JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
(B.Tech+M.Tech)Integrated Dual Degree Programme (Civil Engineering)
COURSE STRUCTURE (W.E.F.2018-19)

R-18

I YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	BSC	Linear Algebra and Calculus	3	1	0	4
2	BSC	Physics	3	1	0	4
3	ESC	Programming for Problem Solving	3	0	0	3
4	ESC	Engineering Graphics	1	0	4	3
5	BSC	Physics Lab	0	0	3	1.5
6	ESC	Programming for Problem Solving (Lab)	0	0	3	1.5
		Total Credits				**17**

I YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	BSC	Ordinary Differential Equations and Multivariable Calculus	3	1	0	4
2	BSC	Chemistry	3	1	0	4
3	ESC	Engineering Mechanics	3	1	0	4
4	ESC	Workshop	1	0	3	2.5
5	HSMC	English	2	0	0	2
6	BSC	Chemistry Lab	0	0	3	1.5
7	HSMC	English Lab	0	0	2	1
		Total Credits				**19**

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R-18

II YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	PCC-1	Building Materials, Construction and Planning	3	0	0	3
2	PCC-2	Engineering Geology	2	0	0	2
3	PCC-3	Strength of Materials-I	3	1	0	4
4	BSC	Probability and Statistics	3	1	0	4
5	PCC-4	Fluid Mechanics	3	1	0	4
6	ESCLCE-CE	Computer aided Civil Engineering Drawing	0	0	3	1.5
7	LC-CE-1	Strength of Materials Lab	0	0	3	1.5
8	LC-CE-2	Engineering Geology lab	0	0	2	1
		Total Credits				**21**

II YEAR II SEMESTER

S.No	Course Code	Course Title	L	T	P	Credits
1	ESC	Basics of Electrical & Electronics Engineering	3	0	0	3
2	ESC	Basics of Mechanical Engineering	2	0	0	2
3	PCC-5	Surveying & Geomatics	3	0	0	3
4	PCC-6	Strength of Materials-II	3	0	0	3
5	PCC-7	Hydraulics and Hydraulic Machinery	3	0	0	3
6	PCC-8	Structural Analysis -I	3	0	0	3
6	LC-CE-3	Surveying Lab	1	0	2	2
8	ESCLCE-CE	Basic Electrical & Electronics Lab	0	0	2	1
9	LC-CE-4	Fluid Mechanics & Hydraulic Machinery Lab	0	0	2	1
		Total Credits				**21**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
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COURSE STRUCTURE (W.E.F.2018-19)

R-18

III YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P/D	Credits
1	PCC-9	Structural Analysis-II	3	0	0	3
2	PCC-10	Geotechnical Engineering	3	0	0	3
3	PCC-11	Structural Engineering –I(RCC)	3	0	2	4
4	PCC-12	Transportation Engineering	3	0	0	3
5	PEC-1	Professional Elective	3	0	0	3
6	HSMC	Engineering Economics and Accounting	2	0	0	2
7	LC-CE-5	Highway Engineering and Concrete Technology Lab	0	0	3	1.5
8	LC-CE-6	Geotechnical Engineering Lab	0	0	3	1.5
9	HSMC LC-CE	**Advanced Communications Lab ******	0	0	2	1.0
		Total Credits				**22**

III YEAR II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	PCC-13	Environmental Engineering	3	0	0	3
2	PCC-14	Foundation Engineering	3	0	0	3
3	PCC-15	Structural Engineering –II(Steel)	3	0	2	4
4	PCC-16	Hydrology & Water Resources Engineering	3	1	0	4
5	PEC-2	Profession Elective	3	0	0	3
6	OEC	Open Elective –I	3	0	0	3
7	LC-CE-7	Environmental Engineering Lab	0	0	2	1
8	LC-CE-8	Computer Aided Design Lab	0	0	2	1
		Total Credits				**22**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
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COURSE STRUCTURE (W.E.F.2018-19)

R-18

IV YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	PCC-17	Estimation, Costing and Project Management (UG)	3	1	0	4
2	PEC-3	**Water Resource Engineering -I**	3	0	0	3
3	OEC	Open Elective –II	3	0	0	3
4	HMSC	**Professional Practice law & Ethics**	2	0	0	2
5	UG PROJ	Project Stage-I	0	0	6	3
6	PGC-1	Advanced Structural Analysis	3	0	0	3
7	PGC-2	Theory of Elasticity	3			3
8	PGLC-1	Numerical Analysis Lab			4	2
9	PGLC-2	Advanced Concrete Technology Lab			4	2
10	MINI	Mini Project/Internship (Only Evaluation done in this semester but the work need to be completed during 3 year summer vacation)	0	0	4	2
		Total Credits				**27(17UG+10 PG)**

IV YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	OEC	UG Open Elective –III	3	0	0	3
2	PROJ	UG Project Stage-II	0	0	16	8
3	PGC-3	Structural Dynamics	3	0	0	3
4	PGC-4	Finite Elements Methods in Structural Engineering	3	0	0	3
5	PGE-1	1.Advanced Reinforced Concrete Design 2. Advanced Design of Foundations 3. Design of Masonry Structures	3	0	0	3
6	PGLC-3	Advanced Structural Engineering Lab			4	2
7	PGLC-4	Advanced Structural Design Lab			4	2
8	PGC	Research Methodology **	2	0	0	2
		Total Credits				**24 (11UG+15PG)**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
(B.Tech+M.Tech)Integrated Dual Degree Programme (Civil Engineering)
COURSE STRUCTURE (W.E.F.2018-19)

R-18

V YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	PGE-2	1.Theory of Thin Plates & Shells 2. Theory and Applications of Cement Composites 3.Theory of Structural Stability	3	0	0	3
2	PGE-3	1.Advanced Steel Design 2.Design of Formwork 3.Design of High Rise Buildings	3	0	0	3
3	PGE-4	1. Earthquake Resistance Design of Buildings 2.Fracture Mechanics of Concrete Structures 3.Structural Optimization	3	0	0	3
4	PGE-5	1.Design of Prestressed Concrete Structures 2.Principles of Bridge Engineering 3.Design of Industrial Structures	3	0	0	3
5	PGC	Mini Project** (will be done during summer vacation of after 4th year second semester and evaluated in the current semester)	0	0	4	2
6	Seminar	Seminar	1	0	0	1
7	Dissertation	Dissertation Phase-I **			20	10
		Total Credits				**(25)(PG)**

V YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	Dissertation	Dissertation Phase-II (Actually it requires 16 weeks duration but to nullify the total periods it can be treated for 18 weeks duration that include 16 weeks instruction hours and examination 2 weeks)	0	0	32	16
		Total Credits				**16**

Total UG Credits: 150
Total PG Credits: 66

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Professional Elective -I

1. Concrete Technology
2. Finite Element Methods for Civil Engineering
3. Earthquake Engineering
4. Introduction To Offshore Structures

Professional Elective -II

1. Pre-stressed Concrete
2. Bridge Engineering
3. Optimization techniques in structural engineering
4. Introduction to Composite Materials

Professional Elective -III

1. Ports & Harbor Engineering
2. Design & Drawing of Irrigation Structures
3. Ground Water Development & Management
4. Stochastic Hydrology

Professional Elective -IV

1. Geo-environmental Engineering
2. Environmental Engineering -II

Professional Elective -V

1. Pavement Design
2. Traffic Engineering
3. Urban transportation engineering

Professional Elective -VI

1. Ground Improvement Techniques
2. Soil Dynamics & Machine Foundations
3. Advanced foundation Engineering
4. Geo techniques for Infrastructure

Open Elective –I

1. Remote Sensing & Geographical Information Systems
2. Disaster Management
3. Nano Technology
4. Construction Management

Open Elective –II

1. Project Management
2. Elements of Earthquake Engineering
3. Construction Technology & Management
4. Air Pollution & Control

Open Elective –III

1. Waste Management
2. PERT & CPM
3. Finite Element Methods
4. Environmental Impact Assessment

Open Elective –I

1. Remote Sensing & Geographical Information Systems
2. Disaster Management
3. Nano Technology
4. Construction Management

Open Elective –II

1. Project Management
2. Elements of Earthquake Engineering
3. Construction Technology & Management
4. Air Pollution & Control

Open Elective –III

1. Waste Management
2. PERT & CPM
3. Finite Element Methods
4. Environmental Impact Assessment

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. Civil Engg. I-Sem

L	T	P	C
3	0	0	3

BUILDING MATERIALS, CONSTRUCTION AND PLANNING

Pre Requisites: Engineering Mechanics

Course Objectives: the objectives of the course is to

- **List** the construction material.
- **Explain** different construction techniques
- **Understand** the building bye-laws
- **Highlight the** smart building materials

UNIT - I

Stones and Bricks, Tiles: Building stones – classifications and quarrying – properties – structural requirements – dressing.

Bricks – Composition of Brick earth – manufacture and structural requirements, Fly ash, Ceramics.

Timber, Aluminum, Glass, Paints and Plastics: Wood - structure – types and properties – seasoning – defects; alternate materials for Timber – GI / fibre – reinforced glass bricks, steel & aluminum, Plastics.

UNIT – II

Cement & Admixtures: Ingredients of cement – manufacture – Chemical composition – Hydration - field & lab tests.

Admixtures – mineral & chemical admixtures – uses.

UNIT - III

Building Components : Lintels, Arches, walls, vaults – stair cases – types of floors, types of roofs – flat, curved, trussed ; foundations – types ; Damp Proof Course ; Joinery – doors – windows – materials – types.

Building Services: Plumbing Services: Water Distribution, Sanitary – Lines & Fittings; Ventilations: Functional requirements systems of ventilations. Air-conditioning - Essentials and Types; Acoustics – characteristic – absorption – Acoustic design; Fire protection – Fire Harzards – Classification of fire resistant materials and constructions

UNIT - IV

Mortars, Masonry and Finishing's

Mortars: Lime and Cement Mortars

Brick masonry – types – bonds; Stone masonry – types; Composite masonry – Brick-stone composite; Concrete, Reinforced brick.

Finishers: Plastering, Pointing, Painting, Claddings – Types – Tiles – ACP.

Form work: Types: Requirements – Standards – Scaffolding – Design; Shoring, Underpinning.

UNIT – V

Building Planning: Principles of Building Planning, Classification of buildings and Building by laws.

Course Outcomes

After the completion of the course student should be able to

- **Define** the Basic terminology that is used in the industry
- **Categorize** different building materials , properties and their uses
- **Understand** the Prevention of damage measures and good workmanship
- **Explain** different building services

TEXT BOOKS:

1. Building Materials and Construction – Arora &Bindra, Dhanpat Roy Publications.
2. Building Construction by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.

REFERENCES:

1. Building Materials and Construction by G C Sahu, Joygopal Jena McGraw hill Pvt Ltd 2015.
2. Building Materials by Duggal, New Age International.
3. Building Materials by P. C. Varghese, PHI.
4. Building Construction by PC Varghese PHI.
5. Construction Technology – Vol – I & II by R. Chubby, Longman UK.
6. Alternate Building Materials and Technology, Jagadish, Venkatarama Reddy and others; New Age Publications.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. Civil Engg. I-Sem

L	T	P	C
2	0	0	2

ENGINEERING GEOLOGY

Pre Requisites: Building Materials

Course Objectives: The objective of this Course is

- To give the basics knowledge of Geology that is required for constructing various Civil Engineering Structures, basic Geology, Geological Hazardous and Environmental Geology
- To focus on the core activities of engineering geologists – site characterization and geologic hazard identification and mitigation. Planning and construction of major Civil Engineering projects

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”

UNIT - II

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.

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 and microscopic and microscopic study of Granite, Dolerite, Basalt, Pegmatite, Laerite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

UNIT - III

Structural Geology: Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults uncomfornities, and joints - their important types and case

studies. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India, Stabilisation of soils. Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration.

UNIT - IV

Earth Quakes: 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 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, Reservoirs, and Tunnels: 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 - Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (i.e. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

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

- Site characterization and how to collect, analyze, and report geologic data using standards in engineering practice
- The fundamentals of the engineering properties of Earth materials and fluids.
- Rock mass characterization and the mechanics of planar rock slides and topples

TEXT BOOKS:

1. Engineering Geology by N. Chennakesavulu, McMillan, India Ltd. 2005
2. Engineering Geology by S K Duggal, H K Pandey Mc Graw Hill Education Pvt Ltd 2014

REFERENCES:

1. Engineering Methods by D. Venkat Reddy; Vikas Publishers 2015.
2. Principles of Engineering Geology by K.V.G.K. Gokhale – B.S publications
3. F.G. Bell, Fundamental of Engineering B.S. Publications, 2005.
4. Krynine& Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution
5. Engineering Geology by SubinoyGangopadhyay, Oxford university press.
6. Engineering Geology for Civil Engineers – P.C. Varghese PHI

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. Civil Engg. I-Sem

L	T	P	C
3	1	0	4

STRENGTH OF MATERIALS - I

Pre Requisites: Engineer Mechanics

Course Objectives: The objective of this Course is

- To understand the nature of stresses developed in simple geometries such as bars, cantilevers and beams for various types of simple loads
- To calculate the elastic deformation occurring in simple members for different types of loading.
- To show the plane stress transformation with a particular coordinate system for different orientation of the plane.
- To know different failure theories adopted in designing of structural members

UNIT – I
SIMPLE STRESSES AND STRAINS:
Concept of stress and strain- St. Venant's Principle-Stress and Strain Diagram - 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 – Pure shear and Complementary shear - Elastic modulii, Elastic constants and the relationship between them – Bars of varying section – composite bars – Temperature stresses.
STRAIN ENERGY – Resilience – Gradual, sudden, and impact loadings – simple applications.

UNIT – II
SHEAR FORCE AND BENDING MOMENT:
Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported including overhanging beams subjected to point loads, uniformly distributed load, uniformly varying load, couple and combination of these loads – Point of contraflexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III
FLEXURAL STRESSES:
Theory of simple bending – Assumptions – Derivation of bending equation- Section Modulus Determination of flexural/bending stresses of rectangularand circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections.

SHEAR STRESSES:
Derivation of formula for shear stress distribution – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle and channel sections.

UNIT – IV
DEFLECTION OF BEAMS:

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, Uniformly varying load and couple - Mohr's theorems – Moment area method – Application to simple cases.

CONJUGATE BEAM METHOD: Introduction – Concept of conjugate beam method - Difference between a real beam and a conjugate beam - Deflections of determinate beams with constant and different moments of inertia.

UNIT – V

PRINCIPAL STRESSES:

Introduction – Stresses on an oblique plane 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 –Principal stresses – Mohr's circle of stresses – ellipse of stress - Analytical and graphical solutions.

THEORIES OF FAILURE: Introduction – Various theories of failure - Maximum Principal Stress Theory, Maximum Principal Strain Theory, Maximum shear stress theory- Strain Energy and Shear Strain Energy Theory (Von Mises Theory).

Course Outcome:

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

- Describe the concepts and principles, understand the theory of elasticity includingstrain/displacement and Hooke's law relationships; and perform calculations, related tothe strength of structured and mechanical components.
- Recognize various types loadsapplied on structural components of simple framing geometries and understand the nature of internalstresses that will develop within the components.
- to evaluate the strains and deformation that will result due to theelastic stresses developed within the materials for simple types of loading
- Analyze various situations involving structural members subjected to plane stressesby application of Mohr's circle of stress;
- Frame an idea to design a system, component, or process

TEXT BOOKS:

1) Strength of Materials by R.K Rajput, S.Chand& Company Ltd.
2) Mechanics of Materials by Dr.B.CPunmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain

REFERENCES:

1) Strength of Materials by R. Subramanian, Oxford University Press
2) Mechanics of material by R.C.Hibbeler, Printice Hall publications
3) Engineering Mechanics of Solids by EgorP.Popov,Printice Hall publications
4) Strength of Materials by T.D.Gunneswara Rao and M.Andal, Cambridge Publishers
5) Strength of Materials by R.K.Bansal, Lakshmi Publications House Pvt. Ltd.
6) Strength of Materials by B.S.Basavarajaiah and P. Mahadevappa, 3rd Edition, Universities Press

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. Civil Engg. I-Sem

L	T	P	C
3	1	0	4

PROBABILITY AND STATISTICS

Pre Requisites: Mathematic - I

Objectives: To make the student to understand the statistics and probability theories such as random variables, sampling distribution, tests of significance etc. so that he can apply them to engineering problems.

Outcomes: Students will able to perform probability theories & statistics on engineering problems

UNIT-I: Probability

Sample space and events – Probabilty – The axioms of probability – Some Elementary theorems – Conditional probability – Baye,s theorem, Random variables – Discrete and continuous**.**

UNIT-II: Single Random variables and probability distributions

Random variables – Discrete and continuous. Probability distributions, mass function/ density function of a probability distribution . Mathematical Expectation, Moment about origin, Central moments Moment generating function of probability distribution.

Binomial , Poisson & normal distributions and their properties . Moment generating functions of the above three distributions. and hence finding the mean and variance.

UNIT-III: Multiple Random variables, Correlation&Regression

Joint probability distributions- Joint probability mass / density function, Marginal probability mass / density functions, Covariance of two random variables, Correlation -Coefficient of correlation, The rank correlation.

Regression- Regression Coefficient, The lines of regression and multiple correlation & regression.

UNIT-IV: Sampling Distributions and Testing of Hypothesis

Sampling: Definitions of population, sampling, statistic, parameter. Types of sampling, Expected values of Sample mean and varience, sampling distribution, Standard error, Sampling distribution of means and sampling distribution of varience.

Parameter estimations – likelihood estimate, interval estimations .

Testing of hypothesis: Null hypothesis, Alternate hypothesis, type I, & type II errors – critical region, confidence interval, Level of significance. One sided test, Two sided test,

Large sample tests:

(i)Test of Equality of means of two samples equality of sample mean and population mean (cases of known varience& unknown varience, equal and unequal variances)

(ii) Tests of significance of difference between sample S.D and population S.D.

(iii)Tests of significance difference between sample proportion and population proportion&difference between two sample proportions.

Small sample tests:

Student t-distribution,its properties; Test of significance difference between sample mean and population mean; difference between means of two small samples

Snedecor's F- distribution and it's properties. Test of equality of two population variences

Chi-square distribution , it's properties, Chi-square test of goodness of fit

UNIT- V:Queuing Theory & Stochastic Processes

Arrival Theorem – Pure Birth process and Death process M/M/1 Model. Introduction to Stochastic Processes – Markov process classification of states – Examples of Markov Chains, Stochastic Matrix, limiting probabilities.

Text Books:

1) FUNDAMENTALS OF MATHEMATICAL STATISTICS BY S C GUPTA AND V.K.KAPOOR
2) PROBABILITY AND STATISTICS FOR ENGINEERING AND THE SCIENCEC BY JAY L.DEVORE.

