DEPARTMENT OF CIVIL ENGINEERING
UNIVERSITY COLLEGE OF ENGINEERING VIZIANAGARAM
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
VIZIANAGARAM-535003, ANDHRA PRADESH, INDIA
B.Tech COURSE STRUCTURE (2020 Admitted batch)

I B.Tech I Semester

S. No	Course Code	Course Title	L	T	P	C
1	R2011BS01	Calculus and Differential Equations	3	0	0	3
2	R2011BS05	Engineering Chemistry	3	0	0	3
3	R2011ES13	Problem solving & Programming using C	3	0	0	3
4	R2011ES06	Engineering Drawing	1	0	4	3
5	R2011ES01	Basic Electrical and Electronics Engineering	3	0	0	3
6	R2011ES01A	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5
7	R2011BS05A	Engineering Chemistry lab	0	0	3	1.5
8	R2011ES13A	Problem solving & Programming using C Lab	0	0	3	1.5

Total = 19.5

Category	Credits
Basic Science Course	7.5
Engineering Science Courses	7.5+4.5= 12
Humanities & Social Science	00
Total Credits	19.5

I B.Tech II Semester

S. No	Course Code	Course Title	L	T	P	C
1	R2012BS02	Linear Algebra and Numerical Methods	3	0	0	3
2	R2012BS03	Engineering Physics	3	0	0	3
3	R2012HS01	Communicative English	3	0	0	3
4	R2012ES09	Engineering Mechanics	3	0	0	3
5	R2012ES08	Computer Aided Engineering Drawing	1	0	4	3
6	R2012BS03A	Engineering Physics Lab	0	0	3	1.5
7	R2012HS01A	English Communication Skills Lab	0	0	3	1.5
8	R2012ES11A	Engineering Workshop Practice	0	0	3	1.5
9	R2012MC01	Environmental Science	2	0	0	0

Total= 19.5

Category	Credits
Basic Science Course	7.5
Engineering Science Courses	7.5
Humanities & Social Science	4.5
	19.5

II B.Tech. – I Semester

S. NO.	CODE	COURSE	L	T	P	C
1	R2021BS01	Vector Calculus, Transforms And PDE	3	0	0	3
2	R202101PC01	Strength Of Materials	3	0	0	3
3	R202101PC02	Fluid Mechanics	3	0	0	3
4	R202101PC03	Surveying	3	0	0	3
5	R202101PC04	Concrete Technology	3	0	0	3
6	R202101PC01A	Strength Of Materials Lab	0	0	3	1.5
7	R202101PC02A	Surveying Field Work	0	0	3	1.5
8	R202101PC03A	Concrete Technology Lab	0	0	3	1.5
9	R202101SC01	Skilled Oriented Course (English & Communication Skills Course)	1	0	2	2
		TOTAL CREDITS				**21.5**

Category	Credits
Basic Science course	3
Professional core Courses	16.5
Skill oriented course*	2
TOTAL CREDITS	**21.5**

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II B.Tech. – II Semester

S. NO.	CODE	COURSE	L	T	P	C
1	R2022BS01	Complex Variables And Statistical Methods	3	0	0	3
2	R202201ES01	Structural Analysis	3	0	0	3
3	R202201PC01	Hydraulics And Hydraulic Machinery	3	0	0	3
4	R202201PC01	Engineering Geology	3	0	0	3
5	R2022HS01	Managerial Economics And Financial Analysis	3	0	0	3
6	R202201ES01A	Building Planning & Drawing	0	0	3	1.5
7	R202201PC01A	Engineering Geology Lab	0	0	3	1.5
8	R202201PC02A	Fluid Mechanics & Hydraulics Machinery Lab	0	0	3	1.5
9	R202201SC01	Skill Oriented Course (Computer Aided Civil Engineering Drawing Course)	1	0	2	2
		TOTAL CREDITS				**21.5**
		HONORS / MINOR COURSES (THE HOURS DISTRIBUTION CAN BE 3-0-2 OR 3-1-0 ALSO)	**4**	**0**	**0**	**4**
INDUSTRIAL / RESEARCH INTERNSHIP (MANDATORY) 2 MONTHS DURING SUMMER VACATION						

Category	CREDITS
Basic Science Courses	3
Professional core Courses	9
Engineering Science Courses	4.5
Skill oriented course*	2
Humanities and Social Sciences	3
TOTAL CREDITS	**21.5**

III B.Tech. – I Semester

S. NO.	CODE	COURSE	L	T	P	C
1	R203101PC01	Geotechnical Engineering	3	3	0	3
2	R203101PC02	Transportation Engineering	3	3	0	3
3	R203101PC03	Design And Drawing Of Reinforced Concrete Structures	3	3	0	3
4	R203101OE01	**OPEN ELECTIVE -I** • Fundamentals Of Entrepreneurship • Earthquake Engineering • Air Pollution and Control	3	3	0	3
5	R203101PE01	**ELECTIVE -I** • Urban Hydrology • Solid Waste & Hazardous Waste Management • Advanced Structural Analysis	3	3	0	3
6	R203101PC01A	GEOTECHNICAL ENGINEERING LAB	0	0	3	1.5
7	R203101PC02A	TRANSPORTATION ENGINEERING LAB	0	0	3	1.5
8	R203101SC01	ADVANCED SURVEYING COURSE (Skill advanced course)	1	0	2	2
9	R2031MC01	DISASTER MANAGEMENT (Mandatory course AICTE suggested)	2	0	0	0
	Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester		0	0	0	1.5
		TOTAL CREDITS				**21.5**
	Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)		4	0	0	4

Category	**Credits**
Professional Core Course	12
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
Skill oriented course	2
Summer Internship	1.5
Total Credits	21.5

III B.Tech. – II Semester

S. NO.	CODE	COURSE	L	T	P	C
1	R203201PC01	ESTIMATION COSTING & SPECIFICATIONS	3	3	0	3
2	R203201PC02	WATER RESOURCE ENGINEERING	3	3	0	3
3	R203201PC03	DESIGN AND DRAWING OF STEEL STRUCTURES	3	3	0	3
4	R203201PC04	ENVIRONMENTAL ENGINEERING	3	3	0	3
5	R203201OE01	OPEN ELECTIVE- II • ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT • RAILWAY, AIRPORTS, DOCKS & HARBOURS • ROCK ENGINEERING	3	3	0	3
6	R203201PE01	ELECTIVE -II • GREEN BUILDINGS • OFFSHORE STRUCTURES • THEORY OF ELASTICITY	3	3	0	3
7	R203201PC01A	ENVIRONMENTAL ENGINEERING LAB	0	0	3	1.5
8	R203201SC01	STAAD. Pro course (Skill advanced course)	1	0	2	2
9	R2032MC01	CONSTRUCTION TECHNIQUES AND PRACTICES Mandatory course (AICTE suggested)	2	0	0	0
		TOTAL CREDITS				**21.5**
	Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)		4	0	0	4
Industrial/Research Internship (Mandatory) 2 Months during summer vacation						

Category	Credits
Professional Core Course	13.5
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
Skill oriented course	2
Mandatory course	0
Industrial/Research Internship	0
Total Credits	21.5

IV B.Tech. – I Semester

S. No	Course Code	Course Title	L	T	P	C
1	R204101PE01	FOUNDATION ENGINEERING PRE-STRESSED CONCRETE GROUND WATER DEVELOPMEN	3	3	0	3
2	R204101PE02	HYDRAULIC STRUCTURES WASTEWATER TREATMENT GROUND IMPROVEMENT TECHNIQUES	3	3	0	3
3	R204101PE03	• EARTH AND ROCKFILL DAMS AND SLOPE STABILITY • FINITE ELEMENT METHOD • TRANSPORT PLANNING	3	3	0	3
4	R204101OE01	REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM REPAIR AND REHABILITATION OF STRUCTURES EARTH RETAINING STRUCTURES	3	3	0	3
5	R204101OE02	• CONSTRUCTION TECHNOLOGY AND MANAGEMENT • BRIDGE ENGINEERING • URBAN PLANNING AND DEVELOPMENT	3	3	0	3
6	R2041HS01	IPR &PATENTS	3	3	0	3
7	R204101SC01	ETABS (skill oriented course)	1	0	2	2
	Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester		0	0	0	3
Total						23
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4	0	0	4

Category	Credits
Professional Elective courses	9
Open Elective Course/Job oriented elective	6
Skill oriented course	2
Humanities and Social Science Elective	3
Industrial/Research Internship	3
Total Credits	23

IV B.Tech. – II Semester

PROJECT WORK

S. No	Category	Code	Course	Hours per week			C
1	Major Project	R204201PR01	Project Project work, seminar and internship in industry	0	0	0	12
	INTERNSHIP (6 MONTHS)						
						Total	12

The main objective of the Project work is

1. To enable the student, apply engineering knowledge that has been taught all throughthe programmed for solving practical engineering problem.
2. To enable the student capable for problem solving / problem shooting.
3. To instill and inculcate team spirit/ team work in to the minds of the students.
4. To enable/ train the students report making/ documentation.
5. To provide students an opportunity to use any civil engineering software for theirproject work.

Outcomes of the Project work.

Up on completion of the Project work, the student will be able to

1. Apply all levels of Engineering knowledge in solving the Engineering problems.
2. Work together with team spirit.
3. Use Civil Engineering software at least one.
4. Document the projects

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I Year-I Semester		L	T	P	C
		3	0	0	3
NAME OF THE SUBJECT: CALCULUS AND DIFFERENTIAL EQUATIONS					

(Common to all branches)

Course Objectives:

(i) This course will illuminate the students in the concepts of calculus.
(ii) To enlighten the learners in the concept of differential equations and multivariable calculus.
(iii) To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

UNIT I:

Sequences, Series and Mean value theorems: (10 hrs)

Sequences and Series: Convergence and divergence – Ratio test – Comparison tests – Integral test – Cauchy's root test – Alternate series – Leibnitz's rule.

Mean Value Theorems (without proofs): Rolle's Theorem – Lagrange's mean value theorem – Cauchy's mean value theorem – Taylor's and Maclaurin's theorems with remainders.

UNIT II:

Differential equations: (15 hrs)

Linear differential equations – Bernoulli's equations – Exact equations and equations reducible to exact form

Non-homogeneous equations of higher order with constant coefficients with non-homogeneous term of the type e^{ax}, sin ax, cos ax, polynomials in x^n, e^{ax} V(x) and x^nV(x) – Method of Variation of parameters- Euler-Cauchy equation and Legender's equation

Applications: Orthogonal trajectories – Electrical circuits (RL, RC, RLC) – Simple Harmonic motion.

UNIT III:

Partial differentiation: (10 hrs)

Introduction – Homogeneous function – Euler's theorem – Total derivative – Chain rule – Jacobian – Functional dependence – Taylor's and Mac Laurin's series expansion of functions of two variables.

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

UNIT IV:

Multiple integrals: (8 hrs)

Double integrals – Change of order of integration - Double integrals in polar coordinates- Areas enclosed by plane curves- Triple integrals – Volume of solids – Change of variables to polar, spherical and cylindrical co-ordinates.

Applications: Finding Areas and Volumes.

UNIT V:

Beta and Gamma functions: (5 hrs)

Introduction to Improper Integrals-Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals.

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

(i) Utilize mean value theorems to real life problems (L3)
(ii) Solve the differential equations related to various engineering fields (L3).
(iii) Familiarize with functions of several variables which are useful in optimization (L3)

(iv) Apply double and triple integration techniques in evaluating areas and volumes bounded by region (L3)
(v) Conclude the use of Beta and Gamma functions in evaluating improper integrals (L4)

Text Books:

1. **B. S. Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **B. V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

Reference Books:

1. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India.
2. **Joel Hass, Christopher Heil and Maurice D. Weir,** Thomas calculus, 14th Edition, Pearson.
3. **Lawrence Turyn,** Advanced Engineering Mathematics, CRC Press, 2013.
4. **Srimantha Pal, S C Bhunia,** Engineering Mathematics, Oxford University Press.

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I Year-I Semester		**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
NAME OF THE SUBJECT : ENGINEERING CHEMISTRY					

(Common to Mechanical, MET, Civil)

Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

Course Objectives:

(i) ***Importance*** of usage of plastics in household appliances and composites (FRP) in aerospace and automotive industries.
(ii) ***Outline*** the basics for the construction of electrochemical cells, batteries and fuel cells. Understand the mechanism of corrosion and how it can be prevented.
(iii) ***Express*** the increases in demand as wide variety of advanced materials are introduced; which have excellent engineering properties. Classify and discuss the materials used in major industries like steel industry, metallurgical industries and construction industries and electrical equipment manufacturing industries. Lubrication is also summarized.
(iv) ***Relate*** the need of fuels as a source of energy to any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence introduced.
(v) ***Explain*** the importance and usage of water as basic material in almost all the industries; ***interpret*** drawbacks of steam boilers and also how portable water is supplied for drinking purposes.

UNIT I:
POLYMER TECHNOLOGY
8 hrs

Polymerisation:- Introduction, methods of polymerization (emulsion and suspension), mechanical properties.

Plastics: Compounding, fabrication (compression, injection, blown film and extrusion), preparation, properties and applications (PVC, polycarbonates and Bakelite), mention some examples of plastic materials used in electronic gadgets, recycling of e-plastic waste (waste to wealth).

Elastomers:- Introduction, preparation, properties and applications (Buna S, thiokol and polyurethanes).

Composite materials: Fiber reinforced plastics, conducting polymers, biodegradable polymers, biopolymers, biomedical polymers.

UNIT II:
ELECTROCHEMICAL CELLS AND CORROSION **10 hrs**

Single electrode potential, electrochemical series and uses of series, standard hydrogen electrode, calomel electrode, construction of glass electrode, batteries (Dry cell, Li ion battery and zinc air cells), fuel cells (H_2-O_2, CH_3OH-O_2, phosphoric acid and molten carbonate).

Corrosion:-Definition, theories of corrosion (chemical and electrochemical), galvanic corrosion, differential aeration corrosion, stress corrosion, galvanic series, factors influencing rate of corrosion, corrosion control (proper designing and cathodic protection), Protective coatings (surface preparation, cathodic coatings, anodic coatings, electroplating and electroless plating [nickel]), Paints (constituents, functions and special paints).

UNIT III:

CHEMISTRY OF MATERIALS **10 hrs**

Part- A:

Nano materials:- Introduction, sol-gel method, characterization by (Brunauer Emmet Teller [BET]), (scanning electron microscopy [SEM]) and (transmission electron microscopy [TEM]) with example (TiO_2), applications of graphene and fullerenes, carbon nanotubes (types, preparation and applications)

Thermal analysis techniques: Instrumentation and applications of thermogravimetric analysis (TGA), differential thermal analysis (DTA), differential scanning calorimetry (DSC).

Part-B:

Refractories: - Definition, classification, properties (refractoriness, refractoriness under load, porosity and thermal spalling), failure of refractories.

Lubricants: - Definition, mechanism of lubricants, properties (definition and importance).

Cement: - Constituents, manufacturing, parameters to characterize the clinker formation: lime saturation factor (LSF), silica ratio (SR) and alumina ratio (AR), chemistry of setting and hardening, deterioration of cement.

UNIT IV:

FUELS **10 hrs**

Introduction, calorific value, higher calorific value, lower calorific values, problems using Dulong's formula, proximate and ultimate analysis of coal sample and their significance, numerical problems, petroleum (refining-cracking), synthetic petrol (Fischer Tropsch and Bergius), petrol knocking, diesel knocking, octane and cetane ratings, anti-knocking agents, Introduction to alternative fuels (Bio-diesel, ethanol, methanol, natural gas, liquefied petroleum gas, compressed natural gas), Flue gas analysis by Orsat apparatus, rocket fuels.

UNIT V:

WATER TECHNOLOGY **8 hrs**

Hardness of water, determination of hardness by complexometric method, boiler troubles (priming and foaming, scale formation, boiler corrosion, caustic embrittlement), internal treatments, softening of hard water (zeolite process and related sums, ion exchange process), treatment of industrial waste water, potable water and its specifications, steps involved in purification of water, chlorination, break point chlorination-desalination (reverse osmosis and electro dialysis).

Course Outcomes: ***At the end of this unit, the students will be able to***

(i) ***Analyze*** the different types of composite plastic materials and interpret the mechanism of conduction in conducting polymers.

(ii) ***Utilize*** the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion

(iii) ***Synthesize*** nanomaterials for modern advances of engineering technology. Summarize the techniques that detect and measure changes of state of reaction. Illustrate the commonly used industrial materials.

(iv) ***Differentiate*** petroleum, petrol, synthetic petrol and have knowledge how they are produced. Study alternate fuels and analyse flue gases.

(v) ***Analyze*** the suitable methods for purification and treatment of hard water and brackish water.

Text Books:

1. P.C. Jain and M. Jain "**Engineering Chemistry**", 15/e, Dhanpat Rai & Sons, Delhi, (Latest edition).
2. Shikha Agarwal, "**Engineering Chemistry**", Cambridge University Press, New Delhi, (2019).
3. S.S. Dara, "**A Textbook of Engineering Chemistry**", S.Chand & Co, (2010).
4. Shashi Chawla, "Engineering Chemistry", Dhanpat Rai Publicating Co. (Latest edition).

Reference Books:

1. K. Sesha Maheshwaramma and Mridula Chugh, "**Engineering Chemistry**", Pearson India Edn.
2. O.G. Palana, "**Engineering Chemistry**", Tata McGraw Hill Education Private Limited, (2009).
3. CNR Rao and JM Honig (Eds) "Preparation and characterization of materials" Academic press, New York (latest edition)
4. B. S. Murthy, P. Shankar and others, "Textbook of Nanoscience and Nanotechnology", University press (latest edition)

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I Year-I Semester		L	T	P	C
		3	0	0	3
NAME OF THE SUBJECT : PROBLEM SOLVING AND PROGRAMMING USING C					

(Common to all branches)

Course Objectives:

The objectives of this course is to acquire knowledge on the

- To impart adequate knowledge on the need of programming languages and problem-solving techniques and develop programming skills.
- To enable effective usage of Control Structures and Implement different operations on arrays.
- To demonstrate the use of Strings and Functions.
- To impart the knowledge of pointers and understand the principles of dynamic memory allocation.
- To understand structures and unions and illustrate the file concepts and its operations.
- To impart the Knowledge Searching and Sorting Techniques.

