drawing of reinforced concrete structures

Learning objectives:

- To be able to analyze flexible pavements with layered elastic programs and existing finite element analysis program Calculate rigid pavement stresses, strains, and deflections using closed-form solutions and finite element analysis
- To know strength and weakness of finite element analysis for pavements. Determine the temperature profile in a pavement system based on the heat conduction equation.

Course outcomes:

At the end of course the student will be able to

1. Comprehend the material specifications and design factors of pavements
2. Analyze stresses in flexible and rigid pavements
3. Design of flexible and rigid pavements
4. Study the constructional operations and equipments
5. Comprehend the concept of strengthening of existing pavements and pavement management system

UNIT – I

DESIGN FACTORS

Types of pavement – Factors affecting design of pavements – wheel loads –ESWL Concept- tyre pressure – contact pressure, Material characteristics – Environmental and other factors.

MATERIAL CHARACTERISTICS

Highway Materials – Soil, Aggregate, Bitumen and Tar- Tests on aggregates – Aggregate Properties and their Importance- Tests on Bitumen – Bituminous Concrete-Requirements of Design Mix-Marshall's Method of Bituminous Mix design.

UNIT – II

STRESSES IN FLEXIBLE PAVEMENT

Stresses in flexible pavement – layered systems concept – one layer system – Boussinesq Two layer system – Burmister Theory for Pavement Design.

STRESSES IN RIGID PAVEMENT

Stresses in rigid pavements – relative stiffness of slab, modulus of sub-grade reaction – stresses due to warping, stresses due to loads, stresses due to friction.

UNIT – III

FLEXIBLE PAVEMENT DESIGN

CBR Method of Flexible Pavement Design- IRC method of flexible pavement design.-AASTHO Method of Flexible Pavement design. Australian Method of Flexible pavement design. Design of Airport pavements.

RIGID PAVEMENT DESIGN

IRC method of Rigid pavement design – Importance of Joints in Rigid Pavements- Types of Joints – Use of Tie Bars and Dowell Bars. Design of RCC pavements

UNIT – IV

HIGHWAY CONSTRUCTION

Introduction – Construction of Earth Roads- Gravel Roads – WBM Roads- Bituminous Pavements-Cement Concrete Roads

ADVANCES IN HIGHWAY CONSTRUCTION AND CONSTRUCTION EQUIPMENTS

Steps in Construction- Reinforced Concrete Pavements – Soil Stabilization – Methods and Objectives- Soil-cement Stabilization and Soil-lime Stabilization. Earth moving equipments, Specific equipments for bituminous roads and specific equipments for concrete roads construction.

UNIT – V

PAVEMENT MANAGEMENT SYSTEM

Need for Highway Maintenance- Pavement Failures- Failures in Flexible Pavements-Types and Causes-Rigid Pavement Failures- Types and causes- Pavement Evaluation-Benkleman Beam method- Strengthening of Existing Pavements-Overlays Design

STRENGTHING OF EXISTING PAVEMENT

Over lay design – Types of Overlays - Methods of Overlay – Importance of Highway Drainage – Design of Surface Drainage - Design of Sub Surface Drainage

Learning resources:

Text books:

1.Highway Engineering, (7th Edition) by Khanna S., Kand Justo C.J., Nemchand & Bros, NewDelhi, 2000.
2.Principles and Practices of Highway Engineering by Kadiyali L.R and Dr.Lal N.B., Khanna Publishers, New Delhi, 2003.
3.Principles of pavement design Yoder and wit zorac, Jhon Willey & Sons, New Delhi, 2012.

Reference books:

1.IRC Code for flexible pavement – IRC – 37 -2001.
2.IRC Code for Rigid pavement – IRC – 58 – 2002.
3.Pavement Analysis and Design, (2^{nd} edition) by Yang H. Huang, Pearson Education, Delhi, 2008.
4.Principles of Highway Engineering And Traffic Analysis, (4^{th} edition) by Fred L. Mannering, Wiley student publication, India, New Delhi, 1990.
5.Construction planning, equipment and measures by Peurifoy R.L., Tata McGraw-Hill Publications, New Delhi, 2006.

e-learning resources:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

4/4 B.Tech. EIGHTH SEMESTER

CE8T4C **WATERSHED MANAGEMENT** **Credits: 3**

Lecture: 3 periods/week **Internal assessment: 30 marks**

Tutorial: 1 period /week **Semester end examination: 70 marks**

Pre-requisites: Water resources engineering, geo technology, surveying

Learning objectives:

- To be able to develop watershed management program for proper use of all available resources of a watershed
- To know optimum production with minimum hazards to natural resources.

Course outcomes:

After the exposure to the subject, student is able to:

1. Understand the concept of water shed development and approaches in India
2. Evaluate the amount of soil loss by equation.
3. Plan rain water harvesting techniques
4. Classify the ecosystem management of crop, soil, agriculture and forests
5. Ability to support communities to integrate community watershed planning.