References:

1) MATHEMATICS FOR ENGINEERS SERIES –PROBABILITY STATISTICS AND STOCHASTIC PROCESS BY K.B.DATTA AND M.A S.SRINIVAS,CENGAGE PUBLICATIONS
2) PROBABILITY, STATISTICS AND STOCHASTIC PROCESS BY PROF.A R K PRASAD., WIELY INDIA
3) PROBABILITY AND STATISTICS BY T.K.V.IYENGAR&B.KRISHNA GANDHI etel
4) A TEXT BOOK OF PROBABILITY AND STATISTICS, SHAHNAZ BATHUL , CENGAGE LEARNING

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. Civil Engg. I-Sem

L	T	P	C
3	1	0	4

FLUID MECHANICS

Pre Requisites: Engineering Mechanics

Course Objectives: The objectives of the course are to

- Introduce the concepts of fluid mechanics useful in Civil Engineering applications
- Provide a first level exposure to the students to fluid statics, kinematics and dynamics.
- learn about the application of mass, energy and momentum conservation laws for fluid flows
- train and analyse engineering problems involving fluids with a mechanistic perspective is essential for the civil engineering students
- To obtain the velocity and pressure variations in various types of simple flows
- to prepare a student to build a good fundamental background useful in the application-intensive courses covering hydraulics, hydraulic machinery and hydrology

UNIT – I

Properties of Fluid

Distinction between a fluid and a solid;
Density,Specificweight,Specificgravity,Kinematicanddynamicviscosity;variation of viscosity with temperature, Newton law of viscosity; vapour pressure, boiling point, cavitation; surfacetension, capillarity, Bulk modulus of elasticity ,compressibility.

Fluid Statics

FluidPressure:Pressure atapoint,Pascalslaw,pressurevariation withtemperature, density andaltitude. Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micromanometers. pressure
gauges.Hydrostaticpressureandforce:horizontal,verticalandinclinedsurfaces. Buoyancy and stability of floating bodies.

UNIT - II

Fluid Kinematics

Classification of fluid flow : steady and unsteady flow;uniform andnon-uniform flow;laminarandturbulentflow; rotational and irrotationalflow;
compressibleandincompressibleflow;idealandrealfluidflow; one,twoandthree dimensionalflows;Streamline, pathline, streak lineandstreamtube;streamfunction, velocity potential function. One,two and three dimensionalcontinuity equations in Cartesiancoordinates.

Fluid Dynamics

Surface and Body forces -Euler's and Bernoulli's equation; Energy correction factor; Momentum equation. Vortex flow – Free and Forced. Bernolli's equation to real fluid flows.

UNIT - III

Flow Measurement in Pipes

Practical applications of Bernoulli's equation: venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend.

Flow Over Notches & Weirs

Flow through rectangular; triangular and trapezoidal notches and weirs; End contractions; Velocity of approach. Broad crested weir.

UNIT – IV

Flow through Pipes

Reynolds experiment, Reynolds number**,** Lossofheadthroughpipes,Darcy-Wiesbatchequation, minorlosses,totalenergyline,hydraulicgradeline,Pipesinseries,equivalentpipes, pipesinparallel,siphon,branchingofpipes,three reservoirproblem, powertransmission through pipes.Analysisofpipenetworks:HardyCrossmethod,waterhammerin pipesandcontrolmeasures,

UNIT - V

Laminar & Turbulent Flow

Laminarflowthrough:circularpipes,annulus andparallelplates.

Boundary Layer Concepts

Boundary Layer Analysis-Assumption and concept of boundary layer theory.Boundary-layer thickness, displacement, momentum & energy thickness, laminar and Turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control.Definition of Drag and Lift and types drag, ,magnus effect.

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Course Outcomes (COs): Upon completion of this course, students should be able to:

- Understand the broad principles of fluid statics, kinematics and dynamics
- Understand definitions of the basic terms used in fluid mechanics and characteristics of fluids and its flow
- Understand classifications of fluid flow
- Be able to apply the continuity, momentum and energy principles

Text Books

1. Fluid Mechanics by Modi and Seth ,Standard Book House.
2. Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning Private Limited,2015.

Ref 1. Fluid Mechanics by R.C.Hibbeler, Pearson India Education Servieces Pvt. Ltderence Books

1. TheoryandApplicationsofFluidMechanics,K.Subramanya,TataMcGrawHill
2. Introduction to Fluid Mechanics and Fluid Machines by SK Som, Gautam Biswas, Suman Chakraborthy, Mc Graw Hill Education (India) Private Limited
3. Fluid MechanicsandMachinery,C.S.P.Ojha, R.BerndtssonandP.N.Chadramouli,

OxfordUniversityPress, 2010
4. Fluid mechanics & Hydraulic Machines, Domkundwar&DomkundwarDhanpat Rai &Co
5. Fluid Mechanics and Hydraulilc Machines, R.K. Bansal, Laxmi Publication Pvt Ltd.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. Civil Engg. I-Sem

L	T	P	C
0	0	3	1.5

COMPUTER AIDED DESIGN LAB

Pre Requisites: Engineering Mechanics

Course Objectives: The objective of this lab is to teach the student usage of Auto cad and basic drawing fundamentals in various civil engineering applications, specially in building drawing.

List of Experiments:

1. Introduction to computer aided drafting and different coordinate system
2. Drawing of Regular shapes using Editor mode
3. Introduction GUI and drawing of regular shapes using GUI
4. Exercise on Draw tools
5. Exercise on Modify tools
6. Exercise on other tools (Layers, dimensions, texting etc.)
7. Drawing of building components like walls, lintels, Doors, and Windows. using CAD software
8. Drawing a plan of Building and dimensioning
9. Drawing a plan of a residential building using layers
10. Developing a 3-D plan from a given 2-D plan
11. Developing sections and elevations for given
    a) Single storied buildings b) multi storied buildings
12. Auto CAD applications in surveying, mechanics etc.

TEXT BOOKS:

1. Computer Aided Design Laboratory by M. N. SeshaPraksh& Dr. G. S. Servesh –Laxmi Publications.
2. Engineering Graphics by P. J. Sha – S. Chand & Co.

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

- Use the Autocad commands for drawing 2D & 3D building drawings required for different civil engg applications.
- Plan and draw Civil Engineering Buildings as per aspect and orientation.
- Presenting drawings as per user requirements and preparation of technical report

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. Civil Engg. I-Sem

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STRENGTH OF MATERIALS LAB

Pre Requisites: Strength of Materials – Theory

Course Objectives:

- Make measurements of different strains, stress and elastic properties of materials used in Civil Engineering.
- Provide physical observations to complement concepts learnt
- Introduce experimental procedures and common measurement instruments,equipment, devices.
- Exposure to a variety of established material testing procedures and techniques
- Different methods of evaluation and inferences drawn from observations

List of Experiments:

1. Tension test
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
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.

Course Outcomes:

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

- Configure &Operate a data acquisition system using various testing machines of solid materials
- Compute and Analyze engineering values (e.g. stress or strain) from laboratory measurements.
- Write a technical laboratory report

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. Civil Engg. I-Sem **L T P C**
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ENGINEERING GEOLOGY LAB

Pre Requisites: Engineering Geology Theory

Course Objectives: The objective of this lab is that to provide practical knowledge about physical properties of minerals, rocks, drawing of geological maps, showing faults, uniformities etc.

List of Experiments

1. Study of physical properties of minerals.
2. Study of different group of minerals.
3. Study of Crystal and Crystal system.
4. Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena, Gypsum.
5. Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties, Trachyte.
6. Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and its varieties.
7. Identification of rocks (Metamorphic Petrolody): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite, Phyllite.
8. Study of topographical features from Geological maps. Identification of symbols in maps.
9. Simple structural Geology Problems(Folds, Faults & Unconformities)

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

- Understands the method and ways of investigations required for Civil Engg projects
- Identify the various rocks, minerals depending on geological classifications
- Will able to learn to couple geologic expertise with the engineering properties of rock and unconsolidated materials in the characterization of geologic sites for civil work projects and the quantification of processes such as rock slides and settlement.
- Write a technical laboratory report

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.
5. Microscopic identification of rocks.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. Civil Engg. II-Sem

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BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING

Course Objectives: Objectives of this course are

- To introduce the concept of electrical circuits and its components
- To introduce the concepts of diodes and transistors, and
- To impart the knowledge of various configurations, characteristics and applications.

Course Outcomes: After this course, the student will be able

- To analyze and solve problems of electrical circuits using network laws and theorems.
- To identify and characterize diodes and various types of transistors.

UNIT- I

Electrical Circuits: R-L-C Parameters, Voltage and Current, Independent and Dependent Sources, Source Transformation – V-I relationship for passive elements, Kirchhoff's Laws, Network reduction techniques – series, parallel, series-parallel, star-to-delta, delta-to-star transformation, Nodal Analysis,

Single Phase AC Circuits: R.M.S. and Average values, Form Factor, steady state analysis of series, parallel and series-parallel combinations of R, L and C with sinusoidal excitation, concept of reactance, impedance, susceptance and admittance – phase and phase difference, Concept of power factor, j-notation, complex and polar forms of representation.

UNIT-II

Resonance: Series resonance and Parallel resonance circuits, concept of bandwidth and Q factor, Locus Diagrams for RL, RC and RLC Combinations for Various Parameters.

Network Theorems: Thevenin's, Norton's, Maximum Power Transfer, Superposition, Reciprocity, Tellegen's, Millman's and Compensation theorems for DC and AC excitations.

UNIT- III

P-N Junction Diode: Diode equation, Energy Band diagram, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances.

Rectifiers and Filters: P-N junction as a rectifier – Half Wave Rectifier, Ripple Factor – Full Wave Rectifier, Bridge Rectifier, Harmonic components in Rectifier Circuits, Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters.

UNIT- IV

Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Symbol, Amplifying Action, Common Emitter, Common Base and Common Collector configurations. Transistor Biasing And Stabilization – Operating point, DC and AC load lines, Biasing – Fixed Bias, Emitter Feedback Bias, Collector to Emitter feedback bias, Voltage divider bias, Bias stability, Stabilization against variations in VBE and β, Bias Compensation using Diodes and Transistors.

Transistor Configurations: BJT modeling, Hybrid model, Determination of h-parameters from transistor characteristics, Analysis of CE, CB and CC configurations using h-parameters, Comparison of CE, CB and CC configurations.

UNIT- V

Junction Field Effect Transistor: Construction, Principle of Operation, Symbol, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, Small Signal Model, Biasing FET.

Special Purpose Devices: Breakdown Mechanisms in Semi-Conductor Diodes, Zener diode characteristics, Use of Zener diode as simple regulator, Principle of operation and Characteristics of Tunnel Diode (With help of Energy band diagram) and Varactor Diode, Principle of Operation of SCR.

Text books:

- Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
- Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath Mc Graw Hill Education

References:

- Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
- Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabratajit, TMH, 2/e, 1998.
- Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th edition.
- Linear circuit analysis (time domain phasor and Laplace transform approaches)- 2nd edition by Raymond A. DeCarlo and Pen-Min-Lin, Oxford University Press-2004.
- Network Theory by N. C. Jagan and C. Lakshminarayana, B.S. Publications.
- Network Theory by Sudhakar, Shyam Mohan Palli, TMH.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. Civil Engg. II-Sem

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BASICS OF MECHANICAL ENGINEERING

Course Objectives: Understanding of basic principles of Mechanical Engineering is required in various field of engineering.

Course Outcomes: After learning the course the students should be able to

To understand the fundamentals of mechanical systems.

To understand and appreciate significance of mechanical engineering in different Fields of engineering.

UNIT – I Introduction: Prime movers and its types, Concept of Force, Pressure, Energy, Work, Power, System, Heat, Temperature, Specific heat capacity, Change of state, Path, Process, Cycle, Internal energy, Enthalpy, Statements of Zeroth Law and First law. Energy: Introduction and applications of Energy sources like Fossil fuels, nuclear fuels, Hydel, Solar, wind, and bio-fuels, Environmental issues like Global warming and Ozone depletion.

UNIT – II Properties of gases: Gas laws, Boyle's law, Charle's law, Combined gas law, Gas constant, Relation between Cp and Cv, Various non-flow processes like constant volume process, constant pressure process, Isothermal process, Adiabatic process, Poly-tropic process Properties of Steam: Steam formation, Types of Steam, Enthalpy, Specific volume, Internal energy and dryness fraction of steam, use of Steam tables, steam calorimeters. Steam Boilers: Introduction, Classification, Cochran, Lancashire and Babcock and Wilcox boiler, functioning of different mountings and accessories.

UNIT – III Heat Engines: Heat Engine cycle and Heat Engine, working substances, Classification of heat engines, Description and thermal efficiency of Carnot; Rankine; Otto cycle and Diesel cycles. Internal Combustion Engines: Introduction, Classification, Engine details, four-stroke/ two-stroke cycle Petrol/Diesel engines, Indicated power, Brake Power, Efficiencies.

UNIT – IV Pumps: Types and operation of Reciprocating, Rotary and Centrifugal pumps, Priming Air Compressors: Types and operation of Reciprocating and Rotary air compressors, significance of Multistage. Refrigeration & Air Conditioning: Refrigerant, Vapor compression refrigeration system, vapor absorption refrigeration system, Domestic Refrigerator, Window and split air conditioners.

UNIT – V Couplings, Clutches and Brakes: Construction and applications of Couplings (Box; Flange; Pin type flexible; Universal and Oldham), Clutches (Disc and Centrifugal), and Brakes (Block; Shoe; Band and Disc). Transmission of Motion and Power: Shaft and axle, Belt drive, Chain drive, Friction drive, Gear drive. Engineering Materials: Types and applications of Ferrous & Nonferrous metals, Timber, Abrasive material, silica, ceramics, glass, graphite, diamond, plastic and polymer.

TEXT BOOKS:

- Basic Mechanical Engineering / Pravin Kumar/ Pearson
- Introduction to Engineering Materials / B.K. Agrawal/ Mc Graw Hill

REFERENCE BOOKS:

- Fundamental of Mechanical Engineering/ G.S. Sawhney/PHI
- Thermal Science and Engineering / Dr. D.S. Kumar/ Kataria

For all other B.Tech 3rd Year 1st Sem syllabus go to **JNTUH B.Tech Mechanical Engineering 3rd Year 1st Sem Course Structure for (R16) Batch.**

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. Civil Engg. II-Sem **L T P C**
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SURVEYING & GEOMATICS

Course Objectives:

The object of the course student should have the capability to:

Know the principle and methods of surveying.
Measure horizontal and vertical- distances and angles
Recording of observation accurately
Perform calculations based on the observation
Identification of source of errors and rectification methods
Apply surveying principles to determine areas and volumes and setting out curves
Use modern surveying equipment's for accurate results

UNIT - I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying.

Measurement of Distances and Directions

Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections.

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination, and dip.

UNIT - II

Leveling- Types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, methods of contour surveying.

Areas - Determination of areas consisting of irregular boundary and regular boundary.

Volumes -Determination of volume of earth work in cutting and embankments for level section, volume of borrow pits, capacity of reservoirs.

UNIT - III

Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.

Traversing: Methods of traversing, traverse computations and adjustments, Omitted measurements.

UNIT - IV

Curves: Types of curves and their necessity, elements of simple, compound, reverse, transition and vertical curves.

Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry,

Modern Surveying Methods: Principle and types of E.D.M. Instruments, Total station- advantages and Applications. Field Procedure for total station survey, Errors in Total Station Survey, Global Positioning System- Principle and Applications.

UNIT - V

Photogrammetry Surveying:

Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereoplotting instruments, mosaics, map substitutes.

Course Outcomes: Course will enable the student to:

- Apply the knowledge to calculate angles, distances and levels
- Identify data collection methods and prepare field notes
- Understand the working principles of survey instruments, measurement errors and corrective measures
- Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies

TEXT BOOKS:

1. Chandra A M, "Plane Surveying and Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi.
2. Duggal S K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.

REFERENCES:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill.
2. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi
3. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi.
4. Surveying (Vol – 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. Civil Engg. II-Sem

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STRENGTH OF MATERIALS – II

Pre Requisites: Strength of Materials -I

Course Objectives: The objective of this Course is

- To understand the nature of stresses developed in simple geometries shafts, springs, columns &cylindrical and spherical shells for various types of simple loads
- To calculate the stability and elastic deformation occurring in various simple geometries for different types of loading.
- To understand the unsymmetrical bending and shear center importance for equilibrium conditions in a structural members of having different axis of symmetry.

UNIT – I

TORSION OF CIRCULAR SHAFTS :

Theory of pure torsion – Derivation of Torsion equation - Assumptions made in the theory of pure torsion – Polar section modulus – Power transmitted by shafts – Combined bending and torsion – Design of shafts according to theories of failure.

SPRINGS : Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel.

UNIT – II

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– Long columns subjected to eccentric loading – Secant formula – Empirical formulae — Rankine – Gordon formula- Straight line formula – Prof. Perry's formula.

BEAM COLUMNS: Laterally loaded struts – subjected to uniformly distributed and concentrated loads.

UNIT - III

DIRECT AND BENDING STRESSES:

Stresses under the combined action of direct loading and bending moment, core of a section – determination of stresses in the case of retaining walls, chimneys and dams – conditions for stability-Overturning and sliding – stresses due to direct loading and bending moment about both axis.

UNIT – IV

THIN CYLINDERS :

Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in dia, and volume of thin cylinders – Thin spherical shells.

THICK CYLINDERS :
Introduction - Lame's theory for thick cylinders – Derivation of Lame's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage.

UNIT – V
UNSYMETRICAL BENDING :
Introduction – Centroidal principal axes of section –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: Introduction - Shear centre for symmetrical and unsymmetrical (channel, I, T and L) sections

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

- Describe the concepts and principles, understand the theory of elasticity, and perform calculations, relative tothe strength of structures and mechanical components in particular to torsion and direct compression;
- to evaluate the strains and deformation that will result due to theelastic stresses developed within the materials for simple types of loading
- Analyze strength and stability of structural members subjected to Direct, and Directand Bending stresses;
- Understand and evaluate the shear center and unsymmetrical bending.
- Frame an idea to design a system, component, or process

Text Books:
1) Strength of Materials by R.K Rajput, S.Chand& Company Ltd.
2) Mechanics of Materials by Dr.B.CPunmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain
References:

1) Strength of Materials by R.Subramanian, Oxford University Press.
2) Mechanics of Materials by R.C.Hibbeler, Pearson Education
3) Engineering Mechanics of Solids by Popov E.P. Printice-Hall Ltd
4) Strength of Materials by T.D.Gunneswara Rao and M.Andal, Cambridge Publishers
5) Strength of Materials by R.K.Bansal, Lakshmi Publications House Pvt. Ltd.
6) Fundamentals of Solid Mechancis by M.L.Gambhir, PHI Learning Pvt. Ltd

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. Civil Engg. II-Sem **L T P C**
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HYDRAULICS & HYDRAULIC MACHINERY

Course Objectives: the objective of the course is

- **To Define** the fundamental principles of water conveyance in open channels.
- **To Discuss**and analyze the open channels in uniform and Non-uniform flow conditions.
- To Study the characteristics of hydroelectric power plant and its components.
- To analyze and design of hydraulic machinery and its modeling

UNIT-I

Open Channel Flow – I

Introduction to Open channel flow-Comparison between open channel flow and pipe flow, Classification of open channels, Classification of open channel flows, Velocity distribution. Uniform flow – Characteristics of uniform flow, Chezy's, Manning's and Bazin formulae for uniform flow – Factorsaffecting Manning'sRoughnessCoefficient"n". Most economical sections. Computation of Uniform flow, Normal depth.