UNIT-I

Introduction to Computer Problem Solving: Programs and Algorithms, Computer Problem Solving Requirements, Phases of Problem Solving, Problem. Solving Strategies, Top-Down Approach, Algorithm Designing, Program Verification, Improving Efficiency, Algorithm Analysis and Notations.

UNIT-II

Introduction to C Programming: Introduction, Structure of a C Program. Comments, Keywords, Identifiers, Data Types, Variables, Constants, Input/output Statements. Operators, Type Conversion.

Control Flow, Relational Expressions: Conditional Branching Statements: if, if-else, if-else—if, switch. Basic Loop Structures: while, do-while loops, for loop, nested loops, The Break and Continue Statements, go to statement.

UNIT-III

Arrays: Introduction, Operations on Arrays, Arrays as Function Arguments, Two dimensional Arrays, Multi dimensional arrays.

Pointers: Concept of a Pointer, Declaring and Initializing Pointer Variables, Pointer Expressions and Address Arithmetic, Null Pointers, Generic Pointers, Pointers as Function Arguments, Pointers and Arrays, Pointer to Pointer, Dynamic Memory Allocation, Dangling Pointer, Command Line Arguments,

UNIT-IV

Functions: Introduction, Function Declaration, Function Definition, Function Call, Categories of Functions, Passing Parameters to Functions, Scope of Variables, Variable Storage Classes. Recursion.

Strings: String Fundamentals, String Processing with and without Library Functions, Pointers and Strings.

UNIT-V

Structures, Unions, Bit Fields: Introduction, Nested Structures, Arrays of Structures, Structures and Functions, Self-Referential Structures, Unions, Enumerated Data Type — Enum variables, Using Typedef keyword, Bit Fields.

Data Files: Introduction to Files, Using Files in C, Reading from Text Files, Writing to Text Files, Random File Access.

Course Outcomes:

At the end of the Course, Student should be able to:

i. Illustrate the Fundamental concepts of Computers and basics of computer programming.
ii. Use Control Structures and Arrays in solving complex problems.
iii. Develop modular program aspects and Strings fundamentals.
iv. Demonstrate the ideas of pointers usage.
v. Solve real world problems using the concept of Structures, Unions and File operations.

Text Books:

i. How to solve it by Computer, R. G. Dromey, and Pearson Education.
ii. Computer Programming. Reema Thareja, Oxford University Press
iii. Let us C , Yaswanth Kanetkar, 16th Edition,BPB Publication.

Reference Books:

i. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
ii. Programming In C A-Practia1 Approach. Ajay Mittal, Pearson.
iii. C Programming — A Problem Solving Approach, Forouzan, Gilberg, Cengage.
iv. The C Programming Language, Dennis Richie And Brian Kernighan, Pearson Education.
v. Programming In C, Ashok Kamthane, Second Edition, Pearson Publication.

Web Links:

- http://www.c4learn.com/
- http://www.geeksforgeeks.org/c/
- http://nptel.ac.in/courses/122104019/
- http://www.learn-c.org/
- https://www.tutorialsyoint.com/cprogramming/

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		L	T	P	C
I Year-I Semester		**1**	**0**	**4**	**3**
NAME OF THE SUBJECT : ENGINEERING DRAWING					

Course Objectives:
The objectives of this course is to acquire knowledge on the:
i. To introduce the students to use of drawing instruments and draw engineering curves.
ii. To introduce the students to use orthographic projections, projections of points & simple lines. To make the students to draw the projections of the lines inclined to both the planes.
iii. The objective is to make the students draw the projections of the plane objects in different positions with the reference planes.
iv. The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
v. The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view.

UNIT - I:
Curves: Parabola, Ellipse and Hyperbola by general and special methods, cycloids, tangents & normals for the curves
Scales: Plain scales, diagonal scales and vernier scales

UNIT - II:
Orthographic Projections: Reference plane, importance of reference lines, projections of points in various quadrants, projections of lines, line parallel to both the planes, line parallel to one plane and inclined to other plane.
Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces.

UNIT - III:
Polygons: Constructing regular polygons by general methods.
Projections of planes: Regular planes perpendicular/parallel to one reference plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT - IV:
Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one plane – auxiliary views.

UNIT-V
Conversion of isometric views to orthographic views and Conversion of orthographic views to isometric views.

Course Outcomes:
The students should be able to:
i. To make the student familiar with the techniques used for drawing various geometric elements used in engineering practice
ii. The student can apply the orthographic projections, project the points and lines parallel to one plane and inclined to both the planes.
iii. Prepare the drawings for construction of regular polygons and the projection of the planes inclined to both the planes.
iv. The students can prepare the drawings for the projections of the various types of solids in different positions inclined to one plane of the planes
vi. Ability to use the concepts of isometric views to orthographic views and vice-versa.

Text Books:

i. Engineering Drawing by N.D. Bhatt, Chariot Publications
ii. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

Reference Books:

i. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
ii. Engineering Graphics for Degree by K.C. John, PHI Publishers
iii. Engineering Graphics by PI Varghese, McGrawHill Publishers
iv. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age

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I Year –I Semester		L	T	P	C
		3	0	0	3
NAME OF THE SUBJECT : BASIC ELECTRICAL AND ELECTRONICS ENGINEERING					

(Common to CIVIL, MECH, MET Engg.)

Course objectives:
The objectives of this course is to acquire knowledge on the

i. principle of operation and construction details of DC machines & Transformers.
ii. principle of operation and construction details of alternator and 3-Phase induction motor.
iii. PN junction diode, half wave, full wave rectifiers and zener diode.
iv. PNP and NPN transistors and various amplifiers.

Unit - I
Electrical Circuits
Basic definitions – types of network elements – Ohm's Law – Kirchhoff's Laws – inductive networks – capacitive networks – series – parallel circuits –Numerical Problems.

Unit - II
DC Machines
Principle of operation of DC generator- types of DC machines - EMF equation- OCC & Load characteristics- principle of operation of DC Motor–––torque equation – applications – three point starter – speed control methods of DC motor – Swinburne's Test and Brake Test.

Unit - III
AC Machines &Transformers
Transformers:
Principle of operation and construction of single phase transformers – EMF equation –OC & SC tests – losses & efficiency.
AC Machines
Principle of operation of 3-Phase induction motor– slip-torque characteristics – Brake Test - efficiency – applications - principle of operation and construction of alternators – types of alternators - principle of operation of synchronous motor.

Unit IV
Diodes and Rectifiers
Classification of Semiconductors–intrinsic-extrinsic-PN junction diode-Forward bias & Reverse Bias- V-I Characteristics- diode as rectifier-half wave and bridge rectifier (with and without filter)-Zener diode-characteristics, applications.

Unit V
Transistors
Transistors, transistor as an amplifier–CE & CB connections-characteristics, Basic principles of Feedback Amplifiers-Types, Basic principle and characteristics of operational amplifiers (OP-AMP) – application of OP-AMPs (inverting, non-inverting, integrator and differentiator).

Course Outcomes:
The student should be able to:

i. understand the basics of series and parallel electrical circuits.
ii. Understand the operation and performance of DC machines and testing of DC shunt motor by Swinburne's test and brake test.
iii. principle of operation, construction and performance of AC machines (transformers, synchronous machines and 3-phase &1-phase induction motors)

iv. understand the concept of semiconductor diodes, operation of half wave, full wave bridge rectifiers, characteristics and applications of Zener diode.
v. analyze the concept of transistors and amplifiers.

Text Books:

i. Electrical Technology by Surinder Pal Bali, Pearson Publications.
ii. Electronic Devices and Circuits by R.L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI 2006.

Reference Books:

i. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor &Francis Group
ii. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah, TMH Publications
iii. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition.
iv. Basic Electrical Engineering by Nagsarkar, Sukhija, Oxford Publications, 2nd edition.
v. Industrial Electronics by G.K. Mittal, PHI.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year – I semester		L	T	P	C
		0	0	3	1.5

NAME OF THE SUBJECT: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

(Common to CIVIL, MECH, MET Engg.)

Course objectives:

The objectives of this course is to acquire knowledge on the

i. efficiency of dc shunt machine, transformer and 3-phase induction motor by conducting direct/indirect tests.
ii. speed control methods of DC shunt motor
iii. characteristics of various basic semiconductor devices.

Any Five Experiments are to be conducted from each section.

Section A: Electrical Engineering:

1. Verification of Kirchhoff's Laws (Kirchhoff's Current Law and Kirchhoff's Voltage Law).
2. Swinburne's test on D.C. Shunt machine (predetermination of efficiency of a given D.C. shunt machine working as motor and generator).
3. Speed control of D.C. Shunt motor by
   a) Armature Voltage control b) Field flux control method
4. Brake test on D.C. Shunt Motor.
5. Magnetization characteristics on DC Shunt generator
6. Load characteristics on DC Shunt generator
7. OC and SC tests on single phase transformer (predetermination of efficiency at given power factors).
8. Brake test on 3-phase Induction motor (determination of performance characteristics)

Section B: Electronics Engineering:

1. Static characteristics of PN junction diode
2. V-I characteristics of Zener-diode
3. Half and full wave rectifier with and without filters.
4. Transistor CB characteristics (input and output)
5. Transistor CE characteristics (input and output)
6. Study of amplifiers.
7. OP- Amp applications (inverting, non-inverting, integrator and differentiator)

Course Outcomes:

The student should be able to:

i. compute the efficiency of DC shunt machine with/without loading the machine.
ii. Estimate the efficiency at different load conditions and power factors for single phase transformer with OC and SC tests.
iii. analyze the performance characteristics of 3-Phase induction motor.
iv. control the speed of dc shunt motor using armature voltage and field flux control methods.
v. analyze the characteristics of PN junction diode, transistor and determine the ripple factor of half wave and full wave rectifiers.

Text books:

i. Principles of Electrical Machines by V.K. Mehta & Rohit Mehta, S.Chand publications
ii. Theory & performance of Electrical Machines by J.B.Guptha, S.K.Kataria & Sons
iii. Electrical Machinery by P.S. Bhimbra, Khanna Publishers.

Reference books:

i. Basic Electrical Engineering by M.S.Naidu & S.Kamakshiah, TMH Publications.
ii. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition.
iii. Basic Electrical Engineering by Nagsarkar, Sukhija, Oxford Publications, 2nd edition.

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		L	T	P	C
I Year-I/II Semester		**0**	**0**	**3**	**1.5**
NAME OF THE SUBJECT: ENGINEERING CHEMISTRY LAB					

(Common to Mechanical, MET, Civil)

Course Objectives:

The objectives of this course is to acquire knowledge on the

(i) Normality, molarity, theory of indicators used in different volumetric and chemical analysis.
(ii) Alkalinity and hardness of water by E DTA method.
(iii) Volumetric analysis Red- Ox titrations of different chemical compounds.
(iv) Determination of concentration of acids and bases using conductometer and potentiometer
(v) Determination of P^H and color metric analysis

Introduction to Chemistry laboratory – Molarity, normality, primary, secondary standard solutions, Volumetric titrations, quantitative analysis

1. Determination of HCl using standard Na_2CO_3 solution.
2. Determination of alkalinity of a sample containing Na_2CO_3 and NaOH.
3. Determination of Mn^{+2} using standard oxalic acid solution.
4. Determination of ferrous iron using standard $K_2Cr_2O_7$ solution.
5. Determination of Cu^{+2} using standard hypo solution.
6. Determination of temporary and permanent hardness of water using standard EDTA solution.
7. Determination of Fe^{+3} by a colorimetric method.
8. Determination of the concentration of acetic acid using sodium hydroxide (pH-metry method).
9. Determination of iso-electric point of amino acids using pH-metry method/conductometric method.
10. Determination of the concentration of strong acid vs strong base (by conductometric method).
11. Determination of strong acid vs strong base (by potentiometric method).
12. Determination of Mg^{+2} present in an antacid.
13. Determination of $CaCO_3$ present in an egg shell.
14. Estimation of Vitamin C.
15. Determination of phosphoric content in soft drinks.
16. Adsorption of acetic acid by charcoal.
17. Preparation of nylon-6, 6 and Bakelite (demonstration only).
18. Determination of Lead in drinking water.
19. Determination of percentage of copper in Brass.

Of the above experiments at-least 10 assessment experiments should be completed in a semester.

Course Outcomes:

(i) Student is exposed to volumetric titrations acquires some volumetric skills.
(ii) Student is able to analyze hard and soft water.
(iii) Student is exposed to volumetric skills of red-ox titrations with different indicators
(iv) Students can handle the instruments like conductometer, potentiometer in determining the concentrations of acids and bases.
(v) Student is able to analyze the different chemical concentrations using colorimeter and P^H meter.

Reference Books

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co. Latest edition

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I Year-I Semester		L	T	P	C
		0	0	3	1.5
NAME OF THE SUBJECT: PROBLEM SOLVING AND PROGRAMMING USING C LAB					

(Common to all branches)

Course Objectives:

The objectives of this course is to acquire knowledge on the

- To impart knowledge on basic Linux commands, various Editors, Raptor.
- To make the students understand the concepts of C programming.
- To nurture the students on Control Structures and develop different operations on arrays.
- To make use of String fundamentals and modular programming constructs.
- To implement programs using dynamic memory allocation.
- To explain the concepts of Structure, Unions and files for solving various problems.

List of Experiments:

1. Introduction to Algorithms and Flowcharts

1.1) Implement Algorithm Development for Exchange the values of Two numbers.
1.2) Given a set of n student's examination marks (in the range 0-100) make a count of the number of students that passed the examination. A Pass is awarded for all of 50 and above.
1.3) Given a set of n numbers design an algorithm that adds these numbers and returns the resultant sum. Assume N is greater than or equal to zero.

2. Introduction to C Programming

2.1) Basic Linux Commands.
2.2) Exposure to Turbo C, Vi, Emacs, Code Blocks IDE, Dev C++.
2.3) Writing simple programs using printf (), scanf () .

3. Raptor

3.1) Installation and Introduction to Raptor.
3.2) Draw a flow chart to find the Sum of 2 numbers.
3.3) Draw a flow chart to find Simple interest.

4. Basic Math

4.1) Write a C Program to convert Celsius to Fahrenheit and vice versa.
4.2) Write a C Program to find largest of three numbers using ternary operator.
4.3) Write a C Program to Calculate area of a Triangle using Heron's formula.

5. Control Flow- I

5.1) Write a C Program to Find Whether the Given Year is a Leap Year or not.
5.2) Write a C program to find the roots of a Quadratic Equation.
5.3) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide UsingSwitch...case.

6. Control Flow- II

6.1) Write a C Program to Find Whether the Given Number is Prime number or not.
6.2) Write a C Program to Find Whether the Given Number is Armstrong Number or not.
6.3) Write a C program to print Floyd Triangle.

7. Control Flow- III

7.1) Write a C program to find the sum of individual digits of a positive integer.
7.2) Write a C program to check whether given number is palindrome or not.
7.3) Write a C program to read two numbers, x and n, and then compute the sum of the geometric progression $1+x+x'+x^3+\ldots\ldots\ldots\ldots+x^n$.

8. Arrays

8.1) Write a C program to search an element in the given array (Linear Search).
8.2) Write a C program to perform matrix addition.
8.3) Write a C program to perform matrix multiplication.

9. Pointers

9.1) Write a C Program to Perform Addition. Subtraction, Multiplication and Division of two numbers using Command line arguments.
9.2) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.
9.3) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.

10. Functions, Array & Pointers

10.1) Write a C Program to demonstrate parameter passing in Functions.
10.2) Write a C Program to find Fibonacci. Factorial of a number with recursion and without recursion.
10.3) Write a C Program to find the sum of given numbers with arrays and pointers.

11. Strings

11.1) Implementation of string manipulation operations with library function:
a. copy
b. concatenate
c. length
d. compare

I 1.2) Implementation of string manipulation operations without library function:
a. copy
b. concatenate
c. length
d. compare

12. Structures

12.1) Write a C Program to Store Information of a book Using Structure.
12.2) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function.

13. Files

13.1) Write a C program to open a file and to print the contents of the file on screen.
13.2) Write a C program to copy content of one file to another file.
13.3) Write a C program to merge two files and store content in another file.

14. Application

Creating structures to capture the student's details save them in file in proper record format. search and prints the student details requested by the user.

Note: Draw the flowcharts using Raptor from Experiment 3 to Experiment 6.

Course Outcomes:

- Implement basic programs in C and design flowcharts in Raptor.
- Use Conditional and Iterative statements to solve real time scenarios in C.
- Implement the concept of Arrays and Modularity and Strings.
- Apply the Dynamic Memory Allocation functions using pointers.
- Develop programs using structures, and Files.

Text Books:

i. Let us C , Yaswanth Kanetkar, 16th Edition,BPB Publication.

ii. How to solve it by Computer, R. G. Dromey, and Pearson Education.
iii. Computer Programming. Reema Thareja, Oxford University Press

Reference Books:

i. Programming in C A-Practical Approach Ajay Mittal. Pearson Education.
ii. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.
iii. Problem solving using C , K Venugopal,3'd Edition, TMG Publication.

Web Links:

1. https://www.hackerrank.com/
2. https://www.codechef.com/
3. https://www.topcoder.com/
4. https://code-cracker.github.io/
5. https://raptor.martincar1is1e.com/
6. httos://npte1.ac.in/courses/106105055/2

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		L	T	P	C
I Year-II Semester		**3**	**0**	**0**	**3**
NAME OF THE SUBJECT: LINEAR ALGEBRA AND NUMERICAL METHODS					

(Common to all branches)

Course Objectives:
The objectives of this course is to acquire knowledge on the

(i) To instruct the concept of Matrices in solving linear algebraic equations
(ii) To elucidate the different numerical methods to solve nonlinear algebraic equations
(iii) To disseminate the use of different numerical techniques for carrying out numerical integration.
(iv) To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications

UNIT – I:
Systems of linear equations, Eigen values and Eigen vectors: (10 hrs)
Rank of a matrix by echelon form and normal form – Solving system of homogeneous and non-homogeneous linear equations – Gauss Elimination method – Eigenvalues and Eigen vectors and their properties.
Applications: Free vibration of a two-mass system.