UNIT - I

INTRODUCTION

Concept of watershed development, objectives of watershed development, need for watershed development in India-Approach for watershed management-Integrated and multidisciplinary approach

CHARACTERISTICS OF WATERSHED

Size, shape, physiographic, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics, basic data on watersheds

UNIT-II

PRINCIPLES OF EROSION

Types of erosion, factors affecting erosion, effects of erosion on land fertility and land capability, estimation of soil loss due to erosion, Universal soil loss equation.

MEASURES TO CONTROL EROSION

Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control,rock fill dams, brushwood dam, Gabion

UNIT-III

WATER HARVESTING

Rainwater Harvesting, catchment harvesting, harvesting structures, soil moisture conservation, check dams, artificial recharge, farm ponds, percolation tanks.

LAND MANAGEMENT

Land use and Land capability classification, management of forest, agricultural, grassland and wild land. Reclamation of saline and alkaline soils.

UNIT-IV

ECOSYSTEM MANAGEMENT

Role of Ecosystem, crop husbandry, soil enrichment, inter, mixed and strip cropping, cropping pattern, sustainable agriculture

BIO-MASS MANAGEMENT

Bio mass-dry land agriculture, Silvi pasture, horticulture, social forestry and afforestation.-firewood-synthetic fuels-conservation-indirect methods

UNIT-V

WATERSHED MANAGEMENT ACTIVITIES

Planning of watershed management activities, people's participation, preparation of action plan, administrative requirements –Case studies.

IMPACT

Model watershed; government projects; Society For Promotion Of Watershed Development-ICRISAT-World bank projects

Learning resources:

Text Books:

1. Watershed Management, (2nd edition) by Murthy JVS., New Age International Publishers. New Delhi, 2004.
2. Water Resource Engineering by Awurbs, R and James WP., Prentice Hall Publishers, 2001.

Reference books:

1. Land and Water Management, (6th edition) by Murthy VVN., Kalyani Publications, 2011.
2. Irrigation and Water Management by Majumdar D.K., Prentice Hall of India, 2000.

e-learning resources:

NPTEL

4/4 B.Tech EIGTH SEMESTER

CE8T4D REPAIR AND REHABILITATION OF STRUCTURES Credits: 3

Lecture: 3 periods/week **Internal assessment: 30 marks**

Tutorial: 1 period /week **Semester end examination: 70 marks**

Pre-requisites: Design and drawing of concrete structures, concrete technology

Learning objectives:

This subject imparts a broad knowledge in the area of repair and rehabilitation of Structures.

Course Outcomes:

Upon completion of this course, the student will be able to

1. Understand the properties of fresh and hardened concrete.
2. Know the strategies of maintenance and repair.
3. Get an idea of repair techniques.
4. Understand the properties of repair materials
5. Understand the retrofitting strategies and techniques

UNIT-I

SERVICEABILITY AND DURABILITY OF STRUCTURES

Serviceability and Durability of Structures - Quality Assurance for concrete construction - Fresh concrete properties – Strength – Permeability - Cracking - Effects due to climate – Temperature – chemicals - Wear and erosion - Design and construction errors - Corrosion mechanism - Effects of cover thickness and cracking - Methods of corrosion Protection – Inhibitors - Resistant steels – Coatings - Cathodic protection

UNIT-II

DIAGNOSIS AND ASSESSMENT OF DISTRESS

Diagnosis and Assessment of Distress - Visual inspection – Non destructive tests – Ultrasonic pulse velocity method – Rebound hammer technique – ASTM classifications – Pullout tests – Core test

UNIT-III

MATERIALS FOR REPAIR

Materials for Repair - Special concretes and mortar - Concrete chemicals – Special elements for accelerated strength gain - Expansive cement - Polymer concrete – Ferro cement, Fibre reinforced concrete - Fibre reinforced plastics.

UNIT-IV

TECHNIQUES FOR REPAIR

Techniques for Repair - Rust eliminators and polymers coatings for rebars during repair - Foamed concrete - Mortar and dry pack - Vacuum concrete - Gunite and shotcrete - Epoxy injection - Mortar repair for cracks - Shoring and underpinning

UNIT V

RETROFITTING OF R.C BUILDINGS

Introduction; Considerations in retrofitting of structures; Source of weakness in RC frame Building, Classification of retrofitting techniques; retrofitting strategies for RC buildings.

Example of Repairs to Structures - Repairs to overcome low member strength – Deflection – Cracking - Chemical disruption - Weathering wear - Fire leakage – Marine Exposure.