Critical Flow: Specific energy – critical depth - computation of critical depth – critical, sub critical and super critical flows-Channel transitions.

UNIT-II

Open Channel Flow – II

Non uniform flow – Gradually Varied Flow - Dynamic equation for G.V.F; Classification of channel bottom slopes – Classification and characteristics of Surface profiles – Computation of water surface profiles by Numerical and Analytical approaches. Direct step method.

Rapidly varied flow: Elements and characteristics (Length and Height) of Hydraulic jump in rectangular channel– Types, applications and location of hydraulic jump, Energy dissipation and other uses – Positive and Negative Surges (Theory only).

UNIT-III

Dimensional Analysis and Hydraulic Similitude

Dimensional homogeneity – Rayleigh's method and Buckingham's pi methods – Dimensionless groups. Similitude, Model studies, Types of models. Application of dimensional analysis and model studies to fluid flow problems. Distorted models.

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

UNIT-IV

Hydraulic Turbines – I

Elements of a typical Hydropower installation – Heads and efficiencies – Classification of turbines – Pelton wheel – Francis turbine – Kaplan turbine – working, working proportions, velocity diagram, work done and efficiency, hydraulic design. Draft tube – Classification, functions and efficiency.

Hydraulic Turbines – II

Governing of turbines – Surge tanks – Unit and specific turbines – Unit speed – Unit quantity – Unit power – Specific speed – Performance characteristics – Geometric similarity – Cavitation. Selection of turbines.

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.

Hydropower Engineering: Classification of Hydropower plants – Definition of terms – load factor, utilization factor, capacity factor, estimation of hydropower potential.

Outcomes:

At the end of the course the student will able to

- applytheirknowledgeoffluidmechanicsin addressingproblemsinopenchannels and hydraulic machinery.
- Understand and solveproblemsinuniform,graduallyandrapidlyvariedflows in open channel insteadystateconditions.
- apply dimensional analysis and to differentiate the model, prototype and similitude conditions for practical problems.
- Get the knowledge on different hydraulic machinery devices and its principles that will be utilized in hydropower development and for other practical usages

Text Books

1. Fluid Mechanics by Modi and Seth ,Standard Book House.
2. Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning Private Limited,2015

REFERENCES

1. Fluid mechanics & Hydraulic Machines, Domkundwar&DomkundwarDhanpat Rai &C
2. Fluid Mechanics by R.C.Hibbeler, Pearson India Education Servieces Pvt. Ltd

3. Fluid Mechanic & Fluid Power Engineering by D.S.Kumar (Kataria& Sons Publications Pvt. Ltd.).
4. Open channel flow by V.T.Chow (Mc.Graw Hill Book Company).
5. Introduction to Fluid Mechanics and Fluid Machines by SK Som, Gautam Biswas, Suman Chakraborthy, Mc Graw Hill Education (India) Private Limited
6. Hydraulic Machines by Banga& Sharma (Khanna Publishers).

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. Civil Engg. II-Sem

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STRUCTURAL ANALYSIS – I

Pre Requisites: Strength of Materials –I

Objectives:the objective of the course is to

- **Differentiate** the statically determinate and indeterminate structures.
- To understand the nature of stresses developed in perfect frames and three hinged archesfor various types of simple loads
- **Analyse**the statically indeterminate members such as fixed bars, continuous beams and for various types of loading.
- Understand the energy methods used to derive the equations to solve engineering problems
- **Evaluate** the Influence on a beam for different static & moving loading positions

UNIT – I

ANALYSIS OF PERFECT FRAMES: Types of frames- Perfect, Imperfect and Redundant pin jointed plane frames - Analysis of determinate pin jointed plane frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.

UNIT – II

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem-Unit Load Method - Deflections of simple beams and pin- jointed plane frames - Deflections of statically determinate bent frames.

THREE HINGED ARCHES – Introduction – Types of Arches – Comparison between Three hinged and Two hinged Arches - Linear Arch - Eddy's theorem - Analysis of Three hinged arches - Normal Thrust and radial shear - Geometrical properties of parabolic and circular arches - Three hinged parabolic circular archeshaving supports at different levels - Absolute maximum bending moment diagram for a three hinged arch.

UNIT-III

PROPPED CANTILEVER and FIXED BEAMS: Determination of static and kinematic indeterminacies for beams- Analysis of Propped cantilever and fixed beams, including the beams with different moments of inertia - subjected to uniformly distributed load - point loads - uniformly varying load, couple and combination of loads - Shear force, Bending moment diagrams and elastic curve for Propped Cantilever and Fixed Beams-Deflection of Propped cantilever and fixed beams - effect of sinking of support, effect of rotation of a support.

UNIT – IV

CONTINUOUS BEAMS: Introduction-Continuous beams - Clapeyron's theorem of three moments- Analysis of continuous beams with constant and variable moments of inertia with one or both ends fixed-continuous beams with overhang - effect of sinking of supports.

SLOPE DEFLECTION METHOD: Derivation of slope-deflection equation, application to continuous beams with and without sinking of supports -Determination of static and kinematic indeterminaciesfor frames - Analysis of Single Bay, Single storey Portal Frames by Slope Deflection Method including Side Sway - Shear force and bending moment diagrams and Elastic curve.

UNIT – V

MOVING LOADS and INFLUENCE LINES: Introduction maximum SF and BM at a given section and absolute maximum shear force and bending moment due to single concentrated load ,uniformly distributed load longer than the span, uniformly distributed load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length - Definition of influence line for shear force and bending moment - load position for maximum shear force and maximum bending Moment at a section - Point loads, uniformly distributed load longer than the span, uniformly distributed load shorter than the span-Influence lines for forces in members of Pratt and Warren trusses - Equivalent uniformly distributed load -Focal length.

Outcomes:

At the end of the course the student will able to

- An ability to apply knowledge of mathematics, science, and engineering
- Analyse the statically indeterminate bars and continuous beams
- **draw strengthbehaviour** of members for static and dynamic loading.
- **Calculate** the stiffness parameters in beams and pin jointed trusses.
- **Understand the indeterminacy** aspects to consider for a total structural system.
- Identify, formulate, and solve engineering problems with real time loading

Text Books:

1) Structural Analysis Vol –I & II by V.N.Vazirani and M.M.Ratwani, Khanna Publishers.

2) Structural Analysis Vol I & II by G.S.Pandit and S.P.Gupta, Tata McGraw Hill Education Pvt. Ltd.

REferences:

1) Structural analysis T.S Thandavamoorthy, Oxford university Press
2) Structural Analysis by R.C.Hibbeler, Pearson Education
3) Basic Structural Analysis by K.U.Muthu*et al.,*I.K.International Publishing House Pvt.Ltd
4) Mechanics of Structures Vol – I and II by H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.
5) Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Education Pvt. Ltd.
6) Fundamentals of Structural Analysis by M.L.Gamhir, PHI Learning Pvt. Ltd

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. Civil Engg. II-Sem

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SURVEYING LAB

Pre Requisites: Surveying Theory

Course Objectives:

- To impart the practical knowledge in the field- measuring distances, directions, angles,
- To determining R.L.'s areas and volumes
- To set out Curves
- To stake out points
- To traverse the area
- To draw Plans and Maps

List of Experiments

1. Surveying of an area by chain, and compass survey (closed traverse) & plotting.
2. Determine of distance between two inaccessible points with compass
3. Radiation method, intersection methods by plane table survey.
4. Levelling – Longitudinal and cross-section and plotting
5. Measurement of Horizontal and vertical angle by theodolite
6. Trigonometric leveling using theodolite
7. Height and distances using principles of tachometric surveying
8. Determination of height, remote elevation, distance between inaccessible points using total station
9. Determination of Area using total station and drawing map
10. Traversing using total station for drawing contour map
11. Stake out using total station

12. Setting out Curve using total station

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

- Apply the principle of surveying for civil Engineering Applications
- Calculation of areas, Drawing plans and contour maps using different measuring equipment at field level
- Write a technical laboratory report

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. Civil Engg. II-Sem

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BASIC ELECTRICAL & ELECTRONICS LAB

Basic Electrical Engineering Laboratory-I

List of Experiments:

1. Characteristics of Fluorescent lamps
2. Characteristics of Tungsten and Carbon filament lamps
3. (a) Verification of Thevenin's theorem.
(b) Verification of Norton's theorems.
4. Verification of Maximum power theorem.
5. Verification of Superposition theorem
6. Study of R-L-C Series circuit
7. Study of R-L-C parallel circuit

Basic Electronics Engineering Laboratory-I

• There will be a couple of familiarization lectures before the practical classes are undertaken where basic concept of the instruments handled Eg: CRO, Multimeters etc will be given. Lectures on measurement techniques and error calculation will also have to be organized.
• 3 hours per week must be kept, initially for practical lectures, and later for tutorials.

List of Experiments:

1. Familiarisation with passive and active electronic components such as Resistors, Inductors, Capacitors, Diodes, Transistors (BJT) and electronic equipment like DC power supplies, multimeters etc.
2. Familiarisation with measuring and testing equipment like CRO, Signal generators etc.
3. Study of I-V characteristics of Junction diodes.

4. Study of I-V characteristics of Zener diodes.
5. Study of Half and Full wave rectifiers with Regulation and Ripple factors.
6. Study of I-V characteristics of BJTs.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. Civil Engg. II-Sem

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FLUID MECHANICS & HYDRAULIC MACHINERY LAB

Pre Requisites: FM & HHM Theory

Course Objectives

- To **identify** the behavior of analytical models introduced in lecture to the actual behavior of real fluid flows.
- To **explain** the standard measurement techniques of fluid mechanics and their applications.
- To **illustrate** the students with the components and working principles of the Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
- To **analyze** the laboratory measurements and to document the results in an appropriate format.

List of Experiments

1. Verification of Bernoulli's equation
2. Determination of Coefficient of discharge for a small orifice by a constant head method
3. Calibration of Venturimeter / Orifice Meter
4. Calibration of Triangular / Rectangular/Trapezoidal Notch
5. Determination of Minor losses in pipe flow
6. Determination of Friction factor of a pipe line
7. Determination of Energy loss in Hydraulicjump
8. Determination of Manning's and Chezy's constants for Open channel flow.

9. Impact of jet on vanes
10. Performance Characteristicsof Pelton wheel turbine
11. Performance Characteristics of Francis turbine
12. Performance characteristics of Keplan Turbine
13. Performance Characteristics of a single stage / multi stage Centrifugal Pump

Course Outcomes

Students who successfully complete this course will have demonstrated ability to:

- **Describe** the basic measurement techniques of fluid mechanics and its appropriate application.
- **Interpre**t the results obtained in the laboratory for various experiments.
- **Discover** the practical working of Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
- **Compare** the results of analytical models introduced in lecture to the actual behavior of real fluid flows and draw correct and sustainable conclusions.
- Write a technical laboratory report

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg. I-Sem **L T P C**
3 0 0 3

STRUCTURAL ANALYSIS – II

Pre Requisites: SA- I

Course Objectives:

The objectives of the course are to

- Identify the various actions in arches.
- Understand classical methods of analysis for statically indeterminate structures.
- Differentiate the approximate and numerical methods of analysis for indeterminate structures.
- Findthe degree of static and kinematic indeterminacies of the structures.
- Plot the variation of S.F and B.M when a moving load passes on indeterminate structure

UNIT – I

TWO HINGED ARCHES: Introduction – Classification of Two hinged Arches – Analysis of two hinged parabolic arches – Secondary stresses in two hinged arches due to temperature and elastic shortening of rib.

MOMENT DISTRIBUTION METHOD - Analysis of continuous beams with and without settlement of supports using -Analysis of Single Bay Single Storey Portal Frames including side Sway - Analysis of inclined frames -Shear force and Bending moment diagrams, Elastic curve.

UNIT – II

KANI'S METHOD: Analysis of continuous beams including settlement of supports - Analysis of single bay single storey and single bay two Storey Frames including Side Sway usingKani's Method - Shear force and bending moment diagrams - Elastic curve.

CABLES and SUSPENSION BRIDGES:

Equilibrium of a Suspension Cable subjected to concentrated loads and uniformly distributed loads - Length of acable - Cable with different support levels - Suspension cable supports - Suspension Bridges - Analysis of Three Hinged Stiffening Girder Suspension Bridges.

UNIT – III

APPROXIMATE METHODS OF ANALYSIS: Introduction – Analysis of multi-storey frames for lateral loads: Portal Method, Cantilever method and Factor method - Analysis of multi-storey frames for gravity loads - Substitute Frame method - Analysis of Mill bents.

UNIT – IV

MATRIX METHODS OF ANALYSIS: Introduction to Flexibility and Stiffness matrix methods of analyses using 'system approach' upto three degree of indeterminacy– Analysis of continuous beams including settlement of supports using flexibility and stiffness methods -Analysis of pin-jointed determinate plane frames using flexibility and stiffness methods- Analysis of single bay single storey portal frames using stiffness method - Shear force and bending moment diagrams - Elastic curve.

UNIT- V

INFLUENCE LINES FOR INDETERMINATE BEAMS: Introduction – influence line diagram for shear force and bending moment for two span continuous beam with constant and different moments of inertia - influence line diagram for shear force and bending moment for propped cantilever beams.

INDETERMINATE TRUSSES: Determination of static and kinematic indeterminacies – Analysis of trusses having single and two degrees of internal and external indeterminacies – Castigliano's second theorem.

Course Outcomes

After the completion of the course student should be able to

- **Analyze** the two hinged arches.
- **Solve** statically indeterminate beams and portal frames using classical methods
- **Sketch** the shear force and bending moment diagrams for indeterminate structures.
- **Formulate** the stiffness matrix and analyze the beams by matrix methods

Text Books:

1) Structural Analysis Vol –I &II by Vazarani and Ratwani, Khanna Publishers.
2) Structural Analysis Vol I & II by G.S. Pandit S.P.Gupta Tata McGraw Hill Education Pvt. Ltd.

References:

1. 1)Indeterminate Structural Analysis by K.U.Muthu et al., I.K.International Publishing House

2. Pvt.Ltd
3. Structural analysis T.S Thandavamoorthy, Oxford university Press
4. Mechanics of Structures Vol –II by H.J.Shah and S.B.Junnarkar, Charotar
5. Publishing House Pvt. Ltd.
6. Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.
7. Examples in Structural Analysis by William M.C.McKenzie, Taylor & Francis.
8. Structural Analysis by R. C. Hibbeler, Pearson Education
9. Structural Analysis by Devdas Menon, Narosa Publishing House.
10. Advanced Structural Analysis by A.K.Jain, Nem Chand & Bros.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg. I-Sem

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GEOTECHNICAL ENGINEERING

Pre-Requisites: Engineering Geology, Applied Mechanics, Fluid Mechanics

Course Objectives: the objectives of the course are to

- understand the formation of soil and classification of the soils
- determine the Index & Engineering Properties of Soils
- determine the flow characteristics & stresses due to externally applied loads
- estimate the consolidation properties of soils
- estimate the shear strength and seepage loss

UNIT – I

INTRODUCTION: Soil formation and structure – moisture content – Mass, volume relationships – Specific Gravity-Field density by core cutter and sand replacement methods-Relative density.
INDEX PROPERTIES OF SOILS: Grain size analysis – consistency limits and indices – I.S. Classification of soils.

UNIT –II
PERMEABILITY: Soil water – capillary rise – flow of water through soils – Darcy's law-permeability – Factors affecting permeability – laboratory determination of coefficient of permeability –Permeability of layered soils .

EFFECTIVE STRESS & SEEPAGE THROUGH SOILS: Total, neutral and effective stress – principle of effective stress - quick sand condition – Seepage through soils – Flownets: Characteristics and Uses.

UNIT –III

STRESS DISTRIBUTION IN SOILS: Boussinesq's and Westergaard's theories for point load, uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under point load along the vertical and horizontal plane, and Newmark's influence chart for irregular areas.

COMPACTION: Mechanism of compaction – factors affecting compaction – effects of compaction on soil properties – Field compaction Equipment – compaction quality control.

UNIT – IV

CONSOLIDATION: Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation **-** stress history of clay; e-p and e-log(p) curves – normally consolidated soil, over consolidated soil and under consolidated soil - preconsolidation pressure and its determination - Terzaghi's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods - computation of total settlement and time rate of settlement.

UNIT - V

SHEAR STRENGTH OF SOILS: Importance of shear strength **–** Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelops – Shear strength of sands - dilatancy – critical void ratio, Introduction to stress path method.

OUTCOMES:

At the end of the course the student will able to

- Characterize and classify the soils
- Able to estimate seepage, stresses under various loading conditions and compaction characteristics
- Able to analyse the compressibility of the soils
- Able to understand the strength of soils under various drainage conditions

Text books:

1 Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International PvtLtd,
2. Soil Mechanics and Foundation Engineering by VNS Murthy, CBS Publishers and Distributors.

References:

1. Foundation Engineering by P.C.Varghese, PHI
2. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
3. Principals of Geotechnical Engineering by BrajaM.Das, Cengage Learning Publishers.
4. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).

5. Geotechnical Engineering Principles and Practices by Cuduto, PHI Intrernational.
6. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.
7. Soil Mechanics and Foundation by byB.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg. II-Sem **L T P C**
3 0 2 4

STRUCTURAL ENGINEERING – I (RCC)

Pre-Requisites: Structural Analysis I & II

Course Objectives
The objectives of the course are to

- **Identify** the basic components of anystructural system and the standard loading for the RC structure
- **Identify** and **tell** the various codal provisions given in IS. 456
- **Describe** the salient feature of limit state method, compare with other methods and the concepts of limit state of collapse and limit state of serviceability
- **Evaluate**the behaviour of RC member under flexure, shear and compression, torsion and bond.

UNIT -I
Introduction- Structure - Components of structure - Different types of structures - Equilibrium and compatibility– Safety and Stability - Loads – Different types of Loads – Dead Load, Live Load, Earthquake Load and Wind Load– Forces – What is meant by Design? – Different types of materials – RCC, PSC and Steel – Planning of structural elements- Concepts of RCC Design – Different methods of Design- Working Stress Method and Limit State Method – Load combinations as per Limit state method - Materials - Characteristic Values – Partial safety factors – Behaviour and Properties of Concrete and Steel- Stress Block Parameters as per IS 456 -2000.

Limit state Analysis and design of sections in Flexure – Behaviour of RC section under flexure - Rectangular, T and L-sections, singly reinforced and doubly reinforced Beams – Detailing of reinforcement

UNIT – II

Design for Shear, Bond and Torsion - Mechanism of shear and bond failure - Design of shear using limit state concept – Design for Bond –Anchorage and Development length of bars - Design of sections for torsion - Detailing of reinforcement

UNIT - III

Design of Two-way slabs with different end conditions, one way slab, and continuous slab Using I S Coefficients - Design of dog-legged staircase –
Limit state design for serviceability for deflection, cracking and codal provisions.

UNIT – IV

Design of compression members - Short Column - Columns with axial loads, uni-axial and bi-axial bending – Use of design charts- Long column – Design of long columns - I S Code provisions.

UNIT – V

Design of foundation **-** Different types of footings – Design of wall footing – Design of flat isolated square, rectangulal, circular footings and combined footings for two columns.