UNIT – II:
Cayley-Hamilton theorem and Quadratic forms: (10 hrs)
Cayley-Hamilton theorem (without proof) – Finding inverse and power of a matrix by Cayley-Hamilton theorem –Reduction to Diagonal form– Quadratic forms and nature of the quadratic forms – Reduction of quadratic form to canonical forms by orthogonal transformation.
Singular values of a matrix, singular value decomposition (Ref. Book – 1).

UNIT – III:
Iterative methods: (8 hrs)
Introduction– Solutions of algebraic and transcendental equations : Bisection method–Secant method – Method of false position– Iteration method – Newton-Raphson method (One variable and simultaneous Equations)
Solutions of system of equations - Jacobi and Gauss-Seidel methods
Evaluation of largest eigenvalue –eigenvector using Power Method.

UNIT – IV:
Interpolation: (10 hrs)

Introduction - Errors in polynomial interpolation – Finite differences– Forward differences– Backward differences –Central differences – Relations between operators – Newton's forward and backward formulae for interpolation – Interpolation with unequal intervals – Lagrange's interpolation formula– Newton's divide difference formula.

UNIT–V:
Numerical integration and solution of differential equations with initial conditions: (10 hrs)
Trapezoidal rule– Simpson's $1/3^{rd}$ and $3/8^{th}$ rule– Solution of differential equations with initial conditions by Taylor's series– Picard's method of successive approximations– Euler's method –Runge-Kutta method (second and fourth order) – Milne's Predictor and Corrector Method.

Course Outcomes: The student will be able to

(i) Develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)

(ii) Solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel (L3)

(iii) Evaluate approximating the roots of polynomial and transcendental equations by different algorithms (L5)

(iv) Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3)

(v) Apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations (L3)

Text Books:

(i) **B. S. Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.

(ii) **B. V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

Reference Books:

(i) **David Poole,** Linear Algebra- A modern introduction, 4th Edition, Cengage.

(ii) **Steven C. Chapra,** Applied Numerical Methods with MATLAB for Engineering and Science, Tata Mc. Graw Hill Education.

(iii) **M. K. Jain, S. R. K. Iyengar and R. K. Jain,** Numerical Methods for Scientific and Engineering Computation, New Age International Publications.

(iv) **Lawrence Turyn,** Advanced Engineering Mathematics, CRC Press.

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I Year-I / II Semester		L	T	P	C
		3	0	0	3
NAME OF THE SUBJECT: ENGINEERING PHYSICS					

(Common to CE, ME & MET)

Course Objectives:

The objectives of this course is to acquire knowledge on the

i. To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications
ii. Understand the mechanism for emission of light, utility of lasers as coherent light sources for low and high energy applications, study of propagation of light through optical fibers and their implications in optical communications.
iii. Open new avenues of utility for dielectric and magnetic materials as potential sources for micro devices.
iv. Familiarize the concepts of theoretical acoustics for their practical utility in engineering acoustics. Explanation for the significance of ultrasound and its application in NDT application.
v. Enlighten the periodic arrangement of atoms in Crystalline solids by Bragg's law – Learning the structural analysis through X-ray diffraction

UNIT I:

Wave Optics **12hrs**

Interference: Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications -Colors in thin films- Newton's Rings- Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffraction - Fraunhofer diffraction due to single slit, double slit - N-slits(Qualitative) – Grating - resolving power of Grating(Qualitative).

Polarization: Introduction-Types of polarization - Polarization by reflection and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

UNIT II:

Lasers and Fiber optics **10hrs**

Lasers: Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of radiation – Einstein's coefficients – Population inversion –Lasing action- Pumping mechanisms – Ruby laser – He-Ne laser - Applications of lasers.

Fiber optics: Introduction –Principle of optical fiber- Acceptance Angle-Numerical Aperture-Classification of optical fibers based on refractive index profile and modes – Block diagram of fiber optics communication.

UNIT III:

Dielectric and Magnetic Materials **8hrs**

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility and Dielectric constant - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field- Clausius-Mossotti equation.

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability - Origin of permanent magnetic moment - Classification of magnetic materials: Dia, para, Ferro, antiferro & Ferrimagnetic materials - Domain concept for Ferromagnetism (Qualitative) - Hysteresis - soft and hard magnetic materials.

Unit-IV:

Acoustics and Ultrasonics **10hrs**

Acoustics: Introduction – requirements of acoustically good hall– Reverberation – Reverberation time– Sabine's formula (Derivation using growth and decay method) - Absorption coefficient and its determination – Factors affecting acoustics of buildings and their remedial measures.

Ultrasonics: Introduction - Properties - Production by magnetostriction and piezoelectric methods – Detection - Acoustic grating - Non Destructive Testing-Transducers – pulse echo system through transmission and reflection modes - Applications.

Unit-V:

Crystallography and X-ray diffraction **8hrs**

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattice – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer– crystal structure determination by Laue's powder method-XRD pattern of amorphous, crystalline, and nanomaterials.

Course Outcomes:

The students should be able to

i. **understand** the concepts of physical optics through the wave nature of light and **discuss** the phenomenal differences between interference, diffraction and polarization.
ii. **describe** the basic laser physics, working of lasers, and principle of propagation of light in optical fibers.
iii. **explain** the basics of dielectric and magnetic materials to synthesize new materials as per needs of engineering applications.
iv. **apply** the knowledge of Ultrasonic to understand non destructive testing and **analyze** acoustic properties of typically used materials in buildings
v. **recognize** various planes in a crystal and describe the structure determination using x-rays.

Text books:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company
2. Engineering physics – D.K. Battacharya and Poonam Tandon, Oxford University press.
3. Engineering Physics by P.K.Palanisamy SciTech publications.

Reference Books:

1. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons
2. Engineering Physics – M.R.Srinivasan, New Age Publications
3. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning

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I Year-I / II Semester		L	T	P	C
		3	0	0	3
NAME OF THE SUBJECT : COMMUNICATIVE ENGLISH					

(Common to all branches)

Course Objectives

(i) Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
(ii) Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
(iii) Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
(iv) Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
(v) Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

UNIT 1:

A Drawer full of happiness

Listening: Listening to short audio texts and identifying the topic. Listening to prose, prose and conversation.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests. Self introductions and introducing others.

Reading: Skimming text to get the main idea. Scanning to look for specific pieces of information.

Reading for Writing: Paragraph writing (specific topics) using suitable cohesive devices; linkers, sign posts and transition signals; mechanics of writing - punctuation, capital letters.

Vocabulary: Technical vocabulary from across technical branches (20) GRE Vocabulary (20) (Antonyms and Synonyms, Word applications) Verbal reasoning and sequencing of words.

Grammar: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural basic sentence structures; simple question form - wh-questions; word order in sentences.

Pronunciation: Vowels, Consonants, Plural markers and their realizations

UNIT 2:

Nehru's letter to his daughter Indira on her birthday

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts, both in speaking and writing.

Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks. Functional English: Greetings and leave takings. **Reading**: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Reading for Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.

Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary Analogies (20 words) (Antonyms and Synonyms, Word applications)

Grammar: Use of articles and zero article; prepositions.

Pronunciation: Past tense markers, word stress-di-syllabic words

UNIT 3:

Stephen Hawking-Positivity 'Benchmark'

Listening: Listening for global comprehension and summarizing what is listened to, both in speaking and writing.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed. Functional English: Complaining and Apologizing.

Reading: Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension. Critical reading.

Reading for Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions. Letter writing-types, format and principles of letter writing.E-mail etiquette, Writing CV's.

Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Association, sequencing of words

Grammar: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Pronunciation: word stress-poly-syllabic words.

UNIT 4:

Liking a Tree, Unbowed: Wangari Maathai-biography

Listening: Making predictions while listening to conversations/ transactional dialogues without video (only audio); listening to audio-visual texts.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. Functional English: Permissions, Requesting, Inviting.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicative process or display complicated data.

Reading for Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables . Writing SOP, writing for media.

Vocabulary: Technical vocabulary from across technical branches (20 words) GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Cloze Encounters.

Grammar: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

Pronunciation: Contrastive Stress

UNIT 5:

Stay Hungry-Stay foolish

Listening: Identifying key terms, understanding concepts and interpreting the concepts both in speaking and writing.

Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides. Functional English: Suggesting/Opinion giving.

Reading: Reading for comprehension. RAP Strategy Intensive reading and Extensive reading techniques.

Reading for Writing: Writing academic proposals- writing research articles: format and style.

Vocabulary: Technical vocabulary from across technical branches (20 words) GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Coherence, matching emotions.

Grammar: Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Pronunciation: Stress in compound words

Course Outcomes:

At the end of the module, the learners will be able to

(i) Understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
(ii) Ask and answer general questions on familiar topics and introduce oneself/others
(iii) Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
(iv) Recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
(v) Form sentences using proper grammatical structures and correct word forms

Prescribed text books:

(i) "**Infotech English**", Maruthi Publications. (Detailed)

Reference Books

1. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012
5. Martin Hewings , Advanced English Grammar, Cambridge university press
6. William Strunk JR. and E B White, Elements of Style, 4th Edition, Pearson
7. *Language and Life: A Skills Approach* Board of Editors, Orient Black Swan Publishers, India. 2018.
8. *Practical English Usage*, Michael Swan. OUP. 1995.
9. *Remedial English Grammar*, F.T. Wood. Macmillan.2007
10. *On Writing Well*, William Zinsser. Harper Resource Book. 2001
11. *Study Writing*, Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
12. *Communication Skills*, Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
13. *Exercises in Spoken English*, Parts. I-III. CIEFL, Hyderabad. Oxford University Press.
14. *Advanced English Grammar*, Martin Hewings. Cambridge University Press. 2016
15. *Elements of Style,* William Strunk and EB White. Pearson. 1999.

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I Year-II Semester		L	T	P	C
		3	0	0	3
NAME OF THE SUBJECT : ENGINEERING MECHANICS					

(Common to ME, CE and MET)

Course Objectives:
The objectives of this course is to acquire knowledge on the
i. The students are to be exposed to the concepts of force and friction, direction and its application.
ii. The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.
iii. The students are to be exposed to concepts of centre of gravity. The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.
iv. The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.
v. The students are to be exposed to rigid motion kinematics and kinetics.

UNIT – I
Introduction to Engineering Mechanics – Basic Concepts.
Systems of Forces: Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.
Friction: Introduction**,** limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction

UNIT II
Equilibrium of Systems of Forces: Free Body Diagrams, , Lami's Theorem, Equations of Equilibrium of Coplanar Systems, Graphical method for the equilibrium, Triangle law of forces, converse of the law of polygon of forces condition of equilibrium, Equations of Equilibrium for Spatial System of forces, Numerical examples on spatial system of forces using vector approach, Analysis of plane trusses.

UNIT – III
Centroid: Centroids of simple figures (from basic principles) – Centroids of Composite Figures
Centre of Gravity: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorems.
Area moments of Inertia: Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.
Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT – IV
Rectilinear and Curvilinear motion of a particle: Kinematics and Kinetics- D'Alembert's Principle, Work Energy method and applications to particle motion- Impulse momentum method.

UNIT – V
Rigid body Motion: Kinematics and kinetics of translation, Rotation about fixed axis and plane motion, Work Energy method and Impulse momentum method.

Course Outcomes:

The students should be able to:

i. To learn the principles (Axioms) of statics, able to find resultant & resolution of system of forces and resultant force.

ii. Explore the concepts of constraints, free body diagram and action-reaction.

iii. Estimate the geometric parameters like centroid, centre of gravity and moment of inertia and identify their application.

iv. Learn the analysis of frames and trusses and know the importance of friction.

v. Able to determine solution to dynamic problems through D'Alembert equilibrium equations, Impulse-Momentum and work– energy method

Text Book:

1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4th Edn - , Mc Graw Hill publications.
2. Engineering Mechanics statics and dynamics – R.C.Hibbeler, 11th Edn – Pearson Publ.
3. Theory & Problems of engineering mechanics, statics & dynamics – E.W.Nelson, C.L.Best & W.G. McLean, 5th Edn – Schaum's outline series - Mc Graw Hill Publ.

Reference Books:

1. Engineering Mechanics , statics – J.L.Meriam, 6th Edn – Wiley India Pvt Ltd.
2. Engineering Mechanics , dynamics – J.L.Meriam, 6th Edn – Wiley India Pvt Ltd.
3. Engineering Mechanics , statics and dynamics – I.H.Shames, – Pearson Publ.
4. Mechanics For Engineers , statics - F.P.Beer & E.R.Johnston – 5th Edn Mc Graw Hill Publ.
5. Mechanics For Engineers, dynamics - F.P.Beer & E.R.Johnston –5th Edn Mc Graw Hill Publ.
6. Engineering Mechanics , Fedinand . L. Singer , Harper – Collins.
7. Engineering Mechanics statics and dynamics , A Nelson , Mc Graw Hill publications
8. Engineering Mechanics, Tayal. Umesh Publ.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
I Year-II Semester		**1**	**0**	**4**	**3**
NAME OF THE SUBJECT : COMPUTER AIDED ENGINEERING DRAWING					

(Common to CE and MET)

Course Objectives:
The objectives of this course is to acquire knowledge on the

i. The knowledge of projections of solids is essential in 3D modeling and animation. The student will be able to draw projections of solids. The objective is to enhance the skills they already acquired in their earlier course in drawing of projection.
ii. The knowledge of sections of solids and development of surfaces is required in designing and manufacturing of the objects. Whenever two or more solids combine, a definite curve is seen at their intersection
iii. The intersection of solids also plays an important role in designing and manufacturing. The objective is to impart this knowledge through this topic. A perspective view provides a realistic 3D View of an object. The objective is to make the students learn the methods of Iso and Perspective views.
iv. The objective is to introduce various commands in AutoCAD to draw the geometric entities and to create 2D and 3D wire frame models.
v. By going through this topic the student will be able to understand the paper-space environment thoroughly.
vi. The objective is to make the students create geometrical model of simple solids and machine parts and display the same as an Isometric, Orthographic or Perspective projection.

UNIT-I:
PROJECTIONS OF SOLIDS: Projections of Regular Solids inclined to both planes - Auxiliary Views.

UNIT-II:
SECTIONS OF SOLIDS: Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.
DEVELOPMENT OF SOLIDS: Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid, Cone and their parts.

UNIT-III:
INTERPENETRATION OF RIGHT REGULAR SOLIDS: Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone, Prism Vs Cone.
PERSPECTIVE PROJECTIONS: Perspective View: Points, Lines, Plane Figures and Simple Solids, Vanishing Point Methods (General Method only).

In part B computer aided drafting is introduced.

UNIT IV:
INTRODUCTION TO COMPUTER AIDED DRAFTING: Generation of points, lines, curves, polygons, dimensioning. Types of modeling: object selection commands – edit, zoom, cross hatching, pattern filling, utility commands, 2D wire frame modeling, 3D wire frame modeling,.

UNIT V:
VIEW POINTS AND VIEW PORTS: view point coordinates and view(s) displayed, examples to exercise different options like save, restore, delete, joint, single option.

UNIT VI:
COMPUTER AIDED SOLID MODELING: Isometric projections, orthographic projections of isometric projections, Modeling of simple solids, Modeling of Machines & Machine Parts.

Course Outcomes:

The students should be able to learn:

i. The concepts of projections of solids inclined to both the planes
ii. The concepts of sections of solids and developments of surfaces
iii. The interpenetration of right regular solids.
iv. Basics in AutoCAD.
v. Concepts of view points and view ports and draw 2D and 3D objects using edit commands in AutoCAD.
vi. Computer aided solid modeling techniques

Text Books:

1. Engineering drawing by N.D Bhatt , Charotar publications.
2. Engineering Graphics, K.C. john, PHI Publications

References Books:

1. Mastering Auto CAD 2013 and Auto CAD LT 2013 – George Omura, Sybex
2. Auto CAD 2013 fundamentals- Elisemoss, SDC Publ.
3. Engineering Drawing and Graphics using Auto Cad – T Jeyapoovan, vikas
4. Engineering Drawing + AutoCAD – K Venugopal, V. Prabhu Raja, New Age
5. Engineering Drawing – RK Dhawan, S Chand
6. Engineering Drawing – MB Shaw, BC Rana, Pearson
7. Engineering Drawing – KL Narayana, P Kannaiah, Scitech
8. Engineering Drawing – Agarwal and Agarwal, Mc Graw Hill
9. Engineering Graphics – PI Varghese, Mc Graw Hill
10. Text book of Engineering Drawing with auto-CAD , K.venkata reddy/B.S . publications.
11. Engineering Drawing with Auto CAD/ James D Bethune/Pearson Publications
12. Engineering Graphics with Auto CAD/Kulkarni D.M, Rastogi A.P, Sarkar A.K/PHI Publications

End Semester examination shall be conducted for **Four** hours with the following pattern:

a) Two hours – Conventional drawing
b) Two hours – Computer Aided Drafting

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I Year- I / II Semester		L	T	P	C
		0	0	3	1.5
Name of the Subject Engineering Physics Lab					

(Common to CE, ME & MET)

Course Objectives:

The objectives of this course is to acquire knowledge on the

i. To **impart skills** in measurements with accurate error propagation.
ii. To **plan** the experimental procedure, **design** and to record and **analysis** results.
iii. To reach non trivial conclusions of significant of the experiments.
iv. To **develop** the skills to handle different instruments without taking erroneous readings and ability to enhance the skills to fabricate engineering and technical equipments.

List of experiments:

1. Laser: Determination of wavelength using diffraction grating.
2. Study of variation of magnetic field along the axis of a current carrying circular coil by Stewart & Gee's method.
3. Determination of ultrasonic velocity in given liquid (Acoustic grating).
4. Determination of dielectric constant for different materials.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of Planck's constant using reverse photoelectric effect.
7. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum).
8. Determination of numerical aperture and acceptance angle of an optical fiber.
9. Determination of thickness of thin object by wedge method.
10. Determination of radius of curvature of given plan convex lens by Newton's rings.
11. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
12. Determination of dispersive power of the prism.
13. Determining the velocity of ultrasonic waves by using an ultrasonic interferometer.
14. Measurement of magnetic susceptibility by Quick's method.
15. Measurement of magnetic susceptibility by Kundt's tube method.