Learning resources:

Text books:

1. Santha Kumar, A.R., (2007), Concrete Technology, Oxford University Press.

Reference books:

1 Shetty, M.S. (2005), Concrete Technology Theory and Practice, S.Chand and company, New Delhi.
2. Santha Kumar, A.R., (1996), Concrete Chemical Theory and Applications, Indian Society for Construction Engineering and Technology, Madras.
3. Diagnosis and treatment of structures in distress by R.N.Raikar, Published by R&D Centre of Structwel Designers & Consultants Pvt.Ltd., Mumbai, 1994.
4. Handbook on Repair and Rehabilitation of RCC buildings, Published by CPWD, Delhi, 2002
5. Garas, F.K,.Clarke, J.L, Armer, GST (1997), Structural assessment, Butterworths, UK.
6. R.T. Allen and S.C.Edwards, (1998), Repair of Concrete Structures, Blakie and Sons, UK.

e-learning resources:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

4/4 B.Tech EIGTH SEMESTER

CE8T4E ADVANCED FOUNDATION ENGINEERING Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Geo technology

Learning objectives:

- Understanding of problem soils and their bearing capacity limitations
- Imparting knowledge on settlement and consolidation of soils.
- Gaining capabilities on the design of foundations including for problem soils

Course outcomes:

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

1. Understand safe bearing capacity of soil
2. Determine settlement analysis of cohesive and cohesion less soil and consolidation
3. Understand soil related problems sheet piles and anchored & coffer dams
4. Design of different types of foundation & well foundation
5. Design deep foundation for expansive soil

UNIT-I

LOADING ON FOUNDATIONS

Effect of eccentric loading, inclined load, inclination of base of foundation, sloping ground; Bearing Capacity of stratified soils; Meyerhof analysis, Vesic's analysis and Hansen's analysis.

UNIT-II

SETTLEMENT ANALYSIS

Contact pressure, sources of settlement, uniform settlement, differential settlement, construction practices to avoid differential settlement, immediate settlement in sands and clays-Terzaghi and Janbu's methods for clays, Schmertmann and Hartman method for cohesion less soils; consolidation settlement

THREE DIMENSIONAL CONSOLIDATIONS

Consolidation equation; Solution; Vertical sand drain analysis and design

UNIT-III

ANCHORED BULKHEADS

Earth pressure diagram, determination of depth of embedment in sands and clays; Types of bracing system, types of coffer dams

MACHINE FOUNDATIONS

Introduction; Terminology, Design criteria for machine foundation; single degree freedom system, free and forced vibration; Methods of analysis of block foundation; Dynamic subsoil investigation; Damping; Design and construction of foundation for reciprocating and impact type machines; Active and Passive isolation

UNIT-IV

CAISSONS AND WELL FOUNDATIONS

Types of caissons, different shapes of well, components of well, functions of wells, sinking of wells, lateral stability by Terzaghi analysis

UNIT-V

FOUNDATIONS IN EXPANSIVE SOILS

Problems associated with expansive soils, Swelling potential, percent swell, swell pressure factors affecting, methods of measurement of swell pressure ; Prediction of heave, factors affecting heave,

methods of prediction of heave; IS Classification of expansive soils, Under- reamed pile foundations, Sand cushion method, CNS layer method, granular pile-anchor technique, lime stabilization of expansive soils, Moisture control in expansive clays- Horizontal and vertical moisture barriers, sub-surface drainage and surface drainage, pre-wetting and ponding

Learning Resources:

Text books:

1. Soil dynamics and machine foundations – Swami Saran
2. Principles of Foundation Engineering(1999), B.M. Das., PWS Publishing Company, 4th edition, Singapore
3. Soil Mechanics and Foundation Engg (7^{th} edition) by Dr. Arora, K.R., Standard Publisher and istributors, Delhi, 2010.
4. Hand book of Machine foundations – Srnivasulu and Vaidyanathan.

Reference books:

1. Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Company.
2. Basic and Applied Soil Mechanics by Gopal Ranjan and ASR Rao, Wiley Eastern Limited, New Delhi.
3. Foundations of Expansive Soils, F.H. Chen. Elsevier Publications.
4. Geotechnical Engineering by SK Gulati & Manoj Datta, Tata McGraw- Hill Publishing Company Limited.

e-learning resources:

NPTEL

4/4 B.Tech. EIGHTH SEMESTER

CE8PW	**MAJOR PROJECT**	**Credits: 9**
Lecture: --		**Internal assessment: 50 marks**
Practice: 12 periods/week		**Semester end examination: 150 marks**

The major project spans for about 16 weeks duration involving verification and/or validation of the concepts or small research studies in any civil engineering disciplines and areas. A report is to be submitted by the students and present a seminar in the final year second semester. The report will be evaluated both internally and externally.

Course outcomes:

At the end of major project the student will have:

1. The experience to understand the statement of a problem and to solve the same with a group of people.
2. Ability to find an integrated solution to a problem.
3. The skill to prepare a Project report