Course Outcomes

After the completion of the course student should be able to

- **Compare** and **Design** the singly reinforced, doubly reinforced and flanged sections.
- **Design** the axially loaded, uniaxial and biaxial bending columns.
- **Classify** the footings and **Design** the isolated square, rectangular and circular footings
- **Distinguish** and **Design** the one-way and two-way slabs.

TEXT BOOKS:

1. Limit state designed of reinforced concrete – P.C.Varghese, PHI Learning Pvt. Ltd.
2. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishers.

REFERENCES :

1. 1.Reinforced concrete design by S.Unnikrishna Pillai &Devdas Menon, Tata Mc.Graw Hill.
2. Reinforced concrete structures, Vol.1, by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd.
3. 2.Fundamentals of Reinforced concrete design by M.L. Gambhir,Printice Hall of India Pvt.Ltd.,

4. Design of Reinforced Concrete Structures by N.Subramanian, Oxford University Press
5. Design of concrete structures by J.N.Bandhyopadhyay PHI Learning Private Limited.
6. Design of Reinforced Concrete Structures by I.C.Syal and A.K.Goel, S.Chand& company.
7. Design of Reinforced Concrete Foundations – P.C. Varghese Prentice Hall of India.

NOTE :
Alternate weeks two periods of theory can be converted into drawing classes. The end examination paper should consist of Part – A and Part – B. Part – A should consist of two questions in design and drawing out of which one question to be answered. Part –B should consist of five questions in design out of which three to be answered. Weightage for Part – A is 40 % and Part – B is 60 %.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg. I-Sem **L T P C**
3 0 0 3

TRANSPORTATION ENGINEERING

Pre-Requisites: Surveying

Course Objectives:

- This course aims at providing a comprehensive insight of various elements of Highway transportation engineering. Topics related to the highway development, characterisation of different materials needed for highway construction, structural and geometric design of highway pavements along with the challenges and possible solutions to the traffic related issues will be covered as a part of this course.

UNIT -I
Introduction, History and Importance of Highways, Characteristics of road transport, Current road development plans in India, Highway development in India, Highway planning, Highway alignment, Engineering surveys for Highway alignment, Highway projects, Highway drawings and reports, Detailed Project Report preparation, PPP schemes of Highway Development in India, Government of India initiatives in developing the highways and expressways in improving the mobility and village road development in improving the accessibility.

UNIT – II
Introduction to Highway Geometric Design; Width of Pavement, Formation and Land, Cross Slopes etc; Concept of Friction: Skid and Slip; Elements of geometric design of highways; Sight Distances: Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance; Horizontal alignment: Design of horizontal curves, super elevation, extra widening of pavement at curves;

Vertical Alignment: Gradients, Compensation in Gradient, Design of summit curves and valley curves using different criteria; Integration of Horizontal and Vertical Curves

UNIT - III

Basic traffic characteristics: Speed, volume and concentration, relationship between flow, speed and concentration; Highway capacity and Level of service (LOS) concepts: Factors affecting capacity and LOS, relationship between V/C ratio and LOS; Traffic volume and spot speed studies: Methods; Road Safety; Traffic Signals: Types, warrants for signalization, design of isolated traffic signal by IRC method; Parking and road accidents: Types of parking facilities – on-street and off street, introduction to parking studies; Accident studies, road safety auditing; Introduction to street lighting; Road Intersections: Design considerations of at-grade intersections, introduction to interchanges

UNIT - IV

Tests on soils: CBR, Field CBR, modulus of sub-grade reaction, Tests on Aggregates: specific gravity, shape (flakiness and elongation indices), angularity number, water absorption, impact, abrasion, attrition, crushing resistance, durability (weathering resistance), stone polishing value of aggregates; Tests on bitumen: spot, penetration, softening point, viscosity, ductility, elastic recovery, flash and fire points, Introduction to modified bituminous binders like crumb rubber modified, natural rubber modified and polymer modified bitumen binders; Bituminous Concrete: Critical parameters controlling bituminous concrete mixture design, aggregate blending concepts viz. Rothfuch's method, trial and error procedure. Introduction to advanced concretes for road applications.

UNIT -V

Introduction to Pavement Design:Types of pavements and their typical cross sections: flexible, rigid and composite; Flexible Pavement analysis and design: Introduction to multi layered analysis, IRC 37-2012 method of flexible pavement design; Rigid pavement analysis and design: Factors controlling rigid pavement design, types of stresses in rigid pavements, critical load positions, load stresses and temperature stresses in interior, corner and edge locations of jointed plain cement concrete pavement slabs, IRC 58-2015 method of rigid pavement design; Overlay Designs: Types of overlays on flexible and rigid pavements.

Out Comes

At the end of this course, the students will develop:

- An ability to apply the knowledge of mathematics, science and engineering in the areas of traffic engineering, highway development and maintenance
- An ability to design, conduct experiments to assess the suitability of the highway materials like soil, bitumen, aggregates and a variety of bituminous mixtures. Also the

students will develop the ability to interpret the results and assess the suitability of these materials for construction of highways.

- An ability to design flexible and rigid highway pavements for varying traffic compositions as well as soil subgrade and environmental conditions using the standards stipulated by Indian Roads Congress.
- An ability to evaluate the structural and functional conditions of in-service highway pavements and provide solution in the form of routine maintenance measures or designed overlays using Indian Roads congress guidelines.
- An ability to assess the issues related to road traffic and provide engineering solutions supported with an understanding of road user psychological and behavioural patterns.

Textbooks:

1. Khanna, S.K, Justo, A and Veeraragavan, A, 'Highway Engineering', Nem Chand & Bros. Revised Tenth Edition, 2014

2.Kadiyali L.R. and Lal N B, Principles and Practices of Highway Engineering; Seventh Edition, First Reprint; Khanna Publishers, New Delhi, 2018

Code of Provisions:

Design Codes: IRC 37-2012, IRC 58-2015, IRC 81-1997

Reference books;

- Papacoastas, C. S. and Prevedouros, Transportation Engineering and Planning, Third Edition, Third Impression; Pearson Education, 2018.
- Khisty C J and Lall B Kent; Transportation Engineering: An Introduction, Third Edition, 1st Indian Adaptation; Pearson India Education Service Pvt. Ltd, New Delhi 2017.
- Subhash C Saxena, Text Book of Highway and Traffic Engineering; First Edition; CBS Publishers and Distributors. New Delhi, 2014
- C Venkatramaih, Transportation Engineering Volume 1 – Highway Engineering, 1st Edition, Universities Press, 2016
- Garber, N.J. and Hoel, L.A. Traffic and Highway Engineering, Fourth Edition; Cengage Learning, Stamford, CT, USA, 2010
- Parthachakroborty and Animesh Das, Principles of Transportation Engineering, PHI, 2013

Nicholas J Garber and Lester AHoel, Traffic and Highway Engineering, 5th Edition, Cengage Learning India Private Limited, New Delhi, 5th Indian Reprint, 201

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg. I-Sem **L T P C**

2 0 0 2

ENGINEERING ECONOMICS AND ACCOUNTING

Pre-Requisites: Mathematics

Course Objectives: To explain the basic principles of managerial economics, accounting and current business environment underlying business decision making.

Course Outcomes: Student will able to solve various business problem up make various business decision

Unit I Introduction & Demand Analysis: Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions. *Elasticity of Demand*: Definition, Types, Measurement and Significance of Elasticity of Demand. *Demand Forecasting,* Factors governing demand forecasting, methods of demand forecasting.

Unit II Production & Cost Analysis: *Production Function* – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. *Cost Analysis***:** Cost concepts. Break-even Analysis (BEA)- Determination of Break-Even Point (simple problems) - Managerial Significance.

Unit III Markets & New Economic Environment: Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. *Pricing*: Objectives and Policies of Pricing. Methods of Pricing. *Business:*Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types,*New Economic Environment*: Changing Business Environment in Post-liberalization scenario.

Unit IV Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital Trading Forecast Capital Budget, Cost Budget. Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems).

Unit V Introduction to Financial Accounting & Financial Analysis: Accounting concepts and Conventions Introduction IFRS Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).*Financial Analysis***:** Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios. Du Pont Chart.

TEXT BOOKS:

1. Aryasri: Managerial Economics and Financial Analysis, TMH, 2012.
2. Vijay Kumar & Appa Rao Managerial Ecoconomics & Financial Analysis, Cengage 2011.
3. J. V. Prabhakar Rao & P.V. Rao Managerial Ecoconomics & Financial Analysis, Maruthi Publishers, 2011.

REFERENCES:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.2012.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, Pearson, 2012.
3. Lipsey & Chrystel, Economics, Oxford University Press, 2009
4. Domnick Salvatore: Managerial Economics In a Global Economy, Thomson, 2012.
5. Narayanaswamy: Financial Accounting—A Managerial Perspective, PHI, 2012.
6. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas, 2012.
7. Truet and Truet: Managerial Economics: Analysis, Problems and Cases, Wiley, 2012.
8. Dwivedi: Managerial Economics, Vikas, 2012.
9. Kasi Reddy Sraswathi, MEFA PHI Learning, 2012.
10. Shailaja &Usha : MEFA, University Press, 2012.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg. I-Sem

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HIGHWAY ENGINEERING AND CONCRETE TECHNOLOGY LAB

Pre-Requisites: Building Materials,Concrete Technology, Highway Materials

Course Objectives: The objectives of the course

- To learn laboratory tests and their procedures cement, fine aggregate, course aggregates and bitumen
- **To Evaluate** fresh concrete properties
- **To Understand** the test procedures for characterization of Concrete and bituminous mixes

Student shall be able to

Categorizethe test on materials used Civil Engineering Building&Pavementconstructions

To perform the tests on concrete for it characterization.

To Design Concrete Mix Proportioning by Using Indian Standard Method.

Examine the tests performed for Bitumen mixes.

To prepare a laboratory report

List of Experiments

I. Test on Cement

1. Normal Consistency and fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity of cement
4. Soundness of cement
5. Compressive strength of cement
6. Workability test on concrete by compaction factor, slump and Vee-bee.

II. Test on Aggregates (Coarse and Fine)

1. Specific gravity (Pycnometer and wire basket),water absorption
2. Shape(Flakiness and elongation indices)
3. Impact and abrasion value tests
4. Crushing resistance and durability tests
5. Sieve Analysis and gradation charts (Job mix formula using Rothfuch's charts)
6. Bulking of sand, Bulk and compact densities of fine and coarse aggregates

III. Test on Fresh Concrete

1. Slump test
2. CF (compact factor stress)
3. Vee-bee Test
4. Flow Table Test

IV. Test on hardened concrete

1. Compression test on cubes & Cylinders
2. Flexure test
3. Split Tension Test
4. Modulus of Elasticity

V. Tests on Bitumen and Bituminous concrete

1. Penetration, softening point and spot test
2. Ductility, Elastic recovery and viscosity
3. Flash and fire points and specific gravity
4. Marshall's Stability (sample preparation and testing for stability and flow values)

TEXT BOOKS:

1. Concrete Manual by M.L. Gambhir, Dhanpat Rai & Sons
2. Highway Material Testing manual, Khanna ,Justo and Veeraraghavan, Nemchand Brothers

IS CODES:

1. IS 10262 :2009 "Concrete Mix Proportioning – Guidelines"
2. 1S 516:2006 "Methods of Tests on Strength of Concrete"
3. IS 383 :1993 "Specification For Coarse And Fine Aggregates From Natural Sources For Concrete"
4. 1S 1201 -1220 (1978) "Methods for testingtars and bituminous materials"
5. IRC SP 53 -2010 "Guidelines on use of modified bitumen"
6. MS-2 Manual for Marshalls Mix design 2002

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg. I-Sem

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GEO TECHNICAL ENGINEERING LAB

Pre-Requisites: Soil Mechanics (Co-requisite)

Course Objectives: To obtain index and engineering properties of locally available soils, and to understand the behavior of these soil under various loads.

Course Outcomes: At the end of the course, the student will be able to Classify and evaluate the behavior of the soils subjected to various loads.

LIST OF EXPERIMENTS

1. Atterberg Limits (Liquid Limit, Plastic Limit, and shrinkage limit)
2. a) Field density by core cutter method and
   b) Field density by sand replacement method
3. Determination of Specific gravity of soil Grain size distribution by sieve analysis
4. Permeability of soil by constant and variable head test methods
5. Standard Proctor's Compaction Test
6. Determination of Coefficient of consolidation (square root time fitting method)
7. Unconfined compression test
8. Direct shear test
9. Vane shear test
10. Differential free swell index (DFSI) test

REFERENCE:

1. Measurement of Engineering Properties of Soils by. E. Saibaba Reddy & K. Rama Sastri, New Age International

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg. I-Sem

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ADVANCED COMMUNICATION LAB ****

Pre-Requisites: English

Course Objectives: The purpose of this course is to develop the students competence in communication at an advanced level. Assuming that the students are fairly proficient in the basic communication skills of listening, speaking, reading and writing in English, this course aims to train them in communicating efficiently in the workplace and professional contexts.

Course Outcomes: Communicate efficiently in the work place up professioal context

1. Introduction

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organise ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

2. Objectives:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

Learning Outcomes

- Accomplishment of sound vocabulary and its proper use contextually.

- Flair in Writing and felicity in written expression.
- Enhanced job prospects.
- Effective Speaking Abilities

3. Syllabus:

The following course content to conduct the activities is prescribed for the Advanced Communication Skills (ACS) Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. **Activities on Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.
3. **Activities on Writing Skills** – Structure and presentation of different types of writing – *letter writing/Resume writing/ e-correspondence/ Technical report writing/ Portfolio writing* – planning for writing – improving one's writing.
4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/**PPTs** and written presentations through posters/projects/reports/ e-mails/assignments etc.
5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

4. Minimum Requirement:

The Advanced Communication Skills (ACS) Laboratory shall have the following infra-structural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

5. Prescribed Lab Manual: A book titled ***A Course Book of Advanced Communication Skills(ACS) Lab*** published by Universities Press, Hyderabad.

6. Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

- **Oxford Advanced Learner's Compass**, 8th Edition
- **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
- **Lingua TOEFL CBT Insider**, by Dreamtech
- **TOEFL & GRE** (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- **The following software from 'train2success.com'**
  - **Preparing for being Interviewed**
  - **Positive Thinking**
  - **Interviewing Skills**
  - **Telephone Skills**
  - **Time Management**

7. Books Recommended:

1. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
2. **English Language Communication : A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.
3. **Advanced Communication Skills Laboratory Manual** by Sudha Rani, D, Pearson Education 2011.
4. **Technical Communication** by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. **Business and Professional Communication:** Keys for Workplace Excellence. Kelly M. Quintanilla & Shawn T. Wahl. Sage South Asia Edition. Sage Publications. 2011.
6. **The Basics of Communication:A Relational Perspective**. Steve Duck & David T. McMahan. Sage South Asia Edition. Sage Publications. 2012.
7. **English Vocabulary in Use** series, Cambridge University Press 2008.
8. **Management Shapers Series** by Universities Press(India)Pvt Ltd., Himayatnagar, Hyderabad 2008.
9. **Handbook for Technical Communication** by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
10. **Communication Skills** by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
11. **Handbook for Technical Writing** by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.
12. **Job Hunting** by Colm Downes,Cambridge University Press 2008.
13. **Master Public Speaking** by Anne Nicholls, JAICO Publishing House, 2006.
14. **English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hil 2009.**
15. Books on **TOEFL/GRE/GMAT/CAT/IELTS** by Barron's/DELTA/Cambridge University Press.
16. **International English for Call Centres** by Barry Tomalin and Suhashini Thomas, Macmillan Publishers, 2009.

DISTRIBUTION AND WEIGHTAGE OF MARKS:

***Advanced Communication Skills Lab Practicals**:*

1. The practical examinations for the ACS Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the English Language lab sessions, there shall be continuous evaluation during the year for 25 sessional marks and 50 End Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned, by inviting the External Examiner from outside. In case of the non-availability of the External Examiner, other teacher of the same department can act as the External Examiner.

Mini Project: As a part of Internal Evaluation

1. **Seminar/ Professional Presentation**
2. **A Report on the same has to be prepared and presented.**

* ***Teachers may use their discretion to choose topics relevant and suitable to the needs of students.***
* ***Not more than two students to work on each mini project.***
* ***Students may be assessed by their performance both in oral presentation and written report.***

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg. II-Sem **L T P C**
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ENVIRONMENTAL ENGINEERING

Pre Requisites: Fluid Mechanic

Course Objectives: This subject provides the knowledge of water sources, water treatment, design of distribution system waste water treatment, and safe disposal methods. The topics of characteristics of waste water, sludge digestion are also included.

UNIT – I

Introduction: Waterborne diseases – protected water supply – Population forecasts, design period – types of water demand – factors affecting – fluctuations – fire demand – water quality and testing – drinking water standards: sources of water - Comparison from quality and quantity and other considerations – intakes – infiltration galleries.

UNIT – II

Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation-flocculation clarifier design – coagulants - feeding arrangements. Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation - comparison of filters – disinfection – theory of chlorination, chlorine demand - other disinfection practices–Design of distribution systems–pipe appurtenances.

UNIT - III

characteristics of sewage –waste water collection–Estimation of waste water and storm water – decomposition of sewage, examination of sewage – B.O.D. Equation – C.O.D. Design of sewers – shapes and materials – sewer appurtenances, manholes – inverted siphon – catch basins – flushing tanks – ejectors, pumps and pump houses – house drainage – plumbing requirements – sanitary fittings-traps – one pipe and two pipe systems of plumbing **–** ultimate disposal of sewage – sewage farming –self purification of rivers.

UNIT – IV

Waste water treatment plant – Flow diagram - primary treatment Design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – Biological treatment – trickling filters –ASP– Construction and design of oxidation ponds. Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks working principles and design – soak pits.

UNIT – V

Air pollution– classification of air pollution– Effects air pollution–Global effects–Meteorological parameters affecting air pollution–Atmospheric stability–Plume behavior –Control of particulates – Gravity settlers, cyclone filters, ESPs–Control of gaseous pollutants–automobile pollution and control.

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

- Assess characteristics of water and wastewater and their impacts
- Estimate quantities of water and waste water and plan conveyance components
- Design components of water and waste water treatment plants
- Be conversant with issues of air pollution and control

TEXT BOOKS:

1. Environmental Engineering by H.S Peavy, D. R. Rowe, G. Tchobanoglous, McGraw Hill Education (India) Pvt Ltd, 2014
2. Environmental Engineering by D. P. Sincero and G.A Sincero, Pearson 2015.

REFERENCES:

1. Environmental Engineering I and II by BC Punmia, Std. Publications.
2. Environmental Engineering I and II by SK Garg, Khanna Publications.
3. Environmental Pollution and Control Engineering CS Rao,Wiley Publications
4. Water and Waste Water Technology by Steel, Wiley
5. Waste water engineering by Metcalf and Eddy, McGraw Hill, 2015.
6. Water and Waste Water Engineering by Fair Geyer and Okun, Wiley, 2011
7. Water and Waste Water Technology by Mark J Hammar and Mark J. HammarJr.Wiley, 2007.
8. Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice
9. Hall, New Jersey.
10. Introduction to Environmental Engineering by P. AarneVesilind, Susan M. Morgan,
    a. Thompson /Brooks/Cole; Second Edition 2008.
11. Integrated Solid Waste Management, Tchobanoglous, Theissen& Vigil. McGraw Hill
    a. Publication

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg. II-Sem

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FOUNDATION ENGINEERING

Pre-Requisites: Soil Mechanics

Objectives:
To Plan Soil explorationprogramme for civil Engineering Projects
To check the stability of slopes
To determine the lateral earth pressures and design retaining walls
To determine the Bearing capacity of Soil
To design pile group foundation

UNIT – I
SOIL EXPLORATION: Need – methods of soil exploration – boring and sampling methods – penetration tests – plate load test– planning of soil exploration programme, Bore logs and preparation of soil investigation report.