Course outcomes: The students will be able to

i. **Describe** the methodology of science and the relationship between observation and theory.
ii. **Develop** scientific problem solving skills, including organization of given information, identification and application of pertinent principles, quantitative solutions, interpreting results, and evaluating the validity of results.
iii. **Discover** of physics concepts in other disciplines such as mathematics, computer science, engineering, and chemistry.
iv. **Learn** to minimize contributing variables and recognize the limitations of equipment.
v. **Apply** conceptual understanding of the physics to general real-world situations.
vi. **Develop** interpersonal and communication skills including communicating in small groups, writing, working effectively with peers.

Reference Books:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.

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I Year-I / II Semester		L	T	P	C
		0	0	3	1.5
Name of the Subject :English Communication Skills Lab					

(Common to all branches)

Course Objectives

(i) To impart grammar as well as communication through pronunciation. By introduction, pure vowels, consonants, diphthongs, phonetic transcription, common errors in pronunciation.
(ii) To impart better knowledge on Stress. Stress of kinds- mono syllabic, di syllabic, poly syllabic, strong and weak forms of stress along with contrastive stress.
(iii) To impart learner grammar as well as communication through compound words, rhythm, intonation and accent neutralization
(iv) To impart learner grammar as well as communication through listening, by identifying the context and specific pieces of information to answer a series of questions in speaking
(v) To improve the spoken skills of students by making them read news papers in order to understand and identify key terms context they read .

UNIT I:

Vowels, Consonants, Pronunciation, Phonetic Transcription, Common Errors in Pronunciation,

UNIT II:

Word stress-di-syllabic words, poly-syllabic words, weak and strong forms, contrastive stress (Homographs)

UNIT III:

Stress in compound words, rhythm, intonation, accent neutralisation.

UNIT IV:

Listening to short audio texts and identifying the context and specific pieces of information to answer a series of questions in speaking.

UNIT V:

Newspapers reading; Understanding and identifying key terms and structures useful for writing reports.

Course Outcomes:

At the end of the module, the learners will be able to

(i) The learner will improve phonetic understanding, transcription, common errors both in pronunciation and written English.
(ii) The learner will improve syllabic division, and how to use right stress in their pronunciation.
(iii) The learner will improve speaking skills with right intonation and rhythm and intonation and how to reduce mother tongue influence in English.
(iv) The learner will Improve speaking skills as well as listening skills by listening through the audio clips prescribed.
(v) The learner will Improve speaking skills along with reading skills.

Prescribed text book:
(i) "**InfoTech English**", Maruthi Publications.

References:
1. Exercises in Spoken English Part 1,2,3,4, OUP and CIEFL.
2. English Pronunciation in use- Mark Hancock, Cambridge University Press.
3. English Phonetics and Phonology-Peter Roach, Cambridge University Press.
4. English Pronunciation in use- Mark Hewings, Cambridge University Press.
5. English Pronunciation Dictionary- Daniel Jones, Cambridge University Press.
6. English Phonetics for Indian Students- P. Bala Subramanian, Mac Millan Publications.

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		L	T	P	C
I Year-II Semester		**0**	**0**	**3**	**1.5**
NAME OF THE SUBJECT : ENGINEERING WORKSHOP PRACTICE					

(Common to ME, CE and MET)

Course Objectives:

The objectives of this course is to acquire knowledge on the

i. To impart hands-on practice on Carpentry trade and skills.
ii. To impart hands-on practice on Fitting trade and skills
iii. To impart hands-on practice on Black Smithy trade and skills
iv. To impart hands-on practice on House Wiring trade and skills
v. To impart hands-on practice on Tin Smithy trade and skills

Note: At least two exercises to be done from each trade.

Trade:

1. **Carpentry**
   1. T-Lap Joint
   2. Cross Lap Joint
   3. Dovetail Joint
   4. Mortise and Tenon Joint

2. **Fitting**
   1. Vee Fit
   2. Square Fit
   3. Half Round Fit
   4. Dovetail Fit

3. **Black Smithy**
   1. Round rod to Square
   2. S-Hook
   3. Round Rod to Flat Ring
   4. Round Rod to Square headed bolt

4. **House Wiring**
   1. Parallel / Series Connection of three bulbs
   2. Stair Case wiring
   3. Florescent Lamp Fitting
   4. Measurement of Earth Resistance

5. **Tin Smithy**
   1. Taper Tray
   2. Square Box without lid
   3. Open Scoop
   4. Funnel

6. **IT Workshop**
   1. Assembly & Disassembly of Computer

Course Outcomes:

The students should be able to:

i. Understand and practice Carpentry tools and trade.
ii. Apply various types of Fitting tools and practice the trade
iii. Understand and practice Black Smithy tools and trade
iv. Apply concepts of House Wiring trade
v. Analyze working of various tools of Tin Smithy trade
vi. Understand the basic hardware of computer

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		L	T	P	C
I Year-I/II Semester		**3**	**0**	**0**	**0**
NAME OF THE SUBJECT: ENVIRONMENTAL SCIENCE					

(Common to All branches)

Course Objectives:

The objectives of this course is to acquire knowledge on the

(i) The natural resources and their sustenance of the life and recognize the need to conserve the natural resources.
(ii) The concepts of ecosystem and its functions in the environment .The need for protecting the producers and consumers and their role in the food web.
(iii) The biodiversity of India and the threats to biodiversity, and the conservation practices to protect the biodiversity.
(iv) Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management.
(v) Social issues both rural and urban environment and the possible means to combat the challenges

UNIT - I:

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, Scope and Importance - Need for public Awareness.

Natural Resources : Renewable and non-renewable resources - Natural resources and associated problems - Forest resources - Use and over - exploitation, deforestation, case studies – Timber extraction - Mining, dams and other effects on forest and tribal people - Water resources - Use and over utilization of surface and ground water - Floods, drought, conflicts over water, dams – benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modem agriculture, fertilizer-pesticide problems, water logging, salinity,
case studies. - Energy resources:

UNIT - II:

ECOSYSTEMS, BIODIVERSITY AND ITS CONSERVATION

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem - Producers, consumers and decomposers - Energy flow in the ecosystem - Ecological succession - Food chains ,food webs and ecological pyramids - Introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems(ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its Conservation : Definition: genetic, species and ecosystem diversity – Biogeographical classification of India - Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values - Biodiversity at global, National and local levels - India as amega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts - Endangered and endemic species of India - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III:

Environmental Pollution and solid waste Management

Environmental pollution: Definition, Cause, effects and control measures of : Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes -Role of an individual in prevention of pollution - Pollution case studies - Disaster management: floods, earthquake, cyclone and landslides.

UNIT - IV:

SOCIAL ISSUES AND THE ENVIRONMBNT

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy - Water conservation, rain water harvesting, watershed management -Resettlement and rehabilitation of people; its problems and concems. Case studies – Environment alethics: Issues and possible solutions - Climate change, global warming, acid rain, ozone layerdepletion, nuclear accidents and holocaust. Case Studies - Wasteland reclamation' - Consumerismand waste products. - Environment Protection Act. - Air (Prevention and Control of Pollution) Act. -Water (prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act -
Issues involved in enforcement of environmental legislation * Public awareness.

UNIT - V:

HUMAN POPULATION AND THE ENVIRONMENT

Human population and the Environment: Population growth, variation among nations' Population explosion - Family Welfare programmed. - Environment and human health - Human Rights – Value Education - HIV/AIDS - Women and Child Welfare - Role of information Technology in Environment and human health - Case studies.
Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain - Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds - river, hill slopes, etc"

Course Outcomes:

The students should be able to:

(i) i. Gain a higher level of personal involvement and interest in understanding and solving ' environmental problems
(ii) ii. Comprehend environmental problems from multiple perspectives with emphasis on human modern lifestyles and developmental activities
(iii) Demonstrate knowledge relating to the biological systems involved in the major global environmental problems of the 2lst century.
(iv) .Influence their society in proper utilization of goods and services, Recognize the interconnectedness of human dependence on the earth's ecosystems.
(v) Learn the management of environmental hazards and to mitigate disasters and have a clear

Text Books:

(i) Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
(ii) Environmental Studies by Palaniswamy - Pearson education
(iii) Environmental Studies by Dr.S.Azeem Unnisa, Academic Publishing Company

Reference Books:

(i) Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications.
(ii) Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
(iii) Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
(iv) Environmental sciences and engineering - J. Glynn Henry and Gary W. Heinke - Prentice hallIndia Private limited.
(v) A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Publishing House
(vi) Introduction to Environmental engineering and science by Gilberl M. Masters and Wendell P.Ela - Prentice hall of India Private limited

II Year - I Semester **L T P C**

3 0 0 3

Vector Calculus, Transforms and PDE

(Common to CE, EEE, ME, ECE & MET**)**

Course Learning Objectives:

The student should able to understand the concepts of

1. Volume integral - Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and their applications.
2. Properties of Laplace Transforms : Shifting theorems –Transforms of derivatives and integrals
3. Fourier series of periodic function, Dirichlet's conditions, Even and odd functions
4. To familiarize the techniques in partial differential equations
5. To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Interpret the physical meaning of different operators such as gradient, curl and divergence
2. Estimate the work done against a field, circulation and flux using vector calculus
3. Apply the Laplace transform for solving differential equations
4. Find or compute the Fourier series of periodic signals
5. Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms

SYLLABUS:

UNIT – 1: Vector calculus:

Differentiation of vectors – Scalar and vector point functions – Gradient – Directional derivative

– Divergence – Curl.

Integration of vectors - Line integral – Circulation - Work done – Surface integral – Flux – Volume integral - Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and their applications.

UNIT – II: Laplace Transforms:

Definition of Laplace transform - Laplace transforms of standard functions – Properties of Laplace Transforms : Shifting theorems –Transforms of derivatives and integrals – Unit step function – Dirac's delta function – Inverse Laplace transforms – Convolution theorem (with out proof).

Applications: Solving ordinary differential equations (initial value problems) and integro differential equations using Laplace transforms.

UNIT – III: Fourier series and Fourier Transforms:

Fourier series: Introduction – Periodic functions – Fourier series of periodic function – Dirichlet's conditions – Even and odd functions – Change of interval – Half-range sine and cosine series.

Fourier Transforms: Fourier integral theorem (without proof) – Fourier sine and cosine integrals – Sine and cosine transforms – Properties – inverse transforms – Finite Fourier transforms.

UNIT – IV: Partial differential equations of first order:

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

UNIT – V: Second order PDE and Applications:

Second order PDE: Solutions of linear partial differential equations with constant coefficients –

RHS term of the type e^{ax+by} , $\sin(ax+by)$,$\cos(ax+by)$, $x^m y^n$.

Applications of PDE: Method of separation of Variables – Solution of One dimensional Wave, Heat and two-dimensional Laplace equation.

TEXT BOOKS:

1. **B. S. Grewal,** Higher Engineering Mathematics, 44th Edition, Khanna Publishers.
2. **B. V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

REFERENCE BOOKS:

1. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India.
2. **Dean. G. Duffy,** Advanced Engineering Mathematics with MATLAB, 3rd Edition, CRC Press.
3. **Peter O' Neil,** Advanced Engineering Mathematics, Cengage.
4. **Srimantha Pal, S C Bhunia,** Engineering Mathematics, Oxford University Press

II Year - I Semester **L T P C**

3 0 0 3

STRENGTH OF MATERIALS

Course Learning Objectives:

The student should able to understand the concepts of

1. Strength of Material and Principles of Elasticity and Plasticity Stress strain behavior of materials and their governing laws. Introduce student the moduli of Elasticity and their relations
2. Bending Moment and Shear force for beams with different boundary and loading conditions and to draw the diagrams of variation across the length.
3. Stresses developed in the cross section and bending equations calculation of section modulus of sections with different cross sections
4. Measuring deflections in beams under various loading and support conditions
5. Classification of cylinders based on their thickness and to derive equations for measurement of stresses across the cross section when subjected to external pressure.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Study the basic materials behavior under the influence of different external loading conditions and the support conditions
2. Draw the diagrams indicating the variation of the key performance features like bending moment and shear forces
3. Understand bending concepts and calculation of section modulus and for determination of stresses developed in the beams and deflections due to various loading conditions
4. Assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure using lame`s equation.
5. Analyze the stresses in thin and thick cylinders

SYLLABUS:

UNIT – I: Simple Stresses And Strains : Elasticity and plasticity – Types of stresses and strains

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

Principal Stresses and Strains: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses

.**Strain Energy** – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

UNIT – II: Shear Force And Bending Moment: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contraflexure – Relation between S.F., B.M and rate of loading at a section of a beam.

Torsion: Theory of pure torsion – Derivation of Torsion equations: $T/J = q/r = N\phi/L$ –Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus

UNIT – III: Flexural Stresses: Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/y = E/R$, Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections**. Shear Stresses:** Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections, built up beams, shear centre.

Columns: 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

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

Analysis Of Pin-Jointed Plane Frames: Determination of Forces in members of plane pin- jointed perfect trusses by (i) method of joints and (ii) method of sections. Analysis of

UNIT – V: Thin And Thick Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains
– changes in diameter, 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

TEXT BOOKS:

i. Strength of Materials by Strength of materials, R. K. Rajput, S. Chand & Co, New Delhi
ii. Strength of Materials by S. Ramamrutham.

REFERENCES:

i. Strength of Materials by R.K Bansal, Lakshmi Publications
ii. Strength of Materials by R. Subramanian, Oxford Publications

II Year - I Semester	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

FLUID MECHANICS

Course Learning Objectives:

The student should able to understand the concepts of

1. The properties of fluids and fluid statics
2. Classification of flows
3. Euler's and bernoulli's equation
4. Losses in pipes and measurement of flow
5. The various flow measuring devices

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Calculate the measurement of pressure
2. Calculate the forces on submerged plane
3. Understand Flow through long tubes, hydro dynamically smooth and rough flows.
4. Measurement of Flow using **Pitot** tube, Venturi meter and Orifice meter
5. Study the Concepts of boundary layer and characterization

SYLLABUS:

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

UNTI – II Hydrostatics: Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure. Stability of Floating and submerged bodies

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

UNIT – III Fluid Dynamics: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line - Momentum equation and its application – forces on pipe bend. Laminar Flow And Turbulent Flows: Reynold's experiment – Characteristics of Laminar & Turbulent flows, Shear and velocity distributions, Laws of Fluid friction, Hagen-Poiseulle Formula, Flow between parallel plates, Flow through long tubes, hydro dynamically smooth and rough flows.

UNIT – IV Closed Conduit Flow: Darcy-Weisbach equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line, variation of friction factor with Reynold's number – Moody's Chart, Pipe network problems, Hazen-Williams formula, Hard- Cross Method, Measurement of Flow: Pitot tube, Venturi meter and Orifice meter – classification of orifices, small orifice and large orifice, flow over rectangular, triangular, trapezoidal and stepped notches - –Broad crested weirs.

UNIT – V Boundary Layer Theory: Boundary layer (BL) – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarman momentum integral equation, laminar and turbulent Boundary layers (no deviations)- BL in transition, separation of BL, Control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

TEXT BOOKS:

i. Fluid Mechanics, P. N. Modi and S. M. Seth, Standard book house, New Delhi

ii. A text of Fluid mechanics and hydraulic machines, R. K. Bansal - Laxmi Publications (P) ltd., New Delhi

REFERENCES:

i. Mechanics of Fluids, Merle C. Potter, David C. Wiggert and Bassem H. Ramadan,

CENGAGE Learning

ii. Fluid Mechanics and Machinery, C.S.P. Ojha, R. Berndtsson and P.N. Chandramouli, Oxford Higher Education.

II Year - I Semester

L	T	P	C
3	0	0	3

SURVEYING

Course Learning Objectives:

The student should able to understand the concepts of

1. basic principles of surveying
2. Various methods of linear measuring instruments
3. Angles measuring instruments like compass and theodolite
4. Temporary and permanent, measurement of horizontal and vertical angles.
5. Determine the area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. To demonstrate the basic surveying skills
2. To use various surveying instruments.
3. To perform different methods of surveying
4. To compute various data required for various methods of surveying.
5. To integrate the knowledge and produce topographical map.

SYLLABUS:

UNIT – I Introduction: definition-Uses of surveying- overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications – Errors in survey measurements

UNIT – II Distances And Direction: Electronic distance measurements (EDM)-principles of electro optical EDM-Errors and corrections to linear measurements-Compass survey- Meridians, Azimuths and Bearings, declination, computation of angle.

Traversing-Purpose-types of traverse-traverse computation-traverse adjustments-Introduction omitted measurements

UNIT – III Leveling And Contouring: Concept and Terminology, Levelling Instruments and their Temporary and permanent adjustments- method of levelling. Characteristics and Uses of contours- methods of conducting contour surveys.

UNIT – IV Theodolite: Description, principles-uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite – Introduction to Trigonometrical leveling,.

Tachometric Surveying: Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.

UNIT – V Curves: Types of curves, design and setting out – simple and compound curves- Introduction to geodetic surveying, Total Station and Global positioning system

Computation Of Areas And Volumes**:** Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

TEXT BOOKS:

i. Surveying, Vol No.1, 2 &3, B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications Ltd, New Delhi.
ii. Advance Surveying, Satish Gopi, R. Sathi Kumar and N. Madhu, Pearson Publications.
ii. Text book of Surveying, C. Venkataramaiah, University press, India Limited.
iv. Surveying and levelling, R. Subramanian, Oxford University press.

REFERENCES:

i. Text book of Surveying, S.K. Duggal (Vol No. 1&2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.
ii. Text book of Surveying, Arora (Vol No. 1&2), Standard Book House, Delhi.
iii. Higher Surveying, A.M. Chandra, New Age International Pvt

II Year - I Semester

L	T	P	C
3	0	0	3

CONCRETE TECHNOLOGY

Course Learning Objectives:

The student should able to understand the concepts of

1. Concepts of Concrete production and its behaviour in various environments.
2. Learn the test procedures for the determination of properties of concrete.
3. Understand durability properties of concrete in various environments.
4. Modulus of elasticity, Dynamic modulus of elasticity , Poisson's ratio
5. Mix proportions and understand the concepts of Durability of concrete, Quality Control of concrete.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Realize the importance of quality of concrete.
2. Test the fresh concrete properties and the hardened concrete properties.
3. Evaluate the ingredients of concrete through lab test results. Design the concrete mix by BIS method.
4. Familiarize the basic concepts of special concrete and their production and applications. Understand the behavior of concrete in various environments.
5. Mix design of concrete

SYLLABUS:

UNIT I : Ingredients Of Concrete Cements & Admixtures: Portland cement – Chemical composition – Hydration, Setting of cement, Fineness of cement, Structure of hydrate cement – Test for physical properties – Different grades of cements – Admixtures – Mineral and chemical admixtures – accelerators, retarders, air entrainers, plasticizers, super plasticizers, fly ash and silica fume.

Aggregates: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand –Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus

– Grading curves – Grading of fine & coarse Aggregates – Gap graded and well graded aggregate as per relevant IS code – Maximum aggregate size. Quality of mixing water,

UNIT – II, Fresh Concrete: Steps in Manufacture of Concrete–proportion, mixing, placing, compaction, finishing, curing – including various types in each stage. Properties of fresh concrete- Workability – Factors affecting workability – Measurement of workability by different tests, Setting times of concrete, Effect of time and temperature on workability – Segregation & bleeding

– Mixing and vibration of concrete, Ready mixed concrete, Shotcrete. Special Concretes: Ready mixed concrete, Shotcrete, Light weight aggregate concrete, Cellular concrete, No-fines concrete, High density concrete, Fibre reinforced concrete, Different types of fibres, Factors affecting properties of F.R.C, Polymer concrete, Types of Polymer concrete, Properties of polymer concrete, High performance concrete – Self consolidating concrete, SIFCON, self healing concrete.

UNIT – III, Hardened Concrete: Water / Cement ratio – Abram's Law – Gel space ratio – Nature of strength of concrete –Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength – Curing, Testing of Hardened Concrete: Compression tests – Tension tests – Factors affecting strength – Flexure tests –Splitting tests – Non-destructive testing methods – codal provisions for NDT.

UNIT – IV, Elasticity, Creep & Shrinkage, Modulus of elasticity, Dynamic modulus of elasticity

, Poisson's ratio, Creep of concrete, Factors influencing creep, Relation between creep & time, Nature of creep, Effects of creep – Shrinkage –types of shrinkage.

UNIT – V, Mix Design: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Concepts Proportioning

of concrete mixes by various methods – BIS method of mix design.

TEXT BOOKS:

i. Concrete Technology, M. S. Shetty. – S. Chand & Company
ii. Concrete Technology, A. R. Santha Kumar, Oxford University Press, New Delhi

REFERENCES:

i. Properties of Concrete, A. M. Neville – PEARSON – 4th edition
ii. Concrete Technology, M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi

II Year - I Semester **L T P C**

0 0 3 1.5

STRENGTH OF MATERIALS LAB

List of Experiments

1. Tension test on Steel bar
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.

List of Major Equipment:

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

TEXT BOOKS:

I. Strength of Materials by Strength of materials, R. K. Rajput, S. Chand & Co, New Delhi

II. Strength of Materials by S. Ramamrutham.

REFERENCES:

I. Strength of Materials by R.K Bansal, Lakshmi Publications

II. Strength of Materials by R. Subramanian, Oxford Publications

II Year - I Semester	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

SURVEYING FIELD WORK

List of Experiments:

1. **Chain Survey:** of road profile with offsets in case of road widening and closed circuit.

2. **Compass Survey**: Determination of distance between two inaccessible points by using compass and area of the given boundary using compass (Closed Traverse)

3. **Plane table survey:** finding the area for a given boundary by the method of Radiation and method of intersection including Two Point Problem by the plane table survey.

4. **Fly Leveling**: Height of the instrument method (differential leveling) and rise and fall method including closed circuit/ open circuit, Longitudinal Section and Cross sections of a given road profile.

5. **Theodolite Survey**: Determining the Horizontal and Vertical Angles by the method of repetition method including finding the distance between two inaccessible points, finding the height of far object.

6. **Tachometric Survey:** Heights and distance problems using tachometric principles.

5. One Exercise on Curve setting.

6. One Exercise on contours.

7. demo on **Total**

Station TEXT

BOOKS:

1. Surveying, Vol No.1, 2 &3, B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications Ltd, New Delhi.

2. Advance Surveying, Satish Gopi, R. Sathi Kumar and N. Madhu, Pearson Publications.

3. Text book of Surveying, C. Venkataramaiah, University press, India Limited.

4. Surveying and levelling, R. Subramanian, Oxford University press.

REFERENCES:

1. Text book of Surveying, S.K. Duggal (Vol No. 1&2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.

II Year - I Semester	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

CONCRETE TECHNOLOGY LAB

List of Experiments: At least 10 experiments must be conducted (at least one for each property)

1. Determination of normal Consistency and fineness of cement.
2. Determination of initial setting time and final setting time of cement.
3. Determination of specific gravity and soundness of cement.
4. Determination of compressive strength of cement.
5. Determination of grading and fineness modulus of Coarse aggregate by sieve analysis.
6. Determination of specific gravity of coarse aggregate
7. Determination of grading and fineness modulus of fine aggregate (sand) by sieve analysis.
8. Determination of bulking of sand.
9. Determination of workability of concrete by compaction factor method.
10. Determination of workability of concrete by slump test
11. Determination of workability of concrete by Vee-bee test.
12. Determination of compressive strength of cement concrete and its young's modulus.
13. Determination of split tensile strength of concrete.
14. Non-Destructive testing on concrete (for demonstration)

List of Equipment:

1. Standard set of sieves for coarse aggregate and fine aggregate
2. Vicat's apparatus
3. Specific gravity bottle.
4. Lechatlier's apparatus.
5. Slump Test Apparatus.
6. Compaction Factor Test Apparatus.

7. Vee- Bee test apparatus
8. Longitudinal compresso meter
9. Universal testing Machine (UTM)/Compression Testing Machine (CTM).
10. Rebound hammer, Ultrasonic pulse velocity machine, micro cover meter

TEXT BOOKS:

iii. Concrete Technology, M. S. Shetty. – S. Chand & Company
iv. Concrete Technology, A. R. Santha Kumar, Oxford University Press, New Delhi

REFERENCES:

iii. Properties of Concrete, A. M. Neville – PEARSON – 4th edition
iv. Concrete Technology, M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi

II Year - I Semester

L	T	P	C
1	0	0	2

ENGLISH & COMMUNICATION SKILLS COURSE

Unit-1: Communication: An Introduction

- Definition, Nature and Scope of Communication
- Importance and Purpose of Communication
- Process of Communication
- Types of Communication

Unit-2: Non-Verbal

Communication

• Personal Appearance

- Gestures
- Postures
- Facial Expression
- Eye Contacts
- Body Language (Kinesics)
- Time language
- Silence
- Tips for Improving Non-Verbal

Communication Unit-3: Effective Communication

- Essentials of Effective Communication
- Communication Techniques
- Barriers to Communication

Unit-4: Communication Network in an Organization-I

- Personal Communication
- Internal Operational Communication
- External Operational Communication

Unit-5: Communication Network in an Organization-II

- Horizontal (Lateral) Communication
- Vertical (Downward) Communication
- Vertical (Upward) Communication

II Year – II Semester

L	T	P	C
3	0	0	3

Complex Variables and Statistical

Methods Course Learning Objectives:

The student should able to understand the concepts of

1. To familiarize the complex variables.
2. Series expansions and Residue Theorem
3. Discrete and Continuous random variables
4. To familiarize the students with the foundations of probability and statistical methods.
5. To equip the students to solve application problems in their disciplines.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Apply Cauchy-Riemann equations to complex valued functions in order to determine whether a given continuous function is analytic
2. Find the differentiation and integration of complex valued functions used in engineering problems and Make use of the Cauchy residue theorem to evaluate certain integrals
3. Apply discrete and continuous probability distributions
4. Design the components of a classical hypothesis test
5. Infer the statistical inferential methods based on small and large sampling tests

UNIT – I: Functions of a complex variable and Complex integration:

Introduction – Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates – Harmonic and conjugate harmonic functions – Milne – Thompson method.

Complex integration: Line integral - Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula (all without proofs).

UNIT – II: Series expansions and Residue Theorem:

Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Types of Singularities: Isolated – pole of order m – Essential – Residues – Residue theorem

(without proof) – Evaluation of real integral of the type $\int_0^{2\pi} f(\cos\theta, \sin\theta)\,d\theta$, $\int_0^{\infty} f(x)\,dx$.

UNIT – III: Probability and Distributions:

Review of probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

UNIT – IV: Sampling Theory:

Introduction – Population and samples – Sampling distribution of Means and Variance (definition only) – Central limit theorem (without proof) – Introduction to t, χ^2 and F-distributions – Point and Interval estimations – Standard error and Maximum error of estimate.

UNIT – V: Tests of Hypothesis:

Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance- Confidence limits-Test of significance for large samples-single and two means – single and two proportions- Student's t- distribution- significance test of a sample mean – significance test of difference between sample means. F-test, chi-square test (χ^2) and test of goodness of fit.

TEXT BOOKS:

1. **B. S. Grewal,** Higher Engineering Mathematics, 44th Edition, Khanna Publishers.
2. **Miller and Freund's,** Probability and Statistics for Engineers, 7/e, Pearson, 2008.

REFERENCE BOOKS:

1. **S. C. Gupta and V. K. Kapoor**, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

2. **Jay l. Devore,** Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.
3. **Shron L. Myers, Keying Ye, Ronald E Walpole,** Probability and Statistics Engineers and the Scientists, 8th Edition, Pearson 2007.
4. **Sheldon, M. Ross**, Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011

II Year – II Semester

L	T	P	C
3	0	0	3

STRUCTURAL ANALYSIS

Course Learning Objectives:

The student should able to understand the concepts of

1. Horizontal thrust, bending moment, normal thrust and radial shear to arches
2. Lateral load analysis using approximate methods
3. Cables subjected to concentrated and uniformly distributed loads, familiarize cables and suspension bridges
4. Continuous beams with and without sinking of supports
5. Matrix methods and flexibility methods

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Calculate bending moment, normal thrust and radial shear to arches
2. Determine Lateral Loads by using Approximate Methods
3. Analyze cables which are subjected to concentrated and uniformly distributed loads,
4. Determine the behavior of continuous beams with and without sinking of supports
5. Find out the stresses in frames by Matrix methods and flexibility methods

SYLLABUS:

UNIT I Three Hinged Arches: Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature. Hinges with supports at different levels.

Two Hinged Arches: Determination of horizontal thrust, bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, Tied arches – Fixed arches – (No analytical question).

UNIT-II, Lateral Load Analysis Using Approximate Methods: application to building frames. (i) Portal Method (ii) Cantilever Method.

UNIT – III, Cable Structures and Suspension Bridges: Introduction, characteristics of cable, analysis of cables subjected to concentrated and uniformly distributed loads, anchor cable, temperature stresses, analysis of simple suspension bridge, three hinged and two hinged stiffening girder suspension bridges.

UNIT – IV Moment Distribution Method: Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports – Portal frames – including Sway-Substitute frame analysis by two cycles.

UNIT – V Kani's Method: Analysis of continuous beams – including settlement of supports and single bay portal frames with and without side sway. Introduction to Matrix Methods: Flexibility methods: Introduction, application to continuous beams (maximum of two unknowns) including support settlements. Stiffness method: Introduction, application to continuous beams (maximum of two unknowns) including support settlements.

TEXT BOOKS:

1. Structural Analysis, T. S. Thandavamoorthy, Oxford university press, India.

2. Structural Analysis, R.C. Hibbeler, Pearson Education, India

3. Theory of Structures – II, B. C. Punmia, Jain & Jain, Laxmi Publications, India.

4. Structural Analysis, C.S. Reddy, Tata Mc-Graw hill, New Delhi.

REFERENCES:

1. Intermediate Structural Analysis, C. K. Wang, Tata McGraw Hill, India

2. Theory of structures, Ramamuratam, Dhanpatrai Publications.

3. Analysis of structures, Vazrani & Ratwani – Khanna Publications.

4. Comprehensive Structural Analysis-Vol. I & 2, R. Vaidyanathan & P. Perumal-Laxmi Publications Pvt. Ltd., New Delhi

5. Structural Analysis I, P.N. Chandramouli. Yesdee Publishing Pvt Limited

6. Structural Analysis, Aslam Kassimali, Cengage Learning

7. Matrix Methods of Structural Analysis, P.N. Godbole, R. S.. Sonaparote, PHI Learning Pvt Limited

II Year – II Semester

L	T	P	C
3	0	0	3

HYDRAULICS AND HYDRAULIC MACHINERY

Course Learning Objectives:

The student should able to understand the concepts of

1. Energy and momentum correction factors – Chezy's, and Manning's formulae for uniform flow To introduce dimensional analysis for fluid flow problems
2. Dynamic equation, Mild, Critical, Steep, horizontal and adverse slopes-surface profiles
3. Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations.
4. Velocity triangles at inlet and outlet, expressions for work done and efficiency-
5. Classification of turbines. Pelton wheel - Francis turbine - Kaplan turbine - working, working proportions

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Solve uniform and non-uniform open channel flow problems.
2. Apply the principals of dimensional analysis and similitude in hydraulic model testing.
3. Understand the working principles of various hydraulic machineries and pumps.
4. Determine hydrodynamic force of jets on stationary and moving flat , inclined and curved vanes
5. Pump installation details of centrifugal and reciprocating pumps

Syllabus:

UNIT – I UNIFORM FLOW IN OPEN CHANNELS:

Types of channels –Types of flows - Velocity distribution – Energy and momentum correction factors – Chezy's, and Manning's formulae for uniform flow – Most Economical sections, Critical

flow: Specific energy-critical depth – computation of critical depth

UNIT II NON-UNIFORM FLOW IN OPEN CHANNELS: Steady Gradually Varied flow-Dynamic equation, Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.

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

UNIT – IV BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat , inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle.

UNIT – V HYDRAULIC TURBINES – I: Layout 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 – theory and efficiency.

CENTRIFUGAL and RECIPROCATING PUMPS: Pump installation details-classification- work done- Manometric head-minimum starting speed-losses and efficiencies-specific speed. **RECIPROCATING PUMPS**: Introduction, classification, components, working, discharge, indicator diagram, work done and slip.

TEXT BOOKS:

1. Open Channel flow, K. Subramanya, Tata McGraw Hill Publishers

2. A text of Fluid mechanics and hydraulic machines, R. K. Bansal, Laxmi Publications New Delhi

3. Fluid Mechanics, Modi and Seth, Standard book house.

REFERENCES:

1. Fluid Flow in Pipes and Channels, G.L. Asawa, CBS

2. Fluid Mechanics and Machinery, C.S.P. OJHA, R. BERNDTSSON and P.N. Chandramouli, Oxford Higher Education.

3. Fluid Mechanics and Machinery, Md. Kaleem Khan, Oxford Higher Education

II Year – II Semester

L	T	P	C
3	0	0	3

ENGINEERING GEOLOGY

Course Learning Objectives:

The student should able to understand the concepts of

1. Weathering: Weathering of rocks, Geological agents, weathering process of Rock, River process and their development.
2. Different methods of study of mineral and rock
3. Strike, Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities Course Outcomes
4. Water table, Cone of depression, Geological controls of Ground Water Movement,
5. Life of Reservoirs Purpose of Tunnelling, effects, Lining of Tunnels.

Course outcomes:

Upon the successful completion of this course, the students will be able to:

1. Identify and classify the geological minerals
2. Measure the rock strengths of various rocks
3. Classify and measure the earthquake prone areas to practice the hazard zonation
4. Classify, monitor and measure the Landslides and subsidence
5. Prepares, analyses and interpret the Engineering Geologic maps

SYLLABUS:

UNIT-I: Introduction: Branches of Geology, Importance of Geology in Civil Engineering with case studies

Weathering: Weathering of rocks, Geological agents, weathering process of Rock, River process and their development.

UNIT-II Mineralogy And Petrology: Definitions of mineral, Structures of silicates and rock, Different methods of study of mineral and rock, The study of physical properties of minerals and

rocks for megascopic study for the following minerals and rocks, Common rock forming minerals are Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and other ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite And Bauxite. Classification, structures, textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their megascopic study of granite varieties, (pink, gray, green).

Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate and their importance in Civil Engineering.

UNIT-III Structural Geology: Strike, Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering– Indian stratigraphy. Aims of statigrtaphy, Principles, Geological time scour, Geological division in India, Major stratigraphic units in India.

UNIT-IV Ground Water: Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques.

Earthquakes And Land Slides: Terminology, Classification, causes and effects, Shield areas and Seismic bells, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides. Case studies.

UNIT-V Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods,

Geology of Dams : Reservoirs And Tunnels: Types and purpose of Dams, Geological considerations in the selection of a Dam site. Life of Reservoirs Purpose of Tunnelling, effects, Lining of Tunnels.

TEXT BOOKS:

1. Engineering Geology, N. Chenn Kesavulu, Laxmi Publications, 2nd Edition, 2014.

2. Engineering Geology, Subinoy Gangopadhay, Oxford University press

REFERENCES:

1. Engineering Geology, D. Venkat Reddy, Vikas Publishing House pvt. Ltd, 2013.

2. Engineering Geology, Vasudev Kanithi, University Press.

3. Engineering Geology for Civil Engineers P. C. Varghese, PHI learning pvt. Ltd.

II Year - II Semester

L	T	P	C
3	0	0	3

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to all Branches)

Course Objectives:

The student should able to understand the concepts of

1. Nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting, Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
2. Nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
3. Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.
4. Accounts with adjustments – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis
5. Time value of money- Methods of appraising Project profitability: Traditional Methods (payback period, accounting rate of return)

Course outcomes:

Upon the successful completion of this course, the students will be able to:

1. Equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
2. Understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
3. Prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.
4. Prepare of Funds flow and cash flow analysis

5. Understand Traditional Methods (payback period, accounting rate of return) and modern methods (Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

Unit-I

Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

Unit – II:

Theories of Production and Cost Analyses:

Theories of Production function- Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale- Different cost concepts: opportunity costs, explicit and implicit costs-Fixed costs, Variable Costs and Total costs –Cost –Volume-Profit analysis-Determination of Breakeven point(problems)-Managerial significance and limitations of Breakeven point.