UNIT – II
SLOPE STABILITY: Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish slip circle method, method of slices, Bishop's Simplified method of slices – Taylor's Stability Number- stability of slopes of earth dams under different conditions.

UNIT – III
EARTH PRESSURE THEORIES: Active , Passive and at rest soil pressures Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory.

RETAINING WALLS: Types of retaining walls – stability of gravity and cantilever retaining walls against overturning, sliding and, bearing capacity, filter material for drainage.

UNIT –IV
SHALLOW FOUNDATIONS- Types - choice of foundation – location and depth - safe bearing capacity – shear criteria – Terzaghi's, and IS code methods - settlement criteria – allowable bearing pressure based on SPT N value and plate load test – allowable settlements of structures.

UNIT -V
PILE FOUNDATION: Types of piles – load carrying capacity of piles based on static pile formulae – dynamic pile formulae – Pile Capacity through SPT results - pile load tests - load carrying capacity of pile groups in sands and clays – Settlement of pile groups – negative skin friction

Outcomes:

At the end of the course the student will able to

- understand the principles and methods of Geotechnical Exploration
- decide the suitability of soils and check the stability of slopes
- calculate lateral earth pressures and check the stability of retaining walls
- analyse and design the shallow and deep foundations

Text books:

1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt . Ltd, New Delhi
2. Principals of Geotechnical Engineering by BrajaM.Das, Cengage Learning Publishers.

References:

1. Soil Mechanics and Foundation Engineeringby VNS Murthy, CBS Publishers and Distributors.
2. Geotechnical Engineering Principles and Practices by Cuduto, PHI Intrernational.
3. Analysis and Design of Substructures – Swami Saran, Oxford and IBH Publishing company Pvt Ltd
   (1998).
4. Geotechnical Engineering by S. K.Gulhati&Manoj Datta – Tata Mc.Graw Hill Publishing company New Delhi. 2005.
5. Bowles, J.E., (1988) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishing company, New york.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg. II-Sem **L T P C**
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STRUCTURAL ENGINEERING – II (Steel)

Pre-Requisites: Structural Analysis I & II

Course Objectives
The objectives of the course is to

- Explain the mechanical properties of structural steel , plasticity ,yield .
- **Describe** the salient features of Limit State Method of design of Steel structures.
- **Identify** and **explain** the codal provisions given in IS. 800.
- **Analyze** the behaviour of steel structures under tension, compression and flexure.
- **Design** the tension, compression , flexural members andplate girder
- Design the connectrion in steel structure,build -up member and (bolted and welded).

UNIT – I
Materials – Types of structural steel – Mechanical properties of steel – Concepts of plasticity – yield strength - Loads and Stresses – Local buckling behavior of steel. Concepts of limit State Design – Different Limit States – Load combinations for different Limit states - Design Strengths-deflection limits – serviceability – stability check.
Design of Connections– Different types of connections – Bolted connections –Design strength – efficiency of joint–prying action - Welded connections – Types of welded joints – Design requirements - Design of Beam-column connections- Eccentric connections - Type I and Type II connection – Framed connection– stiffened / seated connection.

UNIT – II
Design of tension members –Simple and built up members - Design strength – Design procedure for splicing - lug angle.
Design of compression members – Buckling class – slenderness ratio –Design of simple compression members - laced – battened columns – splice – column base – slab base.

UNIT – III
*Plastic Analysis;*Plastic moment – Plastic section modulus - Plastic analysis of continuous beams

Design of Flexural Members –Laterally supported and unsupported Beams – Design of laterally supported beams- Bending and shear strength/buckling – Built-up sections - Beam splice

UNIT – IV

Design of welded plate girders – elements – economical depth – design of main section – connections between web and flange – design of stiffeners - bearing stiffener– intermediatestiffeners – Design of web splice and flange splice.

UNIT – V

Design of Industrial Structures;Types of roof trusses - loads on trusses – wind loads - Purlin design – truss design –Design of welded Gantry girder

Note: ***Design of structural members include detailed sketches.***

Course Outcomes:

After the completion of the course student should be able to

- Analyze the tension members, compression members.
- Design the tension members, compression members and column bases and joints and connections
- Analyze and Design the beams including built-up sections and beam and connections.
- Identify and Design the various components of welded plate girder including stiffeners

Text Books:

1.Design of steel structures by S.K.Duggal,Tata Macgrawhill publishers,2000,2nd Edition

2.Design of steel structures by N.Subramanian,Oxford University press,2008

Reference Books:

1. Design of steel structures by K.S.Sairam,Pearson Educational India, 2nd Edition,2013
2. Design of steel structures by Edwin H.Gayrold and Charles Gayrold,Tata Mac-grawhill publishers,1972
3. Design of steel structures by L.S.JayaGopal,D.Tensing,Vikas Publishing House

NOTE :

Alternate weeks two periods of theory can be converted into drawing classes. The end examination paper should consist of Part – A and Part – B. Part – A should consist of two questions in design and drawing out of which one question to be answered. Part –B should consist of five questions in design out of which three to be answered. Weightage for Part – A is 40 % and Part – B is 60 %.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg. II-Sem **L T P C**

3 1 0 4

HYDROLOGY & WATER RESOURCES ENGINEERING

Pre-Requisites: Fluid Mechanics & HHM

Course Objectives:

This course provides the description of hydrological cycle and derive various formulas used in estimation of different basic components of surface and Ground water cycle. and its components. Further it will explain the water requirement for irrigation and connectivity of hydrology to the field requirement.

Unit - I

Introduction: Concepts of Hydrologic cycle, Global Water Budget, Applications in Engineering. Sources of data.

Precipitation

Forms of precipitation, characteristics of precipitation in India, measurement of precipitation: Recording and non-recording types, rain gauge network: mean precipitation over an area: Arithmetic, Theissen's and Isohyetal methods, Missing Rainfall Data – Estimation, Consistency of Rainfall records, depth area-duration relationships, maximum intensity/depth-duration-frequency relationship, Probable Maximum Precipitation (PMP), rainfall data in India.

Unit - II

Abstractions from precipitation

Evaporation process, evaporimeters,analytical methodsofevaporationestimation,reservoirevaporationand methodsfor itsreduction, evapotranspiration, measurement of evapotranspiration, evapotranspiration equations: Penman and Blaney &Criddle Methods, potentialevapotranspiration overIndia,actual evapotranspiration, ,interception,depression storage,infiltration,infiltrationcapacity,measurementof infiltration,modellinginfiltration capacity,classificationofinfiltrationcapacities,infiltrationindices.

Runoff

Components of Runoff, Factors affecting runoff, Basin yield, SCS-CN method of estimating runoff, Flow duration curves, Mass curve of runoff – Analysis.

Unit - III

Hydrographs

Hydrograph –Distribution of Runoff – Hydrograph Analysis Flood Hydrograph – Effective Rainfall – Base Flow- Base Flow Separation - Direct Runoff Hydrograph Unit pulse and Unit step function - Unit Hydrograph, definition, limitations and applications of Unit hydrograph, derivation of Unit Hydrograph from Direct Runoff Hydrograph and vice versa - S-hydrograph, Synthetic Unit Hydrograph.

Unit - IV

Groundwater Hydrology

Occurrence, movement and distribution of groundwater, aquifers – types, Specific Yield, Permeability, Storage coefficient, Transmissibility, Darcy's Law. **Well Hydraulics -** Steady radial flow into well for confined and unconfined aquifers, Recuperation tests. Well constants.

Crop Water Requirements– Water requirementofcrops-CropsandcropseasonsinIndia,croppingpattern,duty anddelta; Quality ofirrigationwater;Soil-waterrelationships,rootzonesoilwater,infiltration, consumptiveuse,irrigationrequirement,frequencyofirrigation;Methodsofapplyingwater tothefields:surface,sub-surface,sprinklerand trickle /dripirrigation.

Unit - V

Canal Systems: Canal systems, alignment of canals, canallosses,estimation of designdischarge.Designofchannels-rigidboundary channels,alluvialchannels, Regime channels, Kennedy'sandLacey'stheoryofregime channels. Canaloutlets: non-modular,semi-modular andmodularoutlets.Waterlogging:causes,effects andremedialmeasures.Lining of canals-Typesoflining-Advantages and disadvantages.Drainageofirrigatedlands- necessity,methods.

Course Outcomes:

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

- Understand the different concepts and terms used in engineering hydrology
- To**identify and** explain various formulae used in estimation of surface and Ground water hydrology components
- Demonstrate their knowledge to **connect**hydrology to the field requirement

Text Books

1. Hydrology by K. Subramanya (Tata McGraw-Hill)
2. Irrigation Engineering and Hydraulic structures by Santhosh kumar Garg Khanna publishers

Reference Books

1. Elements of Engineering Hydrology by V.P. Singh (Tata McGraw-Hill)
2. Engineering Hydrology by Jaya Rami Reddy (Laxmi Publications
3. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
4. Elements of Water Resources Engineering by K.N.Duggal and J.P.Soni (New Age International)
5. G L Asawa, IrrigationEngineering, WileyEastern

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg. II-Sem **L T P C**
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ENVIRONMENTAL ENGINEERING LAB

Course Objectives: the objectives of the course are to

- **Perform** the experiments to determine water and waste water quality
- **Understand** the water & waste water sampling, their quality standards
- **Estimate** quality of water, waste water, Industrial water

Practical Work: List of Experiments

1. Determination of pH
2. Determination of Electrical Conductivity
3. Determination of Total Solids (Organic and inorganic)
4. Determination of Acidity
5. Determination of Alkalinity
6. Determination of Hardness (Total, Calcium and Magnesium Hardness)
7. Determination of Chlorides
8. Determination of optimum coagulant Dosage
9. Determination of Dissolved Oxygen (Winkler Method)
10. Determination of COD
11. Determination of BOD/DO
12. Determination of Residual Chlorine
13. Total count No.
14. Noise level measurement

Course outcomes

After the completion of the course student should be able to

- **Understand** about the equipment used to conduct the test procedures
- **Perform** the experiments in the lab
- **Examine** and **Estimate** water, waste water, air and soil Quality
- **Compare** the water, air quality standards with prescribed standards set by the local governments
- **Develop** a report on the quality aspect of the environment

Text/Reference Books:

1. Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey. 2. Introduction to Environmental Engineering by P. AarneVesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.

3. Peavy, H.s, Rowe, D.R, Tchobanoglous, G. Environmental Engineering, Mc-Graw - Hill International Editions, New York 1985.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg. II-Sem **L T P C**
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COMPUTER AIDED CIVIL ENGINEERING DRAWING

Pre-Requisites: Computer Aided Civil Engineering Drawing or AUTO CAD Principles –Excel-Structural Engineering -1 & 2

Course Objectives : The objectives of the course are to

- **Learn** the usage of any fundamental software for design
- **Create** geometries using pre-processor
- **Analyse**and Interpret the results using post processor
- **Design** the structural elements

LIST OF EXPERIMENTS

1. Analysis &Design determinate structures using a software
2. Analysis &Design of fixed & continuous beams using a software
3. Analysis & Design of Plane Frames
4. Analysis &Design of space frames subjected to DL & LL
5. Analysis &Design of residential building subjected to all loads (DL,LL,WL,EQL)
6. Analysis & Design of Roof Trusses
7. Design and detailing of built up steel beam
8. Developing a design programme for foundation using EXCEL Spread Sheet
9. Detailing ofRCC beam and RCCslab
10. Detailing of Steel built up compression member

Course Outcomes

After the completion of the course student should be able to

- **Model** the geometry of real world structure Represent the physical model of structural element/structure
- Perform **analysis**
- **Interpret** from the Post processing results
- **Design** the structural elements anda system as per IS Codes

Note: Drafting of all the exercises is to be carried out using commercially available designing software's.

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JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. I-Sem

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ESTIMATION, COSTING AND PROJECT MANAGEMENT

Course Objectives: The subject provide process of estimations required for various work in construction.To have knowledge of using SOR & SSR for analysis of rates on various worksand basics of planning tools for a construction projects.

UNIT – I

General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating. Detailed Estimates of Buildings

UNIT – II

Reinforcement bar bending and bar requirement schedules Earthwork for roads and canals.

UNIT – III

Rate Analysis – Working out data for various items of work over head and contingent charges.

UNIT-IV

Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation -Standard specifications for different items of building construction.

UNIT-V

Construction project planning- Stages of project planning: pre-tender planning,pre-construction planning, detailed construction planning, role of client and contractor, level of detail. Process of development of plans and schedules, work break-down structure, activity lists, assessment of work content, concept of productivities, estimating durations, sequence of activities, activity utility data; Techniques of planning- Bar charts, Gantt Charts.

Networks: basic terminology, types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation, computation of float values, critical and semi critical paths, calendaring networks. PERT- Assumptions underlying PERT analysis, determining three time estimates, analysis, slack computations, calculation of probability of completion

NOTE : NUMBER OF EXERCISES PROPOSED :

1. Three in flat Roof & one in Sloped Roof
2. Exercises on Data – three Nos.

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

- understand the technical specifications for various works to be performed for a projectand how they impact the cost of a structure.
- quantify the worth of a structure by evaluating quantities of constituents, derive theircost rates and build up the overall cost of the structure.
- understand how competitive bidding works and how to submit a competitive bidproposal.
- An idea of how to optimize construction projects based on costs
- An idea how construction projects are administered with respect to contract structures and issues.
- An ability to put forward ideas and understandings to others with effective communication processes

Text Books

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, LaxmiPublications, 2016

Reference books:

1. Estimating and Costing by G.S. Birdie
2. Chitkara, K. K. Construction Project Management. Tata McGraw-Hill Education, 2014\
3. Standard Schedule of rates and standard data book by public works department.
4. I. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)
5. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.
6. Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011
5. Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006
6. Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson Education India, 2015

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. I-Sem

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PROFESSIONAL ELECTIVE
WATER RESOURCES ENGINEERING-I

Pre-Requisites: Fluid Mechanics & HHM

Course Objectives: To study the concepts of

i. Engineering Hydrology and its applications like Runoff estimation, estimation of design discharge and flood routing.
ii. Irrigation Engineering – Water utilization for crop growth and their designs.

Course Outcomes: Estimate runoff, design discharge up flood waiting, Irrigation enginering

UNIT I

Introduction to engineering hydrology and its applications, Hydrologic cycle, types and forms of precipitation, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, processing of rainfall data - Adjustment of record -Rainfall Double Mass Curve. Runoff- Factors affecting Runoff – Runoff over a Catchment- Empirical and Rational Formulae.

Abstraction from rainfall-evaporation, factors affecting evaporation, measurement of evaporation- Evapotranspiration- Penman and Blaney & Criddle Methods -Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices..

UNIT-II

Distribution of Runoff – Hydrograph Analysis Flood Hydrograph – Effective Rainfall – Base Flow- Base Flow Separation - Direct Runoff Hydrograph Unit pulse and Unit step function - Unit Hydrograph, definition, limitations and applications of Unit hydrograph, derivation of Unit Hydrograph from Direct Runoff Hydrograph and vice versa - S-hydrograph, Synthetic Unit Hydrograph.

UNIT-III

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

UNIT-IV

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 –Crop Rotation, 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, Duty and delta, factors affecting duty- Design discharge for a water course. Depth and frequency of Irrigation, irrigation efficiencies-Water Logging.

UNIT-V

Classification of canals, Design of Irrigation canals by Kennedy's and Lacey's theories, balancing depth of cutting, IS standards for a canal design canal lining.

Design Discharge over a catchment, Computation of design discharge-rational formulae etc.

Text books:

1. Engineering Hydrology by Jayaram Reddy, Laxmi publications pvt. Ltd., New Delhi
2. Irrigation and water power engineering by Punmia & Lal, Laxmi publications pvt. Ltd., New Delhi

References:

1. Elementary hydrology by V.P.Singh, PHI publications.
2. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House.
3. Irrigation Water Management by D.K. Majundar, Printice Hall of India.
4. Irrigation and Hydraulic structures by S.K.Grag - Khanna **publishers**
5. Applied hydrology by Ven Te Chow, David R. Maidment larry W. Mays Tata MC. Graw Hill.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. I-Sem

L	T	P	C
3	0	0	3

OPEN ELECTIVE-II

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. I-Sem

L	T	P	C
2	0	0	2

PROFESSINAL PRACTICE LAW & ETHICS (AS Per AICTE Syllabus)

Course Objective:-

- To make the students understand the types of roles they are expected to play in the society aspractitioners of the civil engineering profession
- To develop some ideas of the legal and practical aspects of their profession

Course Outcomes

- To familiarize the students to what constitutes professional practice, introduction of various
- stakeholders and their respective roles; understanding the fundamental ethics governing the profession
- To give a good insight into contracts and contracts management in civil engineering, dispute resolution mechanisms; laws governing engagement of labour
- To give an understanding of Intellectual Property Rights, Patents.
- To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
- To develop good ideas of the legal and practical aspects of their profession

Unit -I

Unit I A- Professional Practice – Respective roles of various stakeholders: Government(constituting regulatory bodies and standardization organizations, prescribing norms to ensure safetyof the citizens); Standardization Bodies (ex. BIS, IRC)(formulating standards of practice);professional bodies (ex. Institution of Engineers(India), Indian Roads Congress, IIA/ COA, ECI,
Local Bodies/ Planning Authorities) (certifying professionals and offering platforms for interaction);Clients/ owners (role governed by contracts); Developers (role governed by regulations such asRERA); Consultants (role governed by bodies such as CEAI); Contractors (role governed by contracts and regulatory Acts and Standards); Manufacturers/ Vendors/ Service agencies (rolegoverned by contracts and regulatory Acts and Standards)

Unit I B- Professional Ethics – Definition of Ethics, Professional Ethics, Business Ethics, Corporate Ethics, Engineering Ethics, Personal Ethics; Code of Ethics as defined in the website ofInstitution of Engineers (India); Profession, Professionalism, Professional Responsibility, Professional Ethics; Conflict of Interest, Gift Vs Bribery, Environmental breaches, Negligence, Deficiencies in state-of-the-art; Vigil Mechanism, Whistleblowing, protected disclosures.