Unit – III:

Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Business Cycles: Meaning and Features – Phases of a Business Cycle. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms.

Unit – IV:

Introduction to Accounting & Financing Analysis:

Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements-Analysis and Interpretation

of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow analysis (Problems)

Unit – V:

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization- Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(pay back period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

TEXT BOOKS:

1. Prof.J.V.Prabhakara Rao & Prof.P.Venkata Rao Maruthi Publications
2. S.A.Siddiqui & A.S.Siddiqui New Age International Publishers

REFERENCES:

1. Varshney R.L, K.L Maheswari, Managerial Economics, S. Chand & Company Ltd,
2. JL Pappas and EF Brigham, Managerial Economics, Holt, R & W; New edition edition
3. N.P Srinivasn and M. SakthivelMurugan, Accounting for Management, S. Chand & Company Ltd,
4. Maheswari S.N, An Introduction to Accountancy, Vikas Publishing House Pvt Ltd
5. I.M Pandey, Financial Management , Vikas Publishing House Pvt Ltd
6. V. Maheswari, Managerial Economics, S. Chand & Company Ltd

II Year - II Semester

L	T	P	C
0	0	3	1.5

BUILDING PLANNING AND DRAWING LAB

List of Experiments:

1. Introduction to building drawing Definition, Need and importance of drawing in civil engineering, Drawing sheets, Graphical and numerical scale, lines, lettering and dimensioning.

2. Building components, Section of wall through door/window, Sketches of building components, Conventional signs, symbols and abbreviations

3. Aspects of planning within and with respect to surroundings, Modular planning concept.

4. Building Bye-Laws Objectives, importance of bye-laws, F.S.I., Principles underlying building bye laws, rules governing light, parking, fire, water supply etc.

5. Residential Building Drawing Introduction to plan, elevation and section of the building, Development of detailed plan from line diagram, Drawings for building services like (electric lines & points for concealed wiring, plumbing /sewage pipes, fire water, etc)

6. Submission and Detailed drawings Concept, key plan, site plan, structural drawing foundation plan, furniture arrangement, sanitary lines and traps, plumbing etc.

7. Planning of public buildings for different purposes like Education, Health, Recreation, Industry and Transportation, Spatial and land use planning,

TEXT BOOKS:

i. Building Materials, S. S. Bhavikatti, Vices publications House private ltd.
ii. Building Materials, B. C. Punmia, Laxmi Publications private ltd.
iii. Planning, designing and Scheduling, Gurucharan Singh and Jagadish Singh
iv. Building planning and drawing by M. Chakravarthi.

REFERENCES:

i. Building Materials, S. K. Duggal, New Age International Publications.

ii. Building Materials, P. C. Verghese, PHI learning (P) ltd.

iii. Building Materials, M. L. Gambhir, Tata McGraw Hill Publishing Co. Ltd. New

II Year - II Semester

L	T	P	C
0	0	3	1.5

ENGINEERING GEOLOGY LAB

LIST OF EXPERIMENTS

1. Physical properties of minerals: Mega-scopic identification of

a. Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc…

b. Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc…

2. Megascopic description and identification of rocks.

a) Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc…

b) Sedimentary rocks – Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc…

c) Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite & Biotiteschist, Marble, Khondalite, etc…

3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.

4. Simple Structural Geology problems.

5. Bore hole data.

6. Strength of the rock using laboratory tests.

7. Field work – To identify Minerals, Rocks, Geomorphology& Structural Geology.

LAB EXAMINATION PATTERN:

1. Description and identification of FOUR minerals

2. Description and identification of FOUR (including igneous, sedimentary and metamorphic rocks)

3. ONE Question on Interpretation of a Geological map along with a geological section.

4. TWO Questions on Simple strike and Dip problems.

5. Bore hole problems.

6. Project report on geology.

TEXT BOOKS:

1. Engineering Geology, N. Chenn Kesavulu, Laxmi Publications, 2nd Edition, 2014.

2. Engineering Geology, Subinoy Gangopadhay, Oxford University press.

REFERENCES:

1. Engineering Geology, D. Venkat Reddy, Vikas Publishing House pvt. Ltd, 2013.

2. Engineering Geology, Vasudev Kanithi, University Press.

3. Engineering Geology for Civil Engineers P. C. Varghese, PHI learning pvt. Ltd.

II Year - II Semester **L T P C**

0 0 3 1.5

FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

List of Experiments

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

List of Equipment:

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

TEXT BOOKS:

1. Open Channel flow, K. Subramanya, Tata McGraw Hill Publishers

2. A text of Fluid mechanics and hydraulic machines, R. K. Bansal, Laxmi Publications New Delhi

3. Fluid Mechanics, Modi and Seth, Standard book house.

REFERENCES:

1. Fluid Flow in Pipes and Channels, G.L. Asawa, CBS

2. Fluid Mechanics and Machinery, C.S.P. OJHA, R. BERNDTSSON and P.N. Chandramouli, Oxford Higher Education.

3. Fluid Mechanics and Machinery, Md. Kaleem Khan, Oxford Higher Education

II Year – II Semester

L	T	P	C
1	0	2	2

SKILLED ORIENTED COURSE (COMPUTER AIDED CIVIL ENGINEERING 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

TEXT BOOKS:

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

III B.Tech I Semester	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

GEOTECHNICAL ENGINEERING

Course Learning Objectives:

The objective of this course is:

1. To enable the student to find out the index properties of the soil and classify it.
2. To impart the concept of seepage of water through soils and determine the seepage discharge.
3. To enable the students to differentiate between compaction and consolidation of soils and to determine the magnitude and the rate of consolidation settlement.
4. To enable the student to understand the concept of shear strength of soils
5. To assess of the shear parameters of sands and clays and the areas of their application.

Course Outcomes:

Upon the successful completion of this course

1. The student must know the definition of the various parameters related to soil mechanics and establish their inter-relationships.
2. The student should be able to know the methods of determination of the various index properties of the soils and classify the soils.
3. The student should be able to know the importance of the different engineering properties of the soil such as compaction, permeability
4. To understand the concept of consolidation and shear strength and determine them in the laboratory.
5. The student should be able to apply the above concepts in day-to-day civil engineering practice.

SYLLABUS:

UNIT – I:

Introduction Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship –Relative density , Mechanism of compaction – factors affecting – effects of compaction on soil properties - compaction control.

Index Properties of Soils: Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – Various Types of soil Classifications – Unified soil classification and I.S. Soil classification.

UNIT –II:

Permeability: Soil water – capillary rise – One dimensioned flow of water through soils – Darcy's law- permeability – Factors affecting –laboratory determination of coefficient of permeability –Permeability of layered systems. Total, neutral and effective stresses –quick sand condition – 2-D flow and Laplace's equation - Seepage through soils – Flow nets: Characteristics and Uses.

UNIT – III

Stress Distribution In Soils: Stresses induced by applied loads - Boussinesq's and Westergaard's theories for point loads and areas of different shapes– Newmark's influence chart – 2:1 stress distribution method.

UNIT – IV

Consolidation: Compressibility of soils – e-p and e-log p curves – Stress history – Concept of consolidation - Spring Analogy - Terzaghi's theory of one- dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (cv) - Over consolidated and normally consolidated clays.

UNIT – V

Shear Strength of Soils: Basic mechanism of shear strength - Mohr – Coulomb Failure theories – Stress-Strain behavior of Sands - Critical Void Ratio – Stress-Strain behavior of clays – Shear Strength determination- various drainage conditions.

TEXTBOOKS:

1. Soil Mechanics and Foundation Engineering, Dr. A.K. Arora
2. Geotechnical Engineering by C. Venkatramaiah
3. Basic & applied soil Mechanics by Gopal Ranjan

REFERENCES:

1. Fundamentals of Soil Mechanics, D. W. Taylor, Wiley.
2. An introduction to Geotechnical Engineering, Holtz and Kovacs; Prentice Hall.
3. Fundamentals of Geotechnical Engineering, B M Das, Cengage Learning, New Delhi.

WEB LINK

https://nptel.ac.in/courses/105/105/105105185/

III B.Tech I Semester	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

TRANSPORTATION ENGINEERING

Course Learning Objectives:

The objective of this course is:

1. To impart different concepts in the field of Highway Engineering.
2. To acquire design principles of Highway Geometrics and Pavements
3. To learn various highway construction and maintenance procedures.
4. To understand the pavement materials.
5. To design flexible and rigid pavements & identify the failures in them.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Plan highway network for a given area.
2. Determine Highway alignment and design highway geometrics.
3. Design Intersections and prepare traffic management plans.
4. Judge suitability of pavement materials and design flexible and rigid pavements.
5. Construct and maintain highways

SYLLABUS:

UNIT I

HIGHWAY DEVELOPMENT AND PLANNING: Highway development in India – Necessity for Highway Planning Different Road Development Plans – Classification of Roads – Road Network Patterns – Highway Alignment- Factors affecting Alignment Engineering Surveys – Drawings and Reports.

UNIT – II

HIGHWAY GEOMETRIC DESIGN: Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance Design of Horizontal Alignment- Design of Superelevation and Extra widening- Design of Transition Curves-Design of Vertical alignment Gradients- Vertical curves.

UNIT – III

TRAFFIC ENGINEERING: Basic Parameters of Traffic-Volume, Speed and Density – Definitions and their inter relation - Traffic Volume Studies- Data Collection and Presentation-speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams. Types of Intersections; At- Grade Intersections – Design of Plain, Flared, Rotary and Channelized Intersections; Design of Traffic Signals – Webster Method –IRC Method

UNIT – IV

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

UNIT – V

PAVEMENT DESIGN : Flexible Pavements: Design factors – Flexible Pavement Design Methods – CBR method – IRC method.Rigid Pavements: Design Considerations – wheel load stresses – Temperature stresses – Frictional stresses – Combination of stresses – Design of slabs – Design of Joints – IRC method. Failures in Flexible & Rigid pavements.

TEXT BOOKS:

1. Highway Engineering – S.K.Khanna & C.E.G.Justo.
2. Principles & Practices of Highway Engineering – Dr. L.R.Kadiyali and Dr. N.B. Lal-Khanna Publications.

REFERENCES:

1. Traffic Engineering and Transport Planning Dr. L.R.Kadiyali, Khanna Publications.
2. High way engineering by Paul .H.Wright & Karen K.Dixon,wiley

Web Link:

https://nptel.ac.in/courses/105/101/1

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III B.Tech I Semester	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES

Course Learning Objectives:

The objective of this course is:

1. Familiarize Students with different types of design philosophies
2. Equip student with concepts of design of flexural members
3. Understand Concepts of shear, bond and torsion
4. Familiarize students with different types of compressions members and Design
5. Understand different types of footings and their design

Course Outcomes:

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

1. Work on different types of design philosophies
2. Carryout analysis and design of flexural members and detailing
3. Design structures subjected to shear, bond and torsion
4. Design different type of compression members and footings
5. Design one way and two way slabs

SYLLABUS:

UNIT –I Introduction:

a) **Working stress method**: Design codes and handbooks, loading standards – Dead, live, wind and earthquake loads, Elastic theory: design constants, modular ratio, neutral axis depth and moment of resistance for balanced, under-reinforced and over-reinforced sections. Design of singly and doubly reinforced beams.

b) **Limit State Design**: Concepts of limit state design – Basic statistical principles – Characteristic loads –Characteristic strength – Partial load and safety factors – representative

stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design – stress - block parameters – limiting moment of Resistance.

All units i.e. from unit II to unit VI are to be taught in Limit State Design.

UNIT –II Design for Flexure: Limit state analysis and design of singly reinforced sections- effective depth- Moment of Resistance- Doubly reinforced and flanged (T) beam sections- Minimum depth for a given capacity- Limiting Percentage of Steel- Minimum Tension Reinforcement-Maximum Flexural Steel- Design of Flanged Sections (T)- Effective width of flange –Behavior- Analysis and Design.

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

Limit state design for serviceability: Deflection, cracking and code provision, Design of formwork for beams and slabs.

UNIT – IV Slabs: Classification of slabs, design of one - way slabs, one way continuous slab using IS Coefficients (Conventional) –Design of two - way slabs-simply supported and various edge conditions using IS Coefficients.

UNIT – V Design of Compression members: Effective length of a column, Design of short and long columns – under axial loads, uniaxial bending and biaxial bending.

Footings: Different types of footings – Design of isolated footings – pedestal, square, rectangular and circular footings subjected to axial loads, uni-axial and bi-axial bending moments.

Note: All the designs to be taught in Limit State Method

Following plates should be prepared by the students.

1. Reinforcement detailing of T-beams and continuous beams.
2. Reinforcement detailing of columns and isolated footings.
4. Detailing of one-way, two-way and continuous slabs and waist-slab staircase.

TEXTBOOKS:

1. Limit State Design for Reinforced Concrete Structures by A. K. Jain

2. Design of Reinforced concrete Structures by N. Subrahmanyian

3. Reinforced Concrete Structures, S. Unnikrishna Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi.

REFERENCES:

1. R C C Design, B.C Punmia, A. K. Jain and A. K Jain. Lakshmi Publications

2. Reinforced Concrete Structures, N. Krishna Raju & R. N. Pranesh, New Age Publications.

IS Codes:

1) IS -456-2000 Code of practice for Reinforced Concrete Structures (Permitted to use in examination hall)

2) IS – 875

3) SP-16

WEBLINK:

1. https://nptel.ac.in/courses/105/105/105105104/ (NPTEL Web Link)
2. https://www.udemy.com/course/basic-design-of-reinforced-concrete-structures/(udemy course)

III B.Tech I Semester

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FUNDAMENTALS OF ENTREPRENEURSHIP

Course learning Objectives

The student should able

1. To understand Entrepreneurship and its role in the society.
2. To understand the Role of entrepreneurship in economic development
3. To gain knowledge aboutGrowth of entrepreneurship in India
4. To understand the finding the gaps for new business and new way of business
5. To understand Entrepreneurship Development Programs

Course learning outcomes

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

1. The student shall be equipped with the required entrepreneurial knowledge and skill to start a business.
2. The student shall be motivated towards entrepreneurial process, innovative and lateral thinking.
3. The student will understand the characteristics of entrepreneur
4. The student will be able to know types of entrepreneurs, entrepreneurial culture and entrepreneurial process
5. The student will have sound knowledge of conducting entrepreneurship development program

Unit-I: Entrepreneur and Entrepreneurship – Description and definition of entrepreneur – Characteristics of entrepreneur – Functions of an entrepreneur – types of entrepreneurs – concept of entrepreneurship – entrepreneurial culture – entrepreneurial process – entrepreneurial competencies – entrepreneurial mobility.

Unit-II: Evolution of Entrepreneurship: Genesis of entrepreneur and entrepreneurship - Theories of Entrepreneurship – Role of entrepreneurship in economic development – Barriers of entrepreneurship - Entrepreneurship and current business environment

Unit-III: Entrepreneurial Mindset:Entrepreneurial Motives, Motivating factors of entrepreneurship - Growth of entrepreneurship in India –
Agriculture- Agricultural Entrepreneurship to Industry entrepreneurship to Services entrepreneurship – corporate entrepreneurship – women entrepreneurship.

Unit-IV: Business Idea generation: Sourcing of business ideas, innovative ideas, opportunity identification, scanning of the environment - finding the gaps for new business and new way of business - setting-up new ventures - acquiring existing business – franchising and Entrepreneurship.

Unit-V: Entrepreneurship Development Programs: Need and objectives of EDP – Evolution of EDPs – Phases of EDPs – Course content and curriculum of EDPs – Management Education centers and Entrepreneurship Development Programs.

TEXT BOOK

1. Donald F. Kuratko Entrepreneurship: Theory, Process, Practice New Delhi: Cengage Learning.

2. A Textbook on Entrepreneurship Development Programme by Dr. Muzafar Ahmad Bhat, Dr. SurakshaChanotra

3. Entrepreneurship Development by K Ramachandran

REFERENCES

1. Bill Bolton, John Thompson (2014), Entrepreneurs: Talent, Temperament and Opportunity, Routledge 3rd Ed.

2. Arya Kumar (2014), Entrepreneurship: Creating and Leading an Entrepreneurial Organization, New Delhi: Pearson Publications.

3. S.Anil Kumar & S.C Purnima (2014), Entrepreneurship Development, New Delhi: New Age Publishers.

Web Link:

1. https://nptel.ac.in/courses/110/106/110106141/

III B.Tech I Semester	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

EARTHQUAKE ENGINEERING

Course Objective:

To provide a coherent development to the students for the courses in sector of earthquake

1. Engineering To present the foundations of many basic engineering concepts related earthquake
2. Engineering To give an experience in the implementation of engineering concepts which are applied in field of earthquake engineering.
3. To involve the application of scientific and technological principles of planning, analysis,
4. Design of buildings according to earthquake design philosophy.
5. Analysis of structure by various methods.

Course Outcomes:

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

1. The students will gain an experience in the implementation of Earthquake Engineering on engineering concepts which are applied in field Structural Engineering.
2. The students will get a diverse knowledge of earthquake engineering practices applied to real life problems
3. The students will learn to understand the theoretical and practical aspects of earthquake engineering along with the planning and design aspects.
4. The students will learn Analysis, Designing and Detailing Structure Considering Earthquake Loads.
5. The students will learn to understand the Classroom participation and involvement in solving the problems.