Unit II:

General Principles of Contracts Management: Indian Contract Act, 1972 and amendmentscovering General principles of contracting; Contract Formation & Law; Privacy of contract; Various types of contract and their features; Valid & Voidable Contracts; Prime and subcontracts; Joint Ventures & Consortium; Complex contract terminology; Tenders, Request For Proposals, Bids & Proposals; Bid Evaluation; Contract Conditions & Specifications; Critical /"Red Flag" conditions; Contract award & Notice To Proceed; Variations & Changes in Contracts; Differing site conditions; Cost escalation; Delays, Suspensions & Terminations; Time extensions & Force Majeure; Delay Analysis; Liquidated damages & Penalties; Insurance & Taxation

Performance and Excusable Non-performance; Contract documentation; Contract Notices; Wrong practices in contracting (Bid shopping, Bid fixing, Cartels); Reverse auction; Case Studies; Build-Own-Operate & variations; Public- Private Partnerships; International Commercial Terms;

Unit III :
Arbitration, Conciliation and ADR (Alternative Dispute Resolution) system: Arbitration – meaning, scope and types – distinction between laws of 1940 and 1996; UNCITRAL model law – Arbitration and expert determination; Extent of judicial intervention; International commercial arbitration; Arbitration agreements – essential and kinds, validity, reference and interim measures by court; Arbitration tribunal – appointment, challenge, jurisdiction of arbitral tribunal, powers, grounds of challenge, procedure and court assistance; Award including Form and content, Grounds for setting aside an award, Enforcement, Appeal and Revision; Enforcement of foreign awards – New York and Geneva Convention Awards; Distinction between conciliation, negotiation, mediation and arbitration, confidentiality, resort to judicial proceedings, costs; Dispute Resolution Boards; Lok Adalats.

Unit IV:
Engagement of Labour, and Labour & other construction-related Laws: Role of Labour in Civil Engineering; Methods of engaging labour- on rolls, labour sub-contract, piece rate work; Industrial Disputes Act, 1947; Collective bargaining; Industrial Employment (Standing Orders) Act,1946; Workmen's Compensation Act, 1923; Building & Other Construction Workers (regulation of employment and conditions of service) Act (1996) and Rules (1998); RERA Act 2017, NBC 2017

Unit V:
Law relating to Intellectual property: Introduction – meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets; Law relating to Copyright in India including Historical evolution of Copy Rights Act, 1957, Meaning of copyright – computer programs, Ownership of copyrights and assignment, Criteria of infringement, Piracy in Internet – Remedies and procedures in India; Law relating to Patents under Patents Act, 1970 including Concept and historical perspective of patents law in India, Patentable inventions with special reference to biotechnology products, Patent protection for computer programs, Process of obtaining patent – application, examination, opposition and sealing of patents, Patent cooperation treaty and grounds for opposition, Rights and obligations of patentee, Duration of patents – law and policy considerations, Infringement and related remedies;

Reference Books
1. B.S. Patil, Legal Aspects of Building and Engineering Contracts, 1974.

2. The National Building Code, BIS, 2017

3. RERA Act, 2017

4. Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset

5. Neelima Chandiramani (2000), The Law of Contract: An Outline, 2nd Edn. Avinash Publications Mumbai

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. I-Sem	**L**	**T**	**P**	**C**
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UG PROJ – PROJECT STAGE –I

PROJECT STAGE – I

Each Student shall start the project work during the IVth Year –I Semester as per the instructions of the of the Project Guide/Project Supervisor assisigned by the HEAD Of The DEPARTMEN. Out of a total 200 marks allotted for the Project Work, 60 marks shall be for CIE(Continuous Project Evaluation) and 140 marks for SEE(End Semester Viva –Voce Examination.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. I-Sem

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PGC-1. ADVANCED STRUCTURAL ANALYSIS

Objectives:
To impart knowledge on the analysis of indeterminate structures like continuous beams, trusses and portal frames.

Outcome:
The learner will be able to analyse different indeterminate structures using Matrix methods.

Pre requisites : Structural Analysis I & II

UNIT I

Introduction to matrix methods of analysis - statical indeterminacy and kinematical indeterminacy - degree of freedom - coordinate system - structure idealization stiffness and flexibility matrices - suitability element stiffness equations - elements flexibility equations - mixed force - displacement equations - for truss element, beam element and torsional element.

Transformation of coordinates - element stiffness matrix - and load vector - local and global coordinates.

UNIT II

Assembly of stiffness matrix from element stiffness matrix - direct stiffness method - general procedure - banded matrix - semi bandwidth - assembly by direct stiffness matrix method.

UNIT III

Analysis of plane truss - continuous beams with and without settlement - plane frame including side sway single storey, single – bay and garde frame by flexibility method using system approach by flexibility methods and gables frames by Gable System Approach.

UNIT IV

Analysis of plane truss - continuous beams with and without settlement - plane frame including sides sway, grids and gable frames by stiffness methods, single bay – two storey, two bay single – storey.

UNIT V. Special analysis procedures - static condensation and sub structuring - initial and thermal stresses.

REFERENCES

1. Matrix Analysis of Frames structures by William Weaver J.R and James M.Gere, CBS publications.
2. Advanced Structural Analysis by Ashok.K.Jain, New Channel Brothers.
3. Matrix method of S.A by Pandit & Gupta
4. Matrix Structural Analysis by Madhu B. Kanchi.
5. Matrix Methods of Structural Analysis by J.Meek.
6. Structural Analysis by Ghali and Neyveli.
7. Structural Analysis by Devdas Menon, Narosa Publishing Housing Pvt Ltd.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. I-Sem	**L**	**T**	**P**	**C**
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THEORY OF ELASTICITY

Objectives:

To impart knowledge on the basic concepts of theory of elasticity, and solve the Structural Engineering problems.

Course outcomes:

The learner will be able to solve problems of elasticity and plasticity and be able to apply numerical methods to solve continuum problems.

Prerequisites: Strength of Materials I & II

UNIT-I

Introduction: Elasticity - notation for forces and stress - components of stresses - components of strain - Hooks law. Plane stress and plane strain analysis - differential equations of equilibrium 2D & 3D - boundary conditions – Strain Displacement Relations - compatibility equations – stress tensor and strain tensor.

UNIT II

Two dimensional problems in rectangular coordinates - solution by polynomials - Saint-Venants principle - determination of displacements - bending of simple beams stress function – Simply Supported and Cantilever Beams.

UNIT III

Two dimensional problems in polar coordinates - stress distribution symmetrical about an axis - pure bending of curved bars - strain components in polar coordinates - displacements for symmetrical stress distributions Edge Dislocation - general solution of two-dimensional problem in polar coordinates - application to Plates with Circular Holes – Rotating Disk. Bending of Prismatic Bars: Stress function - bending of cantilever - circular cross section - elliptical cross section - rectangular cross section.

UNIT IV

Analysis of stress and strain in three dimensions - principal stress - stress ellipsoid - director surface - determination of principal stresses Stress Invariants - max shear stresses - Homogeneous deformation - principal axes of strain-rotation. General Theorems: Differential equations of equilibrium - conditions of compatibility - determination of displacement - equations of equilibrium in terms of displacements - principle of super position - uniqueness of solution - the reciprocal theorem Strain Energy.

UNIT V

Torsion of Circular Shafts - Torsion of Straight Prismatic Bars – Saint Venants Method - torsion of prismatic bars - bars with elliptical cross sections - membrane analogy - torsion of a bar of narrow rectangular bars - torsion of shafts, tubes , bars etc.

References .

1. Theory of Elasticity by Timeshenko, McGrawhill Publications
2. Theory of Elasticity by Y.C.Fung.
3. Theory of Elasticity by Gurucharan Singh.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. I-Sem **L T P C**

PGLC-1.
NUMERICAL ANALYSIS LAB

Course Outcomes: At the end of the course, students will be able to

1. Find Roots of non-linear equations by Bisection method and Newton's method.

2. Do curve fitting by least square approximations

3. Solve the system of Linear Equations using Gauss - Elimination/ Gauss - Seidal Iteration/

Gauss - Jorden Method

4. To Integrate Numerically Using Trapezoidal and Simpson's Rules

5. To Find Numerical Solution of Ordinary Differential Equations by Euler's Method,

Runge- Kutta Method.

Syllabus Contents:

1. Find the Roots of Non-Linear Equation Using Bisection Method.
2. Find the Roots of Non-Linear Equation Using Newton's Method.
3. Curve Fitting by Least Square Approximations.
4. Solve the System of Linear Equations Using Gauss - Elimination Method.
5. Solve the System of Linear Equations Using Gauss - Seidal Iteration Method.
6. Solve the System of Linear Equations Using Gauss - Jorden Method.
7. Integrate numerically using Trapezoidal Rule.
8. Integrate numerically using Simpson's Rules.
9. Numerical Solution of Ordinary Differential Equations By Euler's Method.
10. Numerical Solution of Ordinary Differential Equations ByRunge- Kutta Method.
11. Practice with MAT lab

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. I-Sem	**L**	**T**	**P**	**C**
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PGLC-2.

ADVANCED CONCRETE TECHNOLOGY LAB

Course Outcomes: At the end of the course, students will be able to

1. Design high grade concrete and study the parameters affecting its performance.

2. Conduct Non Destructive Tests on existing concrete structures.

3. Apply engineering principles to understand behavior of structural/ elements.

List of Experiments/Assignments:

1. Study of stress-strain curve of high strength concrete, Correlation between cube strength, cylinder strength, split tensile strength and modulus of rupture.

2. Effect of cyclic loading on steel.

3. Non-Destructive testing of existing concrete members.

4. Behavior of Beams under flexure, Shear and Torsion.

5. Fresh properties of self-compacting concrete.

Reference Books:

1. Properties of Concrete, Neville A. M., 5th Edition, Prentice Hall, 2012.
2. Concrete Technology, Shetty M. S., S. Chand and Co., 2006.
3. Concrete Technology by A.R. Santhakumar, Oxford University Press.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

V Year B.Tech. Civil Engg. I-Sem

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MINI PROJECT / INTERNSHIP

A) There shall be an Industrial oriented Mini Project in Collaboration with an Industry of the relevant specialization to be registered immediately after III Year II Semester Examinations and taken up during the summer vacation for about eight weeks duration.

B) The industry oriented Mini-Project shall be submitted in a report form, and a presentation of the same shall be made before a Committee, which evaluates it for 100 marks. The committee shall consist of Head of the Department, the supervisor of Mini-Project, and a Senior Faculty Member of the Department. There shall be no internal marks for Industry oriented Mini-Project. The Mini-Project shall be evaluated in the IV year I Semester.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. II-Sem

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UG OPEN ELECTIVE –III

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. II-Sem	**L**	**T**	**P**	**C**
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PROJECT STAGE - II

The Project Viva –Voce shall be conducted by a committee comprising of an External Examiner, Head of the Department and Project Supervisor. Out of 60 marks allocated for CIE, 30 marks shall be awarded by the Project Supervisor (based on the Continuous Evaluation of Student's Performance throught the Project work period) and the other 30 marks Shall be awarded by a Departmental Committee Consisting of Head of the Department and Project Supervisor, based on the work carried out the presentation made by the Student at the time of Viva –Voce Examination

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. II-Sem

L	T	P	C
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STRUCTURAL DYNAMICS

Objectives: Objectives:

To impart knowledge on the fundamental of structural dynamics and their applications.

Outcomes: The learner will be able to understand the equation of motion, dynamics response of single and multi degree-of freedom systems.

Prerequisites : Structural Analysis I & II

UNIT I:

Theory of vibrations: Introduction - Elements of vibratory system - Degrees of Freedom - Continuous System - Lumped mass idealization - Oscillatory motion - Simple Harmonic motion - Vectorial representation of S.H.M. - Free vibrations of single degree of freedom system - undamped and damped vibrations - critical damping - Logarithmic decrement - Forced vibration of SDOF systems - Harmonic excitation - Vibration Isolation -Dynamic magnification factor – Phase angle.

UNIT II

Introduction to Structural Dynamics : Fundamental objectives of dynamic analysis -Types of prescribed loading - Methods of discretization - Formulation of equations of motion by different methods – Direct equilibration using Newton's law of motion / D'Alembert's principle, Principle of virtual work and Hamilton principle.

Single Degree of Freedom Systems : Formulation and solution of the equation of motion - Free vibration response - Response to Harmonic, Periodic, Impulsive and general dynamic loadings - Duhamel integral.

UNIT III

Multi Degree of Freedom Systems : Selection of the degrees of Freedom - Evaluation of structural property matrices - Formulation of the MDOF equations of motion -Undamped free vibrations - Solutions of Eigen value problem for natural frequencies and mode shapes - Analysis of Dynamic response – Normal co-ordinates - Uncoupled equations of motion - Orthogonal properties of normal modes - Mode superposition procedure.

UNIT IV

Practical Vibration Analysis: Introduction - Stodola method - Fundamental mode analysis - Analysis of second and higher modes - Holzer method - Basic procedure.

Continuous Systems: Introduction - Flexural vibrations of beams - Elementary case – Derivation of governing differential equation of motion - Analysis of undamped free vibrations of beams in flexure - Natural frequencies and mode-shapes of simple beams with different end conditions - Principles of application to continuous beams.

UNIT V

Introduction to Earthquake Analysis: Deterministic Earthquake Response: Systems on Rigid Foundations : Types of Earthquake Excitations – Lumped SDOF Elastic Systems, Translational Excitations Grreliyed – coordinate SDOF Elastic Systems, Translational Excitations, Linear Static Method – Analysis for obtaining response of multi storeyes RC Building.

References:

1. Dynamics of Structures by Clough & Penzien, McGraw Hill, New York
2. Dynamics of Structures by Anil K. Chopra, Pearson Education (Singapore), Delhi.
3. Structural Dynamics by Mario Paz, C.B.S Publishers, New Delhi.
4. Theory of vibrations by W.T. Thomson CBS Publishers and Distributors.
5. Structural Dynamics by Roy. R. Craig John willy & fours.
6. I.S: 1893 (Part 1) - 2016, “Code of practice for Earthquake resistant design of Structures”

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. II-Sem **L T P C**
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PGC-4 FINITE ELEMENTS IN STRUCUTRAL ENGINEERING

Course Outcomes: At the end of the course, students will be able to
1. Use Finite Element Method for structural analysis.
2. Execute the Finite Element Program/ Software.
3. Solve continuum problems using finite element analysis.

UNIT - I
Introduction: History and Applications. Spring and Bar Elements, Minimum Potential Energy Principle, Direct Stiffness Method, Nodal Equilibrium equations, Assembly of Global Stiffness Matrix, Element Strain and Stress.

UNIT –II
Beam Elements: Flexure Element, Element Stiffness Matrix, Element Load Vector.
Method of Weighted Residuals: Galerkin Finite Element Method, Application to Structural Elements, Interpolation Functions, Compatibility and Completeness Requirements, Polynomial Forms, Applications.

UNIT –III
Types: Triangular Elements, Rectangular Elements, Three-Dimensional Elements, Isoparametric Formulation, Axi-Symmetric Elements, Numerical Integration, Gaussian Quadrature.

UNIT-IV
Application to Solid Mechanics: Plane Stress, CST Element, Plane Strain Rectangular Element, Isoparametric Formulation of the Plane Quadrilateral Element, Axi- Symmetric Stress Analysis, Strain and Stress Computations.
UNIT-V
Computer Implementation of FEM procedure, Pre-Processing, Solution, Post-Processing, Use of Commercial FEA Software.

Reference Books:

1. Finite Element Analysis, Seshu P., Prentice-Hall of India,2005.
2. Concepts and Applications of Finite Element Analysis, Cook R. D., Wiley J., New York, 1995.
3. Fundamentals of Finite Element Analysis, Hutton David, Mc-Graw Hill, 2004.
4. Finite Element Analysis, Buchanan G.R., McGraw Hill Publications, New York, 1995.
5. Finite Element Method, Zienkiewicz O.C. & Taylor R.L. Vol. I, II & III, Elsevier, 2000.
6. Finite Element Methods in Engineering, Belegundu A.D., Chandrupatla, T.R., Prentice Hall India, 1991.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. II-Sem	**L**	**T**	**P**	**C**
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PGE -1 ADVANCED REINFORCED CONCRETE DESIGN

Objectives:

To impart knowledge on the behavior and design on various reinforced concrete structural elements.

Outcome:

The learner will be able to design the reinforced concrete elements like beams, slabs and compression members.

Prerequisites : Design of Reinforced Concrete Structures

UNIT I

Basic Design Concepts: Behavior in flexure, Design of singly Reinforced rectangular sections, Design of Doubly Reinforced rectangular sections, Design of flanged bean sections, Design for shear – Design for Torsion**,** Limit state of Serviceability**:** Deflections of Reinforced concrete beams and slabs short term deflections and long term deflection estimation of crack width in RCC members, calculation of crack widths.

UNIT II

Limit Analysis of R.C.Structures: Rotation of a plastic hinge, Redistribution of moments, moment rotation characteristics of RC member, I.S. code provisions, applications for fixed and continuous beam. Yield line analysis for slabs: Upper bound and lower bound theorems – yield line criterion – Virtual work and equilibrium methods of analysis – For square and circular slabs with simple and continuous end conditions. Moment Curvature diagram.

UNIT III

Ribbed slabs : Analysis of the Slabs for Moment and Shears, Ultimate Moment of Resistance, Design for shear, Deflection, Arrangement of Reinforcements.

Flat slabs: Direct design method – Distribution of moments in column strips and middle strip-moment and shear transfer from slabs to columns – Shear in Flat slabs-Check for one way and two way shears-Introduction to Equivalent frame method. Limitations of Direct design method, Distribution of moments in column strips and middle strip sketch showing reinforcement details.

UNIT IV

Design of Reinforced Concrete Deep Beams & Corbels: Steps of Designing Deep Beams, Design by IS 456. Checking for Local Failures, Detailing of Deep Beams, Analysis of Forces in a Corbels , Design of Procedure of Corbels , Design of Nibs.

UNIT V

Design of Compression Members - Estimation of Effective Length of a Column – Code Requirements on Slenderness Limits,– Design of Short Columns Under Axial Compression – Design of Short Columns Under Compression With Uniaxial Bending – Design of Short Columns Under Axial Compression With Biaxial Bending – Design of Slender Columns sketch showing reinforcement details.

Design of Combined Footings - Distribution of Soil Pressure - Geometry of Two-column Combined Footing – Design Considerations in Two-Column Footings sketch showing reinforcement details.

REFERENCE:

1. "Reinforced Concrete Design" S. Unnikrishna Pillai & Devdas Menon; Tata Mc. Graw-Hill Publishing Company Ltd. New Delhi 2010.
2. "Advanced Reinforced Concrete" P.C. Varghese Prentice Hall of INDIA Private Ltd. 2008.
3. "Limit State Theory and Design of Reinforced Concrete" Dr. S. R. Karve and V.L Shah. Standard Publishers, PUNE 2004.
4. "Design of Reinforced Concrete Structures" by N.Subramanian, Oxford University Press.
5. Reinforced concrete structural elements – behaviour, Analysis and design by P. Purushotham, Tata Mc.Graw-Hill, 1994.
6. Design of concrete structures – Arthus H. Nilson, David Darwin, and Chorles W. Dolar, Tata Mc. Graw-Hill, 3rd Edition, 2005.
7. Reinforced Concrete design by Kennath Leet, Tata Mc. Graw-Hill International, editions, 2nd edition, 1991.
8. "Design Reinforced Concrete Foundations" P.C. Varghese Prentice Hall of INDIA Private Ltd.
9. IS 456-2000
10. SP 16
11. SP 34

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. II-Sem	**L**	**T**	**P**	**C**
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PGE -1 ADVANCED DESIGN OF FOUNDATIONS

Course Outcomes: At the end of the course, students will be able to

1. Decide the suitability of soil strata for different projects.
2. Design shallow foundations deciding the bearing capacity of soil.
3. Analyze and design the pile foundation.
4. Understand analysis methods for well foundation.