SYLLABUS

UNIT-I:

Introduction to Dynamic Loads Static Load v/s Dynamic Load, Types of Dynamic forces, Force Control and Displacement Control

UNIT-II:

Basics of Seismology Earth and its interior, Plate Tectonics, Convection Currents, The Earth quake, Inter Plate Earthquake (Convergent Boundaries, Divergent Boundaries and Transform Boundaries), Intra Plate Earthquake (Faults and Types of Faults), Seismic Waves, Basic Terminology, Measuring Units and Instruments

UNIT-III:

Behavior of Structures During Earthquake and Earthquake Resistant Features of Structure a) Inertia forces in structures b) Behavior of Brick Masonry Structures: Behavior of Brick Masonry Walls, Box Action, Different types of Bands c) Behavior of Stone Masonry Structures: Behavior of Stone Masonry Walls, Earthquake Resistant Features of Stone Masonry Structures

UNIT IV:

Fundamentals of Earthquake Vibrations of Structures Equation of Motion (By Newton's Law and By D'Alembert's Principle), Degrees of Freedom, Simplified Single Degree of Freedom, Mathematical Modeling, Equation of Motion for Free Vibration for Damped and Un damped System (Single Degree of Freedom System), Equation of Motion for Forced Vibration for Damped and Un damped System (Single Degree of Freedom System), Logarithmic Decrement

UNIT V:

Earthquake Load Analysis on Structures Introduction to methods of Earthquake Load Analysis (Linear Static, Linear Dynamic, Non-Linear Static, Non-Linear Dynamic) Analysis

of Structure by Linear Static Method (Seismic Coefficient Method) Analysis of Structure by Linear Dynamic Method (Random Response Method)

TEXTBOOKS:

1. Earthquake Resistant Design of Structures By Pankaj Agarwal & Manish Shrikhande, PHI Publications
2. Manish Shrikhande& Pankaj Agrawal; Earthquake Resistant Design of Structures, PHI Publication, New Delhi
3. S. K. Duggal; Earthquake Resistance Design of Structures; Oxford University Press, New Delhi

REFERENCE:

1. A. K. Chopra; Dynamics of Structures, Pearson, New Delhi
2. IITK-bmtpc, Earthquake Tips "Learning Earthquake Design and Construction" by C.V.R.Murthy, Building Material and Technology Promotion Council

WEBLINK:

1. https://nptel.ac.in/courses/145/106/110506141/

III B.Tech I Semester	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

AIR POLLUTION AND CONTROL

Course Learning Objectives:

The objective of this course is:

1. Impart knowledge on fundamental aspects of air pollution & control, noise pollution, and solid waste management.
2. Provide basic knowledge on sustainable development.
3. Introduces some basics of sanitation methods essential for protection of community health.
4. Differentiate the solid and hazardous waste based on characterization
5. Identify the air pollutant control devices

Course Learning Outcomes:

By the end of successful completion of this course, the students will be able to:

1. Have knowledge on the NAAQ standards and air emission standards
2. Differentiate the treatment techniques used for sewage and industrial wastewater treatment methods.
3. Understand the fundamentals of solid waste management, practices adopted in his town/village and its importance in keeping the health of the city.
4. Appreciate the methods of environmental sanitation and the management of community facilities without spread of epidemics.
5. Appreciate the importance of sustainable development while planning a project or executing an activity.

SYLLABUS

UNIT – I

Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary air pollutants, Point, Line and Areal Sources of air pollution- Stationary and mobile sources.

Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

UNIT – II

Meteorology and Plume Dispersion; Properties of atmosphere; Heat, Pressure, Wind forces, Moisture and Relative Humidity, Influence of Meteorological phenomena on Air Quality- wind rose diagrams. Lapse Rates, Pressure Systems, Winds and moisture, plume behavior and plume Rise Models; Gaussian Model for Plume Dispersion.

UNIT-III

Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's – Settling Chambers, Cyclone separators, filters, Dry and Wet scrubbers, Electrostatic precipitators.

UNIT – IV

Control of gaseous emissions - General Methods of Control of NOx and SOx emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling

– Adsorption – Absorption – Combustion.

UNIT – V

Air Quality Management – Monitoring of SPM, SOx; NOx and CO Emission Standards– Air sampling – Sampling Techniques – High volume air sampler – Stack sampling - Analysis of Air pollutants – Air quality standards – Air pollution control act.

TEXTBOOKS:

1. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.
2. Air Pollution & Control by S.C. Bhatia.
3. Air Pollution and Control Editors: Sharma, N., Agarwal, A.K., Eastwood, P., Gupta, T., Singh, A.P. (Eds.)

REFERENCE:

1. An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S. Publications.
2. Air pollution by Wark and Warner.- Harper & Row, New York.

WEBLINK

https://nptel.ac.in/courses/105/102/105102089/

III B.Tech I Semester	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

URBAN HYDROLOGY

Course Learning Objectives:

The course is designed to:

1. Appreciate the impact of urbanization on catchment hydrology
2. Understand the importance of short duration rainfall runoff data for urban hydrology studies.
3. Learn the techniques for peak flow estimation for storm water drainage system design.
4. Understand the concepts in design of various components of urban drainage systems.
5. Learn some of the best management practices in urban drainage.

Course Outcomes:

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

1. Develop intensity duration frequency curves for urban drainage systems.
2. Develop design storms to size the various components of drainage systems.
3. Apply best management practices to manage urban flooding.
4. Prepare master drainage plan for an urbanized area.
5. Practice best management in urban drainage.

SYLLABUS:

UNIT I

Introduction: Urbanisation and its effect on water cycle – urban hydrologic cycle – trends in urbanisation – Effect of urbanisation on hydrology.

UNIT II

Precipitation Analysis: Importance of short duration of rainfall and runoff data, methods of estimation of time of concentration for design of urban drainage systems, Intensity-Duration
-Frequency (IDF)curves, design storms for urban drainage systems.

UNIT III

Approaches to urban drainage: Time of concentration, peak flow estimation approaches, rational method, NRCS curve number approach, runoff quantity and quality, wastewater and stormwater reuse, major and minor systems.

UNIT IV

Elements of drainage systems: Open channel, underground drains, appurtenances, pumping, source control.

UNIT V

Analysis and Management: Stormwater drainage structures, design of stormwater network- Best Management Practices–detention and retention facilities, swales, constructed wetlands, models available for stormwater management.

TEXTBOOKS:

1. 'Manual on Drainage in Urbanised area'by Geiger W. F., J Marsalek, W. J. Rawls and F. C. Zuidema, (1987 - 2 volumes), UNESCO,
2. 'Urban Hydrology' by Hall M J (1984), Elsevier Applied Science Publisher.
3. 'Hydrology – Quantity and Quality Analysis' by Wanielista M P and Eaglin (1997), Wiley and Sons.

REFERENCES:

1. 'Stormwater Detention for Drainage' by Stahre P and Urbonas B (1990), Water Quality and CSO Management, Prentice Hall.
2. 'Urban water cycle processes and interactions' by Marsalek et al (2006), Publication No. 78, UNESCO, Paris (http://www.bvsde.paho.org/bvsacd/cd63/149460E.pdf)

3. 'Frontiers in Urban Water Management – Deadlock or Hope' by Maksimovic C and J A Tejada-Guibert (2001), IWA Publishing.

Web Link

https://nptel.ac.in/courses/105/101/105101002\

III B.Tech I Semester	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

SOLID WASTE & HAZARDOUS WASTE MANAGEMENT

Course Learning Objectives:

The objective of this course is:

1. To impart the knowledge the methods of collection and optimization of collection routing of municipal solid waste.
2. To acquire the principles of treatment of municipal solid waste
3. To know the impact of solid waste on the health of the living beings
4. To learn the criterion for selection of landfill and its design
5. To plan the methods of processing such as composting the municipal organic waste.

Course Learning Outcomes:

Upon successful completion of this course, the students will be able to:

1. Design the collection systems of solid waste of a town
2. Design treatment of municipal solid waste and landfill
3. To know the criteria for selection of landfill
4. To characterize the solid waste and design a composting facility
5. Processing and composting the municipal organic waste.

SYLLABUS:

UNIT- I

Introduction to Solid Waste Management: Goals and objectives of solid waste management, Classification of Solid Waste - Factors Influencing generation of solid waste - sampling and characterization –Future changes in waste composition, major legislation, monitoring responsibilities.

UNIT- II

Basic Elements In Solid Waste Management: Elements and their inter relationship – principles of solid waste management- onsite handling, storage and processing of solid waste

Collection of Solid Waste: Type and methods of waste collection systems, analysis of collection system - optimization of collection routes– alternative techniques for collection system.

UNIT- III

Transfer and Transport: Need for transfer operation, compaction of solid waste - transport means and methods, transfer station types and design requirements.

UNIT- IV

Separation and Transformation of Solid Waste: Unit operations used for separation and transformation: shredding - materials separation and recovery, source reduction and waste minimization.

UNIT- V

Processing and Treatment: Processing of solid waste - Waste transformation through combustion and composting, anaerobic methods for materials recovery and treatment – Energy recovery – biogas generation and cleaning– Incinerators.

TEXTBOOKS

1. George Techobanoglous "Integrated Solid Waste Management", McGraw Hill Publication, 1993
2. Charles A. Wentz; "Hazardous Waste Management", McGraw Hill Publication, 1995.

REFERENCES

1. Vesilind, P.A., Worrell, W., Reinhart, D. "Solid Waste Engineering", Cenage learning, New Delhi, 2004

WEBLINK

https://nptel.ac.in/courses/105/106/105106056/

III B.Tech I Semester

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ADVANCED STRUCTURAL ANALYSIS

Course Learning Objectives:

The objective of this course is:

1. Familiarize Students with Different types of Structures
2. Equip student with concepts of Arches
3. Understand Concepts of lateral Load analysis
4. Familiarize Cables and Suspension Bridges
5. Understand Analysis methods Moment Distribution, Kanis Method and Matrix methods

Course Outcomes:

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

1. Differentiate Determinate and Indeterminate Structures
2. Analyze the load effect on arches
3. Carryout lateral Load analysis of structures
4. Analyze Cable and Suspension Bridge structures
5. Analyze structures using Moment Distribution, Kani' s Method and Matrix methods

SYLLABUS:

UNIT I

Three Hinged Arches: Elastic theory of arches – Eddy' s theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature. Hinges with supports at different levels.

Two Hinged Arches: Determination of horizontal thrust, bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, Tied arches – Fixed arches.

UNIT-II

Lateral Load Analysis Using Approximate Methods: application to building frames. (i) Portal Method (ii) Cantilever Method.

UNIT – III

Cable Structures and Suspension Bridges: Introduction, characteristics of cable, analysis of cables subjected to concentrated and uniformly distributed loads, anchor cable, temperature stresses, analysis of simple suspension bridge, three hinged and two hinged stiffening girder suspension bridges.

UNIT – IV

Moment Distribution Method: Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports – Portal frames – including Sway-Substitute frame analysis by two cycles. Kani' s Method: Analysis of continuous beams – including settlement of supports and single bay portal frames with and without side sway.

UNIT – V

Introduction to Matrix Methods: Flexibility methods: Introduction, application to continuous beams (maximum of two unknowns) including support settlements. Stiffness method: Introduction, application to continuous beams (maximum of two

unknowns) including support settlements.

TEXT BOOKS:

1. Structural Analysis, R.C. Hibbeler, Pearson Education, India
2. Theory of Structures – II, B. C. Punmia, Jain & Jain, Laxmi Publications, India.
3. Structural Analysis, C.S. Reddy, Tata Mc-Graw hill, New Delhi.

REFERENCES:

1. Intermediate Structural Analysis, C. K. Wang, Tata McGraw Hill, India
2. Theory of structures, Ramamuratam, Dhanpatrai Publications.
3. Analysis of structures, Vazrani & Ratwani – Khanna Publications.

WEBLINK:

https://nptel.ac.in/courses/105/105/105105109/

III B.Tech I Semester	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

GEOTECHNICAL ENGINEERING LAB

Course Learning Objectives:

The objective of this course is:

1. To impart knowledge of determination of index properties required for classification
2. To know the Grain size analysis by sieving of soils.
3. To teach how to determine compaction characteristics and consolidation behavior
4. From relevant lab tests; to determine permeability of soils.
5. To teach how to determine shear parameters of soil through different laboratory tests.

Course Outcomes:

Upon successful completion of this course, student will be able to

1. Determine index properties of soil and classify them.
2. Determine permeability of soils.
3. Determine Compaction, Consolidation and shear strength characteristics.
4. Determine shear for soil sample
5. Determine CBR of soil sample

SYLLABUS:

List of Experiments

1. Specific gravity, G
2. Atterberg's Limits.
3. Field Density-Core cutter and Sand replacement methods
4. Grain size analysis by sieving
5. Hydrometer Analysis Test
6. Permeability of soil - Constant and Variable head tests
7. Compaction test
8. Consolidation test (to be demonstrated)

9. Direct Shear test
10. Tri-axial Compression test (UU Test)
11. Unconfined Compression test
12. Vane Shear test
13. Differential free swells (DFS)
14. CBR Test

At least ten experiments shall be conducted.

References

1. Soil mechanics and foundation engineering by K.R Arora
2. Geotechnical Engineering (22404) (paperback, Dr. dinesh kumar gupta, vaibhao k. sonarkar, dr. sikander a. rasal)
3. Soil Mechanics and Foundations by B.C. Punmi, Ashok Kumar Jain , Arun Kumar Jain

III B.Tech I Semester	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

TRANSPORTATION ENGINEERING LAB

Course Learning Objectives:

The objective of this course is:

1. To test crushing value, impact resistance, specific gravity and water absorption, percentage attrition, percentage abrasion, flakiness index and elongation index for the given road aggregates.
2. To know penetration value, ductility value, softening point, flash and fire point, viscosity and stripping for the given bitumen grade.
3. To test the stability for the given bitumen mix
4. To carry out surveys for traffic volume, speed and parking.

Course outcomes:

1. Ability to test aggregates and judge the suitability of materials for the road construction
2. Ability to test the given bitumen samples and judge their suitability for the road construction
3. Ability to obtain the optimum bitumen content for the mix design
4. Ability to determine the traffic volume, speed and parking characteristics.

SYLLABUS:

I. ROAD AGGREGATES:

1. Aggregate Crushing value
2. Aggregate Impact Test.

3. Specific Gravity and Water Absorption.
4. Attrition Test
5. Abrasion Test.
6. Shape tests

II. BITUMINOUS MATERIALS:

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.
5. Stripping Test
6. Viscosity Test.

III. BITUMINOUS MIX:

1. Marshall Stability test.

IV. TRAFFIC SURVEYS:

1. Traffic volume study at mid blocks.
2. Traffic Volume Studies (Turning Movements) at intersection.
3. Spot speed studies.
4. Parking study.

V. DESIGN & DRAWING:

1. Earthwork calculations for road works.
2. Drawing of road cross sections.
3. Rotor's intersection design.

LIST OF EQUIPMENT:

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometer.
4. Los angles Abrasion test machine
5. Devil's Attrition test machine
6. Length and elongation gauges
7. Bitumen penetration test setup.
8. Bitumen Ductility test setup.
9. Ring and ball apparatus
10. Viscometer.
11. Marshal Mix design apparatus.
12. Enoscope for spot speed measurement.
13. Stop Watches

Text Books:

1. Highway Material Testing Manual, S. K. Khanna, C. E. G Justo and A. Veeraraghavan, Neam Chan Brothers New Chand Publications, New Delhi.

Reference Books:

1. I R C Codes of Practice

2. Asphalt Institute of America Manuals

3. Code of Practice of B.I.S.

III B.Tech I Semester

L	**T**	**P**	**C**
1	**0**	**2**	**2**

ADVANCED SURVEYING COURSE (Skill advanced

course) List of experiments:

1. Traverse - using Total station

2. Contouring

(i). Radial tachometric contouring - Radial Line at Every 45 Degree and Length not less than 60 Meter on each Radial Line

(ii). Block Level/ By squares of size at least 100 Meter x 100 Meter atleat 20 Meter interval

(III). L.S & C.S - Road and canal alignment for a Length of not less than 1 Kilo Meter atleast L.S at Every 30M and C.S at every 90 M

3. Offset of Buildings and Plotting the Location

4. Sun observation to determine azimuth (guidelines to be given to the students)

5. Use of GPS to determine latitude and longitude and locate the survey camp location

6. Traversing using GPS

7. Curve setting by deflection angle

TEXT BOOKS:

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

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

3. Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 3rd Edition, 2004.

4. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1993.

REFERENCES:

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

2. Arora K.R. "Surveying Vol I & II", Standard Book House, 10th Edition 2008.

III B.Tech I Semester	**L**	**T**	**P**	**C**
	2	**0**	**0**	**0**

DISASTER MANAGEMENT

Mandatory course (AICTE suggested)

Course Learning Objectives:

The objective of this course is:

1. To understand Types of disasters like Earthquake, Landslide, Flood, Drought, Fire
2. To know Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders
3. To understand Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India
4. To understand Role of GIS and Information Technology Components in Preparedness, Risk Assessment
5. To know various case studies

Course Learning Outcomes:

The students will be able to

1. Differentiate the types of disasters, causes and their impact on environment and society
2. Assess vulnerability and various methods of risk reduction measures as well as mitigation.
3. Draw the hazard and vulnerability profile of India, Scenarios in the Indian context
4. To analyze the Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.
5. Understand about Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT I INTRODUCTION TO DISASTERS

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR)

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community,

Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders- Institutional Processes and Framework at State and Central Level- State Disaster

Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TEXTBOOKS:

1. Singhal J.P. "Disaster Management", Laxmi Publications, 2010. ISBN-10:

9380386427 ISBN-13: 978-9380386423

2. Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India

Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]

3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk

Management, NIDM, New Delhi, 2011

REFERENCES:

1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005

2. Government of India, National Disaster Management Policy,2009.

III B.Tech II Semester

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ESTIMATION COSTING & SPECIFICATIONS

Course Learning Objectives:

The objective of this course is to enable the students to:

1. Understand the quantity calculations of different components of the buildings.
2. Understand the rate analysis of different quantities of the buildings components.
3. Learn various specifications and components of the buildings.
4. Understand about the details of Contract system
5. Estimate the quantities by available methods

Course Outcomes:

Upon the successful completion of this course:

1. The student should be able to determine the quantities of different components of buildings.
2. The student should be in a position to find the cost of various building components.
3. The student should be capable of finalizing the value of structures.
4. The student should be capable of Valuation of buildings Standard specifications for different items of building construction.
5. The student should be able to determine the quantities by using separate wall method and center line method

SYLLABUS:

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

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

UNIT-III

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

UNIT – IV

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

UNIT-V

Detailed Estimation of Buildings using individual wall method. Detailed Estimation of Buildings using center line method.