UNIT- I

Planning of Soil Exploration for Different Projects, Methods of Subsurface Exploration, Methods of Borings along with Various Penetration Tests.

UNIT- II

Shallow Foundations, Requirements for Satisfactory Performance of Foundations, Methods of Estimating Bearing Capacity, Settlements of Footings and Rafts, Proportioning of Foundations using Field Test Data, Pressure - Settlement Characteristics from Constitutive Laws.

UNIT- III

Pile Foundations, Methods of Estimating Load Transfer of Piles, Settlements of Pile Foundations, Pile Group Capacity and Settlement, Laterally Loaded Piles, Pile Load Tests, Analytical Estimation of Load- Settlement Behavior of Piles, Proportioning of Pile Foundations, Lateral and Uplift Capacity of Piles.

UNIT- IV

Well Foundation, IS and IRC Code Provisions, Elastic Theory and Ultimate Resistance Methods.

Tunnels and Arching in Soils, Pressure Computations around Tunnels.

UNIT-V

Open Cuts, Sheeting and Bracing Systems in Shallow and Deep Open Cuts in Different Soil Types.

Coffer Dams, Various Types, Analysis and Design, Foundations under uplifting loads, Soil-structure interaction

Reference Books:

1. 1.Design of foundation system, N.P. Kurian, Narosa Publishing House
2. 1.Foundation Analysis and Design, J. E. Bowles, Tata McGraw Hill New York
Analysis and Design of Substructures, Sawmi Saran, Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi

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JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. II-Sem

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PGE -1 DESIGN OF MASONARY FOUNDATIONS

Course outcomes: At the end of the course, students will be able to
1. Understand the masonry design approaches.
2. Analyse Reinforced Masonry Members.
3. Determine interactions between members.
4. Determine shear strength and ductility of Reinforced Masonry members.
5. Check the stability of walls
6. Perform elastic and Inelastic analysis of masonry walls.

UNIT- I
Introduction: Historical Perspective, Masonry Materials, Masonry Design Approaches, Overview of Load Conditions, Compression Behaviour of Masonry, Masonry Wall Configurations, Distribution of Lateral Forces.

UNIT- II
Flexural Strength of Reinforced Masonry Members: In plane and Out-of-plane Loading.

UNIT- III
Interactions: Structural Wall, Columns and Pilasters, Retaining Wall, Pier and Foundation.

UNIT- IV
Shear Strength and Ductility of Reinforced Masonry Members.

UNIT- V
Prestressed Masonry - Stability of Walls, Coupling of Masonry Walls, Openings, Columns, Beams.
Elastic and Inelastic Analysis, Modeling Techniques, Static Push Over Analysis and use of Capacity Design Spectra.

Reference Books:
1. Design of Reinforced Masonry Structures, Narendra Taly, ICC, 2nd Edn,
2. Masonry Structures: Behavior and Design, Hamid Ahmad A. and Drysdale Robert G., 1994.
3. Mechanics of Masonry Structures, Editor: Maurizio Angelillo, 2014.
4. Earthquake-resistant Design of Masonry Buildings,Toma_evi_Miha, Imperial College Press, 1999.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. II-Sem **L T P C**
4

PGLC-3 ADVANCED STRUCTURAL ENGINEERING LAB

The objectives of this course is to make students to learn principles of design of experiments, To investigate the performance of structural elements . To evaluate the different testing methods and equipments.

Course Outcomes: On completion of this course, students are able to

• Achieve Knowledge of design and development of experimenting skills.

• Understand the principles of design of experiments

• Design and develop analytical skills.

• Summerize the testing methods and equipments.

List of Experiments

1. Testing of beams for deflection, flexure and shear **12 Hrs**

2. Experiments on Concrete, including Mix design **12 Hrs**

3. Experiments on vibration of multi storey frame models for Natural frequency and modes.

12Hrs

4. Use of Non destructive testing (NDT) equipments – Rebound hammer, Ultra sonic pulse velocity meter and Profometer **12 Hrs**

IV Year B.Tech. Civil Engg. II-Sem **L T P C**
4

PGLC-4 STRUCTURAL DESIGN LAB

Course Outcomes: At the end of the course, students will be able to

1. Design and Detail all the Structural Components of Frame Buildings.

2. Design and Detail complete Multi-Storey Frame Buildings.

Syllabus Content:

Design and detailed drawing of complete G+ 3 structures by individual student using latest relevant IS codes.

List of Experiments

1. Static and Dynamic analysis of Building structure using software (ETABS / STAADPRO) 12 Hrs

2. Design of RCC and Steel structure using software (ETABS / STAADPRO) 12 Hrs

3. Analysis of folded plates and shells using software. 12 Hrs

4. Preparation of EXCEL sheets for structural design. 12 Hrs

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. II-Sem

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RESEARCH METHODOLOGY

Course Outcomes:

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

1. Understand research problem formulation.

2. Analyze research related information

3. Follow research ethics

4. Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.

5. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.

6. Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

UNIT –I : Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem.

Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT - II: Effective literature studies approaches, analysis

Plagiarism, Research ethics,

UNIT - III: Effective technical writing, how to write report, Paper

Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT - IV: Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development.

International Scenario: International cooperation on Intellectual Property. Procedure for

grants of patents, Patenting under PCT.

UNIT - V: Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT - VI: New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case

Studies, IPR and IITs.

References:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"

2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"

4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall , "Industrial Design", McGraw Hill, 1992.
6. Niebel , "Product Design", McGraw Hill, 1974.
7. Asimov , "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.

T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

JNTUH COLLEGE OF ENGINEERING HYDERABAD

V Year B.Tech. Civil Engg. I-Sem	**L**	**T**	**P**	**C**
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PGE- 2 THEORY OF THIN PLATES & SHELLS

Objectives:

To impart knowledge on the behavior and design of shells and Folded plates.

Outcomes:

The learner will be able to analyse and design the shells and folded plates.

Prerequisites : Theory of Elasticity, Structural Analysis

UNIT I

Introduction: Space Curves, Surfaces, Shell Co-ordinates, Strain Displacement Relations,

Assumptions in Shell Theory, Displacement Field Approximations, Stress Resultants, Equation of Equilibrium using Principle of Virtual Work, Boundary Conditions.

UNIT II

Small Deflection Theory of Thin Rectangular Plates : Assumptions – Derivation of governing differential equation for thin plates – Boundary conditions – simply supported plate under sinusoidal load – Navier solution – Application to different cases – Levy's solution for various boundary conditions subjected to different loadings like uniform and hydrostatic pressure.

UNIT III

Circular Plates: Differential Equation for symmetrical bending of Laterally loaded circular Plates – Uniformly loaded circular plates –circular plate concentrically loaded – circular plate loaded at center

UNIT IV

Shells – functional behaviour – examples – structural behaviour of shells classification of shells – Definitions – various methods of analysis of shells – merits and demerits of each method – 2D. Membrane equation.

Equations of equilibrium: Derivation of stress resultants – cylindrical shells – Flugges simulations equations.

UNIT V

Introduction to the shells of Double curvatures: Geometry, analysis and design of elliptic paraboloid, conoid and hyperbolic parabolic shapes, inverted umbrella type.

Axi- Symmetrical shells: General equation - Analysis and axi-symmetrical by membrane theory. Application to spherical shell and hyperboloid of revolution cooling towers.

REFERENCES:

1. Theory of Plates & Shells –Stephen, P.Timoshenko, S.Woinowsky-Krieger – Tata MC Graw Hill Edition
2. Analysis and design of concrete shell roofs By G.S.Ramaswami. CBS publications.
3. Design of concrete shell roofs By Billington – Tata MC Graw Hill, New York
4. Shell Analysis By N.K.Bairagi. Khanna Publishers, New Delhi.
5. Design of Shells and Folded Plates by P.C. Varghese, PHI Learning Pvt. Ltd

Design of concrete shell roofs By Chaterjee. Oxford and IBH.,

JNTUH COLLEGE OF ENGINEERING HYDERABAD

V Year B.Tech. Civil Engg. I-Sem

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PGE-2 THEORY AND APPLICATIONS OF CEMENT COMPOSITES

Course Outcomes: At the end of the course, students will be able to

1. Formulate constitutive behaviour of composite materials – Ferrocement, SIFCON and Fibre Reinforced Concrete - by understanding their strain- stress behaviour.

2. Classify the materials as per orthotropic and anisotropic behaviour.

3. Estimate strain constants using theories applicable to composite materials.

4. Analyse and design structural elements made of cement composites.

UNIT – I

Introduction: Classification and Characteristics of Composite Materials- Basic Terminology, Advantages. Stress-Strain Relations- Orthotropic and Anisotropic Materials, Engineering Constants for Orthotropic Materials, Restrictions on Elastic Constants, Plane Stress Problem, Biaxial Strength, Theories for an Orthotropic Lamina.

UNIT – II

Mechanical Behaviour: Mechanics of Materials Approach to Stiffness- Determination of

Relations between Elastic Constants, Elasticity Approach to Stiffness- Bounding Techniques of Elasticity, Exact Solutions - Elasticity Solutions with Continuity, Halpin, Tsai Equations,

Comparison of approaches to Stiffness.

UNIT – III

Cement Composites: Types of Cement Composites, Terminology, Constituent Materials

And their Properties, Construction Techniques for Fibre Reinforced Concrete – Ferro cement,

SIFCON, Polymer Concretes, Preparation of Reinforcement, Casting and Curing.

UNIT – IV

Mechanical Properties of Cement Composites:BehaviorofFerrocement, Fiber Reinforced Concrete in Tension, Compression, Flexure, Shear, Fatigue and Impact, Durability and Corrosion.

UNIT – V

Application of Cement Composites: FRC and Ferrocement- Housing, Water Storage, Boats and Miscellaneous Structures. Composite Materials- Orthotropic and Anisotropic behaviour, Constitutive relationship, Elastic Constants.

Analysis and Design of Cement Composite Structural Elements – Ferro cement, SIFCON and Fibre Reinforced Concrete.

Reference Books:

1. Mechanics of Composite Materials, Jones R. M,, 2nd Ed., Taylor and Francis,BSP Books, 1998.
2. Ferrocement – Theory and Applications, Pama R. P., IFIC, 1980.
3. New Concrete Materials, Swamy R.N., 1stEd., Blackie, Academic and Professional, Chapman &

Hall, 1983.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

V Year B.Tech. Civil Engg. I-Sem	**L**	**T**	**P**	**C**
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PGE-2 THEORY OF STRUCTURAL STABILITY

Course Outcomes: At the end of the course, students will be able to

1. Determine stability of columns and frames

2. Determine stability of beams and plates

3. Use stability criteria and concepts for analyzing discrete and continuous systems,

UNIT – I

Criteria for Design of Structures: Stability, Strength, and Stiffness, Classical Concept of Stability of Discrete and Continuous Systems, Linear and nonlinear behavior.

UNIT – II

Stability of Columns: Axial and Flexural Buckling, Lateral Bracing of Columns, Combined Axial, Flexural and Torsion Buckling.

UNIT – III

Stability of Frames: Member Buckling versus Global Buckling, Slenderness Ratio of Frame Members.

UNIT – IV

Stability of Beams: lateral torsion buckling.

Stability of Plates: axial flexural buckling, shear flexural buckling, buckling under combined loads.

UNIT – V

Introduction to Inelastic Buckling and Dynamic Stability.

Reference Books:

1. Theory of elastic stability, Timoshenko and Gere, Tata Mc Graw Hill,1981
2. Principles of Structural Stability Theory, Alexander Chajes, Prentice Hall, New Jersey.
3. Structural Stability of columns and plates, Iyengar, N. G. R., Eastern west press Pvt. Ltd.
4. Strength of Metal Structures, Bleich F. Bucking, Tata McGraw Hill, New York.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

V Year B.Tech. Civil Engg. I-Sem

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PGE- 3 ADVANCED STEEL DESIGN

Objectives:

To impart knowledge on behavior and design of various connections, industrial and steel girders.

Outcomes: The learner will be able to design different steel structures.

Pre requisites : Design of Steel Structures & Structural Analysis

UNIT-I

SIMPLE CONNECTIONS – RIVETED, BOLTED PINNED AND WELDED CONNECTIONS : Riveted Connections – Bolted Connections –Load Transfer Mechanism – Failure of Bolted Joints – Specifications for Bolted Joints – Bearing – Type Connections – Tensile Strength of Plate – Strength and Efficiency of the Joint – Combined Shear and Tension – Slip-Critical connections – Prying Action – Combined Shear and Tension for Slip-Critical Connections. Design of Groove Welds - Design of Fillet Welds – Design of Intermittent Fillet Welds – Failure of Welds.

UNIT-II

ECCENTRIC AND MOMENT CONNECTIONS : Introduction – Beams – Column Connections – Connections Subjected to Eccentric Shear – Bolted Framed Connections –Bolted Seat Connections – Bolted Bracket Connections. Bolted Moment Connections – Welded Framed Connections- Welded Bracket Connections – Moment Resistant Connections.

UNIT-III ANALYSIS AND DESIGN OF INDUSTRIAL BUILDINGS:

Dead loads, live loads and wind loads on roofs. Design wind speed and pressure, wind pressure on roofs; wind effect on cladding and louvers; Design of angular roof truss, tubular truss, truss for a railway

platform.Design of purlins for roofs, design of built up purlins, design of knee braced trusses and stanchions. Design of bracings.

UNIT-IV DESIGN OF STEEL TRUSS GIRDER BRIDGES:

Types of truss bridges, component parts of a truss bridge, economic Proportions of trusses, self weight of truss girders, design of bridge Compression members, tension members; wind load on truss girder Bridges; wind effect on top lateral bracing; bottom lateral bracing; portal

Bracing; sway bracing Design of Lacing.

UNIT-V Plastic Analysis and Design :

Introduction – Plastic Theory – Plastic neutral Axis plastic moment, Elastic & Plastic Section modulii shape factors plastic Hinge – Fundamental condition conditions in plastic analysis, methods of plastic analysis – collapse load – simply supported, propped cantilever beam, fixed beams continuous beams, portal frame single bay single storey portal frame at different level subjected to vertical and horizontal loads, Method of instantaneous center gable frame – Trial and effort method – plastic moment distribution method – continuous beam, two bay-single story portal frame – Deflections and ultimate load propped cantilever beam fixed beam minimum weight design continuous beams and single bay-single storey portal frame.

References:

1. Limit State Design of Steel Structures S.K. Duggal Mc Graw Hill Education Private Ltd. New Delhi.
2. Design of Steel Structures. P.Dayaratnam, Publisher : S. Chand, Edition 2011-12.
3. Design Steel Structures Volume – II, Dr. Ramachandra & Vivendra Gehlot Scientitic Publishes Journals Department..
4. Design of Steel Structures. P.Dayaratnam, Publisher : S. Chand, Edition 2011-12.
5. Design of Steel Structures Galyord & Gaylord, Publisher : Tata Mc Graw Hill, Education. Edition 2012.
6. Indian Standard Code – IS – 800-2007.
7. Indian Standard Code – IS – 875 – Part III - 2015

JNTUH COLLEGE OF ENGINEERING HYDERABAD

V Year B.Tech. Civil Engg. I-Sem

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PGE- 3 DESIGN OF FORM WORK

Course Outcomes: At the end of the course, students will be able to

1. Select proper formwork, accessories and material.

2. Design the form work for Beams, Slabs, columns, Walls and Foundations.

3. Design the form work for Special Structures.

4. Understand the working of flying formwork.

5. Judge the formwork failures through case studies.

UNIT- I

Introduction: Requirements and Selection of Formwork.

UNIT- II

Formwork Materials- Timber, Plywood, Steel, Aluminium, Plastic, and Accessories. Horizontal and Vertical Formwork Supports.

UNIT- III

Formwork Design: Concepts, Formwork Systems and Design for Foundations, Walls, Columns, Slab and Beams.

Formwork Design for Special Structures: Shells, Domes, Folded Plates, Overhead

Water Tanks, Natural Draft Cooling Tower, Bridges.

UNIT- IV

Flying Formwork: Table Form, Tunnel Form, Slip Form, Formwork for Precast Concrete,

Formwork Management Issues –Pre- and Post-Award.

UNIT- V

Formwork Failures : Causes and Case studies in Formwork Failure, Formwork Issues in Multi-Story Building Construction.

Reference Books:

1. Formwork for Concrete Structures, Peurify, Mc Graw Hill India, 2015.
2. Concrete Technology by A.R. Santhakumar, Oxford Univ. Press
3. Formwork for Concrete Structures, Kumar NeerajJha, Tata McGraw Hill Education, 2012.

IS 14687: 1999, False work for Concrete Structures - Guidelines, BIS.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

V Year B.Tech. Civil Engg. I-Sem

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PGE- 3 DESIGN OF HIGH RISE BUILDINGS

Course Outcomes: At the end of the course, students will be able to

1. Analyse, design and detail Transmission/ TV tower, Mast and Trestles with different loading conditions.

2. Analyse, design and detail the RC and Steel Chimney.

3. Analyse. design and detail the tall buildings subjected to different loading conditions using relevant codes.

UNIT- I

Design of transmission/ TV tower, Mast and trestles: Configuration, bracing system, analysis and design for vertical transverse and longitudinal loads.

UNIT-II

Analysis and Design of RC and Steel Chimney, Foundation design for varied soil strata.

UNIT- III

Tall Buildings: Structural Concept, Configurations, various systems, Wind and Seismic loads, Dynamic approach, structural design considerations and IS code provisions. Firefighting design provisions.

UNIT- IV

Application of software in analysis and design.

Reference Books:

1. Structural Analysis and Design of Tall Buildings, Taranath B. S., Mc Graw Hill, 1988.

2. Structural Design of Multi-storeyed Buildings, Varyani U. H., 2nd Ed., SouthAsian Publishers, New Delhi, 2002.
3. Illustrated Design of Reinforced Concrete Buildings(GF+3storeyed), Shah V. L. &Karve S. R., Structures Publications, Pune, 2013.
4. Design of Multi Storeyed Buildings, Vol. 1 & 2, CPWD Publications, 1976.
5. Tall Building Structures, Smith Byran S. and Coull Alex, Wiley India. 1991.
6. High Rise Building Structures, Wolfgang Schueller, Wiley., 1971.
   Tall Chimneys, Manohar S. N., Tata Mc Graw Hill Publishing Company, New Delhi

JNTUH COLLEGE OF ENGINEERING HYDERABAD

V Year B.Tech. Civil Engg. I-Sem

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PGE- 4
EARTHQUAKE RESISTANCE DESIGN OF BUILDINGS

Objectives:

To impart knowledge on the seismology and behavior of buildings during earthquakes.

Outcomes : The learner will be able to analyse and design buildings to resist seismic forces.

Prerequisites : Structural Dynamics, Reinforced Concrete Design

UNIT - I

Engineering Seismology: Earthquake phenomenon cause of earthquakes-Faults- Plate tectonics- Seismic waves- Terms associated with earthquakes-Magnitude/Intensity of an earthquake-scales-Energy released-Earthquake measuring instruments-Seismoscope, Seismograph, accelerograph-Characteristics of strong ground motions- Seismic zones of India.

Introduction-Functional planning-Continuous load path-Overall form-simplicity and symmetry-elongated shapes-stiffness and strength - Seismic design requirements-regular and irregular configurations-basic assumptions.

UNIT - II

Conceptual Design - Horizontal and Vertical Load Resisting Systems - System and Members for Lateral Loads and High Rise / Tall Structures.

Twisting of Buildings – Flexible Building and Rigid Building Systems.

Strength and Stiffness – Ductility – Definition – Ductility Relationships – Choice of construction Materials – Unconfined Concrete & Confined Concrete - Design Earthquake Loads – Basic Load Combinations – Permissible Stresses.

Seismic Methods of Analysis – Static Method – Equivalent Lateral Force Method. Dynamic Analysis – Response Spectrum Method.

UNIT - III

Introduction to Earthquake Resistant Design – Seismic Design Requirements and Methods.

RC Buildings – IS Code based Method.- Vertical Irregularities – Mass Irregularity Torsional Irregularity - Plan Configuration Problem - Design Lateral Force, Base Shear Evaluation – Lateral Distribution of Base Shear – Structural Walls Strategies and the Location of Structural Walls – Sectional Shapes – Behaviour of Unreinforced and Reinforced Masonry Walls – Behaviour of Walls Box Action and Bands – Behaviour of infill Walls - Non Structural Elements – Failure Mechanism of Nonstructural Elements – Effects of Nonstructural Elements on Structural System – Analysis – Prevention of Damage to Nonstructural Elements – Isolation of Non-Structures.

UNIT - IV

Design of Shear walls: Classification according to Behavior, Loads in Shear walls, Design of Rectangular and Flanged Shear walls, Derivation of Formula for Moment of Resistance of Rectangular Shear walls – Behaviour of Coupled Shear Walls.

UNIT - V

Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction- Impact of Ductility- Requirements for Ductility- Assessment of Ductility- Factors affecting Ductility- Ductile detailing considerations as per IS 13920. Behavior of beams, columns and joints in RC buildings during earthquakes- Vulnerability of open ground storey and short columns during earthquake- Seismic Evaluation and Retrofitting.

Capacity Based Design: Introduction to Capacity Design, Capacity Design for Beams and Columns-Case studies.

REFERENCES :

1. Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press
2. Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd.
3. Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly, John Wiley & Sons
4. Masory and Timber structures including earthquake Resistant Design –Anand S.Arya, Nem chand & Bros
5. Earthquake –Resistant Design of Masonry Building –Miha Tomazevic, Imperial college Press.
6. Design of Reinforced Concrete Structures by N.Subramanian, Oxford University Press.
7. Earthquake Tips – Learning Earthquake Design and Construction C.V.R. Murty

Reference Codes:

1. IS: 1893 (Part-1) -2016. "Criteria for Earthquake Resistant – Design of structures." B.I.S., New Delhi.
2. IS:4326-1993, " Earthquake Resistant Design and Construction of Building", Code of Practice B.I.S., New Delhi.
3. IS:13920-2016, " Ductile detailing of concrete structures subjected to seismic force" – Guidelines, B.I.S., New Delhi.

V Year B.Tech. Civil Engg. I-Sem

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PGE- 4
FRACTURE MECHANICS OF CONCRETE STRUCTURES

Objectives:

To impart knowledge on the mechanisms of failure and non linear fracture mechanics.

Outcomes:

The learner will be able to understand the behavior of concrete with tension and compression failure surfaces and concepts of CTOD and CMD.

Prerequisites : Concrete Technology Strength of Materials I & II

UNIT I

Fundamentals of Fracture Mechanics, Mechanisms of fracture and crack growth

UNIT II

Cleavage fracture, ductile fracture, fatigue cracking, Environment assisted cracking, Quasi brittle materials.

UNIT III

Service failure analysis, linear elastic fracture mechanics, Griffith's criteria, stress intensity factors, crack tip plastic zone, Erwin's plastic zone correction, R curves, compliance, J Integral, nonlinear analysis ,Review of concrete behaviour in tension and compression, Basic frameworks for modeling of quasibrittle materials.

UNIT IV

Nonlinear Fracture Mechanics – Discrete crack concept/Smeared crack concept, Size effect, Plasticity models for concrete – Associated and non-associated flow, Failure surfaces for quasibrittle materials.

UNIT V

Concept of CTOD and CMD, Material models, crack models, band models, models based on continuum damage mechanics

REFERENCES:

1. Elementary engineering fracture mechanics – David Broek – Sijthoff & Noordhoff – Alphen aan den Rijn – Netherlands

2. Fracture mechanics of concrete structures – Theory and applications – Rilem Report – Edited by L. Elfgreen – Chapman and Hall – 1989.
3. Fracture mechanics – applications to concrete – Edited by Victor, C. Li, & Z.P. Bazant – ACI SP 118.
4. Valliappan S. "Continuum Mechanics Fundamentals" (1982), Oxford IBH, N D. New Delhi.
5. Venkataraman and Patel “Structural Mechanics with introduction to Elasticity and Plasticity” – Mcgraw Hill, 1990.
6. Shanes – “Introduction to Solid Mechanics – II Edition, PH, 1989.

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V Year B.Tech. Civil Engg. I-Sem

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PGE- 4
STRUCTURAL OPTIMIZATION

Course Outcomes: At the end of the course, students will be able to

1. Use Variational principle for optimization

2. Apply optimization techniques to structural steel and concrete members.

3. Design using frequency constraint.

UNIT –I

Introduction : Simultaneous Failure Mode and Design, Classical External Problems.

UNIT –II

Calculus of Variation: Variational Principles with Constraints,

UNIT –III

Linear Programming, Integer Programming, Nonlinear Programming, Dynamic Programming,

UNIT –IV

Geometric Programming **and** Stochastic Programming.

UNIT –V

Applications: Structural Steel and Concrete Members, Trusses and Frames.

Design: Frequency Constraint, Design of Layouts.

Reference Books:

1. Elements of Structural Optimization, Haftka, Raphael T., Gürdal, Zafer, Springer.
2. Variational methods for Structural optimization, Cherkaev Andrej, Springer

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V Year B.Tech. Civil Engg. I-Sem

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PGE- 5

DESIGN OF PRESTRESSED CONCRETE STRUCTURES

Course outcomes: At the end of the course, students will be able to

1. Find out losses in the prestressed concrete. Understand the basic aspects of prestressed concrete fundamentals, including pre and post-tensioning processes.

2. Analyse prestressed concrete deck slab and beam/ girders.

3. Design prestressed concrete deck slab and beam/ girders.

4. Design of end blocks for prestressed members.

UNIT I:

Design of Prestressed Concrete Sections- Design of sections for flexure, Minimum section modulus- prestressing force- Limitation of prestress in long spans- limiting zone for the prestressing force- Design of sections for the limit state of collapse in flexure-Design of sections for axial tension.

UNIT II:

Statically Indeterminate Structures: Primary and secondary moments – methods of Analysis of secondary moments. –Analysis of continuous beams and simple portal frames (single bay and single storey)

Composite Beams: Different Types- Propped and Unpropped- stress distribution- Differential shrinkage- Analysis of composite beams- General design considerations.

UNIT III:

Design of sections for Compression and Bending: Load- Moment Interaction curves for prestressed concrete short columns-Design of long prestressed columns-design of prestressed concrete compression members in biaxial bending- practical design considerations-design of prestressed sections for shear and torsion.

UNIT IV:

Prestressed Concrete Slabs: Types of prestressed concrete floor slabs- design of prestressed concrete one way and two way slabs—design of prestressed concrete simple flat slabs and continuous flat slab floors.

UNIT V:

Prestressed Concrete Pipes, Tanks, Poles and Piles: Circular prestressing- Types of prestressed concrete pipes- Design of prestressed concrete pipes- analysis and design of prestressed concrete tanks-Design of prestressed concrete poles, partially prestressed pretensioned poles-advantages of prestressed concrete piles-types of prestressed concrete piles- design considerations- pile reinforcements- pile shoes-sheet piles.

References :

1. prestressed concrete,krishnanraju N.,Tata Mc Graw Hill,New Delhi.1981.
2. design of prestressed concrete structure,Lin T.Y..,Asia Publication house,1995.
3. prestressed concrete by k.v.muthu PHI learning Pvt.CEO
4. limited state design of prestressed concrete,Gutan Y..,Applied science publishers,1972.
5. Is:1343-2012-code of practice for prestressed concrete

V Year B.Tech. Civil Engg. I-Sem

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PGE- 5
PRINCIPLES OF BRIDGE ENGINEERING

Objectives:
To impart knowledge about different types of bridges, their analysis and design for combination of different loading condition as per codal provisions.

Outcomes:
The learner will be in a position to understand and design different types of bridges.

Prerequisites : Structural Analysis I &II, Reinforced Concrete Design

UNIT I
Concrete Bridges: Introduction-Types of Bridges-Economic span length-Types of loading-Dead load-live load-Impact Effect-Centrifugal force-wind loads-Lateral loads-Longitudinal forces-Seismic loads - Discussion of IRC Loadings - Frictional resistance of expansion bearings-Secondary Stresses-Temperature Effect-Erection Forces and effects-Width of roadway and footway-General Design Requirements –

UNIT II
Solid slab Bridges: Introduction-Method of Analysis and Design.

UNIT III
Girder Bridges: Introduction-Method of Analysis and Design-Courbon's Theory, Grillage analogy

UNIT IV
Pre-Stressed Concrete Bridges: Basic principles-General Design requirements-Mild steel reinforcement in prestessed concrete member-Concrete cover and spacing of pre-stressing steel-Slender beams-Composite Section-Propped-Design of Propped Composite Section-Unproped composite section-Two-stage Prestressing-Shrinking stresses-General Design requirements for Road Bridges – Design of Beams and Expansion Joints.

UNIT V
Design of Bearings: Sub-srtucture of bridges: Substructure- Beds block-Piers- Pier Dimensions- Design loads for piers- Abutments- Design loads for Abutments.

References
1. Essentials of Bridge Engineering by D.Johnson Victor, Oxford and IBH Publishing Co. Pvt. Ltd
2. Design of Concrete Bridges by M.G.Aswani, V.N.Vazirani and M.M.Ratwani. Khanna Publications 2004
3. Bridge Deck Behaviour by E.C.Hambly.
4. Concrete Bridge Design and Practice by V.K.Raina Tata Mc Graw Hill Publishing co
5. Bridge Engineering by Ponnusamy Tata Mc Graw Hill Publishing co
6. Design of Bridges by N.Krishna Raju, Oxford and IBH Publishing Co. Pvt. Ltd
7. Bridge Engineering by V.V.Sastry, DhanPat Rai & Co.

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V Year B.Tech. Civil Engg. I-Sem

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PGE- 5

DESIGN OF PRESTRESSED CONCRETE STRUCTURES

Objectives:

To impart knowledge about different types of industrial structures their analysis and design for different conditions as per codal provision.

Outcomes:

The learner will be able to plan different types of industrial structures such as cold framed members, RC buckers, Soil, Chimneys. Cylindrical shells and design them.

Prerequisites : Design of Steel Structures & Structural Analysis

UNIT 1

Planning of Industrial Structures – types of industrial structures – different components of industrial structures – Bracings of Industrial Buildings – Design of Steel Industrial Buildings.

UNIT 2

Thin Walled / Cold Formed Steel Members : Definitions – Local Bucking of Thin-Elements-Post Buckling of Thin-Elements – Light Guage Steel Columns and Compression Members – Form-Factor for Columns and Compression Members – Behaviour of Stiffened Elements Under Uniform Compression – Multiple Stiffened Compression Elements –Effective Length of Light Gauge Steel Compression Members – Light Gauge Steel Tension Members.

UNIT 3

RC Bunkers & Silos : Introduction – Janssen's Theory – Airy's Theory – Design of Square, Rectangular and Circular Bunkers ; Design of Silos.

UNIT 4

RC Chimneys : Introduction – Wind Pressure – Stresses in Chimney Shaft Due to Self-Weight and Wind – Stresses in Horizontal Reinforcement Due to Wind Shear – Stresses Due to Temperature Difference – Combined Effect of Self Load, Wind and Temperature – Temperature Stresses in Horizontal Reinforcement Problems.

UNIT 5

Design Principles of Cylindrical Shells & Design Problems.

References:

1. Advanced Reinforced Concrete Design, By N. Krishna Raju (CBS Publishers & Distributors) 2005.
2. Design of Steel Structures, By Ram Chandra and Virendra Gehlot vol-II, 2007.
3. Design of Steel Structures, By Duggal - Tata McGraw-Hill publishers – 2010

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V Year B.Tech. Civil Engg. I-Sem

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SEMINAR

There shall be a Seminar Presentation in V Year I Semester.

For the seminar, the student shall collect the information on a specialized topic, prepare a Technical Report and Submit to the Department at the time of Seminar Presentation. The Seminar Presentation (along with the Technical Report) shall be evaluated by two faculty members assigned by the Head of the Department, for 100 marks. There shall be SEE or external Examination for Seminar

JNTUH COLLEGE OF ENGINEERING HYDERABAD

V Year B.Tech. Civil Engg. I-Sem

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Dissertation Phase -I

Prerequisites: None.

OBJECTIVE: To identify the topic by reviewing literature (Journal/ Conferences/ Articles etc.) and based on the topic, setting objectives and developing methodology to carryout project thesis work

OUTCOME: The student will be able to identify topics in thrust areas of Structural engineering. Take up critical review of literature on the chosen topic. Carryout independent research work on the topic by experimental / analytical approaches. Documentation and presentation of the research work

JNTUH COLLEGE OF ENGINEERING HYDERABAD

V Year B.Tech. Civil Engg. II-Sem

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Dissertation

Prerequisites: None.

OBJECTIVE:

To carryout experimental/analytical programme and critical analysis of results on the identified topic in thrust areas of Structural engineering.

OUTCOME:

Take up critical review of literature on the chosen topic carryout independent research work on the topic by experimental / analytical approaches. Preparation of document and critical analysis of the results of research work and presentation.

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III Year B.Tech. Civil Engg. II-Sem **L T P C**
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OPEN ELECTIVE - I
DISASTER MANAGEMENT

Pre Requisites: NIL

Course Objectives: The subject provide different disasters, tools and methods for disaster management

Course Outcomes: Estimate, perform quantity survey & valuate various engineering works

UNIT 1 : Understanding Disaster
Concept of Disaster
Different approaches
Concept of Risk
Levels of Disasters
Disaster Phenomena and Events (Global, national and regional)

Hazards and Vulnerability
Natural and man-made hazards; response time, frequency and forewarning levels of different hazards
Characteristics and damage potential or natural hazards; hazard assessment
Dimensions of vulnerability factors; vulnerability assessment
Vulnerability and disaster risk
Vulnerabilities to flood and earthquake hazards

UNIT 2 : Disaster Management Mechanism
Concepts of risk management and crisis managements
Disaster Management Cycle
Response and Recovery
Development, Prevention, Mitigation and Preparedness
Planning for Relief

UNIT 3: Capacity Building
Capacity Building: Concept
Structural and Nonstructural Measures
Capacity Assessment; Strengthening Capacity for Reducing Risk
Counter-Disaster Resources and their utility in Disaster Management
Legislative Support at the state and national levels

UNIT 4: Coping with Disaster

Coping Strategies; alternative adjustment processes
Changing Concepts of disaster management
Industrial Safety Plan; Safety norms and survival kits
Mass media and disaster management

UNIT 5: Planning for disaster management

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

Text Books

1. Alexander, D. Natural Disasters, ULC press Ltd, London, 1993.
2. Carter, W.N. Disaster Management: A Disaster Management Handbook, Asian Development Bank, Bangkok, 1991.
3. Manual on Natural Disaster Management in India, NCDM, New Delhi, 2001.

References

1. Abarquez I. & Murshed Z. Community Based Disaster Risk Management: Field Practitioner's Handbook, ADPC, Bangkok, 2004.
2. Goudie, A. Geomorphological Techniques, Unwin Hyman, London 1990.
3. Goswami, S.C Remote Sensing Application in North East India, Purbanchal Prakesh, Guwahati, 1997.
4. Chakrabarty, U.K. Industrial Disaster Management and Emergency Response, Asian Book Pvt. Ltd., New Delhi 2007.
5. Disaster Management in India, Ministry of Home Affairs, Government of India, New Delhi, 2011.
6. National Policy on Disaster Management, NDMA, New Delhi, 2009
7. Disaster Management Act. (2005), Ministry of Home Affairs, Government of India, New Delhi, 2005.
8. District Disaster Management Plan-Model Template, NIDM, New Delhi, 2005.
9. Disaster Management, Future challenge and opportunities, Edited by Jagbir singh, I.K. International publishing home Pvt, Ltd.

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IV Year B.Tech. Civil Engg. I-Sem **L T P C**
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OPEN ELECTIVE – II ESTIMATION, QUANTITY SURVEY & VALUATION

Pre Requisites: Concrete Technology, RC Design, Desgin of Steel Structure

Course Objectives: The subject provide process of estimations required for various work in construction. To have knowledge of using SOR & SSR for analysis of rates on various works .

Course Outcomes: Able to provide control steps for disaster mitigation steps

UNIT – I
General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating.

UNIT – II
Detailed Estimates of Buildings - Reinforcement bar bending and bar requirement schedules

UNIT – III
Earthwork for roads and canals.

UNIT – IV
Rate Analysis – Working out data for various items of work over head and contigent charges.

UNIT-V
Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation -Standard specifications for different items of building construction.

NOTE : NUMBER OF EXERCISES PROPOSED :
3. Three in flat Roof & one in Sloped Roof
4. Exercises on Data – three Nos.

Text Books
3. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
4. Estimating and Costing by G.S. Birdie

Reference books :
7. Standard Schedule of rates and standard data book by public works department.
8. I. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)
9. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. Civil Engg. II-Sem **L T P C**
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OPEN ELECTIVE - III
ENVIRONMENTAL IMPACT ASSESSMENT

Pre Requisites: Environmental Engineering

Course Objectives: This subject will cover various aspects of Environment Impact Assessment methodologies, impact of development activities. Impact on surface water, Air and Biological Environment, Environment legislation Environment.

Course Outcomes: Environmental Science

UNIT – I

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis.

UNIT-II

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

UNIT-III

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures.

UNIT – IV

Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocel, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report, Post Audit activities.

UNIT - V

The Environmental Protection Act, The water Act, The Air (Prevention & Control of pollution Act.), Motor Act, Wild life Act. Case studies and preparation of Environmental Impact assessment statement for various Industries.

Text Books:

1. Larry Canter – Environmental Impact Assessment, McGraw-Hill Publications
2. Barthwal, R. R. B. – Environmental Impact Assessment, New Age International Publications

References:

1. Glynn, J. and Gary, W. H. K. - Environmental Science and Engineering, Prentice Hall Publishers
1. Suresh K. Dhaneja - Environmental Science and Engineering, S.K.,Katania & Sons Publication., New Delhi.
2. Bhatia, H. S. - Environmental Pollution and Control, Galgotia Publication(P) Ltd, Delhi.
3. Wathern, P. – Environmental Impact Assessment: Theory & Practice, Publishers- Routledge, London, 1992.