TEXT BOOKS:

1. Estimating and Costing, B.N. Dutta, UBS publishers, 2000.
2. Construction Planning and Technology, Rajiv Gupta, CBS Publishers & Distributors Pvt. Ltd. New Delhi.
3. Estimating and Costing, G.S. Birdie.

REFERENCES:

1. Standard Schedule of rates and standard data book, Public works department.
2. IS 1200 (Parts I to XXV-1974/ Method of Measurement of Building & Civil Engg Works – B.I.S.
3. Estimation, Costing and Specifications, M. Chakraborthi; Laxmi publications.

WEBLINK:

https://nptel.ac.in/courses/105/103/105103093/

III B.Tech II Semester	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

WATER RESOURCES ENGINEERING

Course Learning Objectives:

The course is designed to

1. Introduce hydrologic cycle and its relevance to Civil engineering.
2. Make the students understand physical processes in hydrology and, components of the hydrologic cycle.
3. Appreciate concepts and theory of physical processes and interactions.
4. Learn measurement and estimation of the components hydrologic cycle.
5. Provide an overview and understanding of Unit Hydrograph theory and its analysis.

Course Outcomes:

At the end of the course the students are expected to

1. Have a thorough understanding of the theories and principles governing the hydrologic processes.
2. Be able to quantify major hydrologic components and apply key concepts to several practical areas of engineering hydrology and related design aspects.
3. Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures.
4. Be able to develop design storms and carry out frequency analysis.
5. Be able to determine storage capacity and life of reservoirs.

SYLLABUS:

UNIT I

Introduction: Engineering hydrology and its applications, Hydrologic cycle, hydrological data-sources of data.

Precipitation: Types and forms, measurement, raingauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall,

Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm.

UNIT-II

Abstractions from Precipitation: Initial abstractions. Evaporation: factors affecting, measurement, reduction Evapotranspiration: factors affecting, measurement, control Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.

UNIT-III

Runoff: Catchment characteristics, Factors affecting runoff, components, computation- empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve.

Hydrograph analysis:

Components of hydrograph, separation of base flow, effective rainfall hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, derivation of unit hydrograph, unit hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of unit hydrograph, synthetic unit hydrograph.

UNIT-IV

Floods: Causes and effects, frequency analysis- Gumbel's and Log-Pearson type III distribution methods, Standard Project Flood (SPF) and Probable Maximum Flood (MPF), flood control methods and management. Flood Routing: Hydrologic routing, channel and reservoir routing- Muskingum and Puls methods of routing.

UNIT-V

Groundwater: Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, Dupuit's equation- steady radial flow to wells in confined and unconfined aquifers, yield of a open well-recuperation test.

TEXTBOOKS:

1. 'Engineering Hydrology' by Subramanya, K, Tata Mc Graw-Hill Education Pvt. Ltd.

2. 'Engineering Hydrology' by Jayarami Reddy, P, Laxmi Publications Pvt. Ltd.
3. 'Applied hydrology'by Chow V.T., D.R Maidment and L.W. Mays, Tata McGraw Hill Education Pvt. Ltd.

REFERENCES:

1. 'Water Resources Engineering', Mays L.W, Wiley India Pvt. Ltd, (2013).
2. 'Hydrology'by Raghunath. H.M., New Age International Publishers, (2010).

Web Link

https://nptel.ac.in/courses/105/104/105104103/

III B.Tech II Semester	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

DESIGN AND DRAWING OF STEEL STRUCTURES

Course Learning Objectives:

The objective of this course is to:

1. Familiarize Students with different types of Connections and relevant IS codes
2. Equip student with concepts of design of flexural members
3. Understand Design Concepts of tension and compression members in trusses
4. Familiarize students with different types of Columns and column bases and their Design
5. Familiarize students with Plate girder and Gantry Girder and their Design

Course Outcomes:

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

1. Work with relevant IS codes
2. Carryout analysis and design of flexural members and detailing
3. Design compression members of different types with connection detailing
4. Design Plate Girder and Gantry Girder with connection detailing
5. Produce the drawings pertaining to different components of steel structures

SYLLABUS:

UNIT – I

Connections: Introduction: (a) Riveted connections – Definition, rivet strength and capacity- Codal Provisions, (**b) Welded connections**: Introduction, Advantages and disadvantages of welding- Strength of welds-Butt and fillet welds: Permissible stresses – IS Code requirements. Design of fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints.

All units i.e. from unit II to unit-VI to be taught in Limit State Design and in Welded connections only.

UNIT – II

Beams: Allowable stresses, design requirements as per IS Code-Design of simple and compound beams-Curtailment of flange plates, Beam to beam connection, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.

UNIT –III

Tension Members and compression members: General Design of members subjected to direct tension and bending –effective length of columns. Slenderness ratio – permissible stresses.

Design - Design of compression members, struts etc.

UNIT – IV

Design of Columns: Built up compression members – Design of lacings and battens. Design Principles of Eccentrically loaded columns, Splicing of columns.

Design of Column Foundations: Design of slab base and gusseted base. Column bases subjected moment.

UNIT – V

Design of Plate Girder: Design consideration – I S Code Recommendations Design of plate girder-Welded – Curtailment of flange plates, stiffeners – splicing and connections.

Design of Gantry Girder: impact factors - longitudinal forces, Design of Gantry girders

Note: Welding connections should be used in Units
II – V. The students should prepare the following
plates.
Plate 1 Detailing of welded joints.
Plate 2 Detailing of simple and Compound beams including curtailment of flange plates.

Plate 3 Detailing of compression and tension member

Plate 4 Detailing of Column including lacing, battens, Column bases – slab base and gusseted base

Plate 5 Detailing of Plate girder including curtailment, splicing and stiffeners.

TEXTBOOKS:

1. Steel Structures Design and Practice, N. Subramanian, Oxford University Press.
2. Design of steel structures, S. K. Duggal, Tata McGraw Hill, New Delhi
3. Design of Steel Structures S. S. Bhavikatti, I. K International Publishing House Pvt. Ltd.

REFERENCES:

1. Structural Design in Steel, SarwarAlamRaz, New Age International Publishers, New Delhi
2. Design of Steel Structures, M. Raghupathi, Tata Mc. Graw-Hill

IS Codes:

1) Indian Standard Code for General Construction in Steel, 3rd revision, Indian Standards Institution, New Delhi,2008.

2) IS – 875, Code of practice for design loads (other than earth quake) for buildings and structures (Part-1-Part 5),Bureau of Indian standards.

3) Steel Tables.

These codes and steel tables are permitted to use in the examinations.

Web link:

https://nptel.ac.in/courses/105/105/105105162/

III B.Tech II Semester	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

ENVIRONMENTAL ENGINEERING

Course Learning Objectives:

The course will address the following:

1. Outline planning of water supply systems for a community/town/city
2. Provide knowledge of water quantity requirements its sources
3. Impart understanding of importance of water quality and treatment procedure
4. Design of water treatment plant for a village/city
5. Impart knowledge on design of water distribution network

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Estimation of design population and water demand
2. Identify the water source and select proper intake structure
3. Characterization of water for drinking, industry and construction
4. Design of water treatment plant for a village/city
5. Selection and design of an ideal distribution system

SYLLABUS

UNIT–I

Introduction: Importance and Necessity of Protected Water Supply systems, Water borne diseases, Flow chart of public water supply system, Role of Environmental Engineer. Evolution of water supply system.

Water Demand and Quantity Estimation: Estimation of water demand for a town or city, Per capita Demand and factors influencing it - Types of water demands and its variations- factors affecting water demand, Design Period, Factors affecting the Design period, Population forecasting.

UNIT-II

Sources of Water: Lakes, Rivers, Impounding Reservoirs, comparison of sources with reference to quality, quantity and other considerations- Capacity of storage reservoirs, Mass curve analysis. Groundwater sources of water: Types of water bearing formations, springs, Wells and Infiltration galleries, Yields from infiltration galleries.

Collection and Conveyance of Water: Factors governing the selection of the intake structure, Types of Intakes. Conveyance of Water: Gravity and Pressure conduits, Types of Pipes, Pipe Materials, Pipe joints, Design aspects of pipe lines, laying of pipelines

UNIT-III

Quality and Analysis of Water: Characteristics of water– Physical, Chemical and Biological. Analysis of Water – Physical, Chemical and Biological characteristics. Comparison of sources with reference to quality- IS 10500 2012 and WHO guidelines for drinking water - Water quality standards for Agriculture, Industries and Construction

UNIT–IV

Treatment of Water: Treatment methods: Theory and Design of Sedimentation, Coagulation, Sedimentation with Coagulation, Filtration

Disinfection: Theory of disinfection-Chlorination and other Disinfection methods, Softening of Water, Removal of color and odors- Removal of Iron and Manganese - Adsorption- Fluoridation and deflouridation– Aeration–Reverse Osmosis- Ion exchange– Ultra filtration

UNIT–V

Distribution of Water: Requirements- Methods of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Components of Distribution system: valves such as sluice valves, air valves, scour valves and check valves, hydrants, and water meters, selection of pipe materials, pipe joints. Ideal water supply system.

TEXTBOOKS:

1. Rural, Municipal and Industrial Water Management, KVSG Murali Krishna, Reem Publications, New Delhi, 2012
2. Elements of Environmental Engineering – K. N. Duggal, S. Chand & Company Ltd., New Delhi,2012.
3. Water Supply and Sanitary Engineering – G. S. Birdie and J. S. Birdie

REFERENCES:

1. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, George Tchobanoglus – Mc- Graw-Hill Book Company, New Delhi,1985.
2. Water Supply Engineering – P. N. Modi.
3. Water Supply Engineering – B. C. Punmia

WEBLINK:

https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ge22/

III B.Tech II Semester	**L**	**T**	**P**	**C**
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ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT

Course Learning Objectives:

The objective of this course is:

1. To impart knowledge on different concepts of Environmental Impact Assessment
2. To know procedures of risk assessment
3. To learn the EIA methodologies and the criterion for selection of EIA methods
4. To pre-requisites for ISO 14001 certification
5. To know the procedures for environmental clearances and audit

Course Learning Outcomes

Upon successful completion of this course, the students will be able to:

1. Prepare EMP, EIS, and EIA report
2. Identify the risks and impacts of a project
3. Selection of an appropriate EIA methodology
4. Evaluation the EIA report
5. Estimate the cost benefit ratio of a project

SYLLABUS:

UNIT – I

Basic concept of EIA: Elements of EIA – factors affecting EIA-Initial environmental Examination – life cycle analysis preparation of Environmental Base map Classification of environmental parameters – role of stakeholders in the EIA preparation – stages in EIA

UNIT – II

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 - EIS and EMP

UNIT-III

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives- application of remote sensing and GIS for EIA.

UNIT-IV

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts

on surface water environment, Generalized approach for assessment of Air pollution Impact.

UNIT – V

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation. Environmental Risk Assessment and Risk management in EIA: Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessmentadvantages of Environmental Risk Assessment

TEXTBOOKS:

1. Environmental Impact Assessment, Canter Larry W., McGraw-Hill education Edi (1996)

2. Environmental Impact Assessment Methodologies, Y. Anjaneyulu, B. S. Publication, Sultan Bazar, Hyderabad.

REFERENCES:

1. Environmental Science and Engineering, J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers

2. Environmental Science and Engineering, Suresh K. Dhaneja, S. K. , Katania & Sons Publication., New Delhi.

WEBLINK

https://nptel.ac.in/content/storage2/courses/120108004/

III B.Tech II Semester

L	T	P	C
3	0	0	3

RAILWAY, AIRPORTS, DOCKS & HARBOURS

Course Learning Objectives:

The objective of this course is:

1. To know various components and their functions in a railway track
2. To acquire design principles of geometrics in a railway track.
3. To know various techniques for the effective movement of trains.
4. To acquire design principles of airport geometrics and pavements.
5. To know the planning, construction and maintenance of Docks and Harbours.

Course Outcomes:

At the end of course, Student can

1. Design geometrics in a railway track.
2. Provide good transportation network
3. Analyzing various techniques for the effective movement of trains
4. Design airport geometrics and airfield pavements.
5. Plan, construct and maintain Docks and Harbours.

SYLLABUS:

A.RAILWAY ENGINEERING

UNIT – I

Components of Railway Engineering: Permanent way components – Railway Track Gauge - Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast – Rail Fastenings – Creep of Rails- Theories related to creep – Adzing of Sleepers- Sleeper density
– Rail joints.

UNIT – II

Geometric Design of Railway Track: Alignment – Engineering Surveys – Gradients – Grade Compensation – Cant and Negative, Super elevation – Cant Deficiency – Degree of Curve – safe speed on curves.

UNIT – III

Turnouts & Controllers: Track layouts – Switches – Signal Objectives – Classification – Fixed signals – Stop signals – Signalling systems – Mechanical signalling system – Electrical signalling system – System for Controlling Train Movement – Interlocking – Modern signalling Installations.

B.AIRPORT ENGINEERING

UNIT – IV

Airport Planning & Design: Airport Master plan – Airport site selection – Air craft characteristics – Zoning laws – Airport classification – Runway orientation – Wind rose diagram – Design of Runway length – Taxiway design – Terminal area and Airport layout – Visual aids and Air traffic control.

C.D OCKS & HARBOURS

UNIT – V

Planning, Layout, Construction & Maintenance Of Docks & Harbours: Classification of ports – Requirement of a good port – classification of Harbours – Docks - Dry & wet docks – Transition sheds and workhouses – Layouts; Quays – construction of Quay walls – Wharves – Jetties – Tides
- Tidal data and Analysis – Break waters – Dredging – Maintenance of Ports and Harbours – Navigational aids.

TEXT BOOKS:

1. Railway Engineering by Satish Chandra and Agarwal M.M., Oxford University Press, New Delhi
2. Airport Engineering by Khanna & Arora - Nemchand Bros, New Delhi.
3. Docks and Harbour Engineeringby Bindra S.P. - Dhanpathi Rai & Sons, New Delhi.

REFERENCES:

1. 'Railway Engineering'by Saxena & Arora - Dhanpat Rai, New Delhi.
2. 'Transportation Engineering Planning Design' by Wright P.H. & Ashfort N.J. - John Wiley & Sons.
3. 'Airport Engineering' by Virendra Kumar, Dhanpat Rai Publishers, New Delhi.

Web Link

https://nptel.ac.in/courses/105/107/105107123/

III B.Tech II Semester	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

ROCK ENGINEERING

Course Objectives:

1. To impart knowledge on fundamentals of rock mechanics and its application in solving simple problems.
2. To impart the knowledge on the mechanics of rock and its applications in underground structures and rock slope stability analysis.
3. To understand Coulomb failure criteria and Hock and Brown empirical criteria
4. To understand the Underground openings – Rock slopes – Foundations and mining subsidence
5. To understand the Rock support and Rock reinforcement

Course Outcomes:

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

1. Classify the rocks, study the index properties of rock systems.
2. Understand the modes of rock failure, stares-strain characteristics, failure criteria.
3. Estimate the stresses in rocks.
4. Apply rock mechanics in engineering.
5. Get knowledge on rock stabilization.

SYLLABUS

UNIT I CLASSIFICATION AND INDEX PROPERTIES OF ROCKS Geological classification – Index properties of rock systems – Classification of rock masses for engineering purpose – Rock Mass Rating and Q System

.

UNIT II ROCK STRENGTH AND FAILURE CRITERIA Modes of rock failure – Strength of rock – Laboratory measurement of shear, tensile and compressive strength. Stress

- strain behaviour of rock under Hydrostatic compression and deviatoric loading – Mohr – Coulomb failure criteria and Hock and Brown empirical criteria

UNIT III INITIAL STRESSES AND THEIR MEASUREMENTS Estimation of initial stresses in rocks – influence of joints and their orientation in distribution of stresses – measurements of in-situ stresses – Hydraulic fracturing – Flat jack method – Over coring method

UNIT IV APPLICATION OF ROCK MECHANICS IN ENGINEERING Simple engineering application – Underground openings – Rock slopes – Foundations and mining subsidence.

UNIT V ROCK STABILISATION Introduction – Rock support and Rock reinforcement – Principles – Support reaction curves – Shotcreting.

TEXTBOOKS:

1. Goodman, P.E. "Introduction to Rock Mechanics", John Wiley and Sons, 1999.
2. Stillborg B., "Professional User Handbook for rock Bolting", Tran Tech Publications, 1996.
3. Ramamurthy T., "Engineering in Rocks for Slopes Foundations and Tunnels", PHI Learning Pvt. Ltd., 3rd Edition, 2014.

REFERENCES:

1. Brown, E.T. "Rock Characterisation Testing and Monitoring". Pergaman Press 1991.
2. Arogyaswamy, R.N.P., Geotechnical Application in Civil Engineering", Oxford and IBH, 1991.
3. Brady, B.H.G. and Brown, E.T., Rock mechanics for underground mining (Third Edition), Kluwer Academic Publishers, Dordrecht, 2006.

III B.Tech II Semester	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

GREEN BUILDINGS

Course Learning Objectives:

The objective of this course is:

1. To introduce Green Building provisions
2. To introduce various equipments of Green technology
3. To introduce the importance of safety in construction projects
4. Methods of production of aggregate products and concreting
5. Usage of machinery required for the works

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Appreciate the importance Green Building provisions
2. Understand the various equipments of Green technology
3. Know the methods of importance of safety in construction projects
4. Apply the gained knowledge to pollution prevention programme
5. Understand the machinery required for the works

SYLLABUS:

UNIT- I

Green Buildings Provisions and Miscellaneous Services : Rain water Harvesting for buildings- Concept of GREEN buildings -Components of GREEN building -Introduction and Significance to Grey water- Components of Grey water system -Management of Grey water system.

UNIT- II

Introduction: Green Technology – definition- Importance – Historical evolution – advantages and disadvantages of green technologies-factors affecting green technologies- Role of Industry, Government and Institutions – Industrial Ecology – role of industrial ecology in green technology.

Cleaner Production (CP): Definition – Importance – Historical evolution - Principles of Cleaner Production–Benefits–Promotion-Barriers – Role of Industry

UNIT- III

Cleaner Production Project Development and Implementation: Government and Institutions – clean development mechanism, reuse, recovery, recycle, raw material substitution-Wealth from waste, case studies.

Overview of CP Assessment Steps and Skills, Process Flow Diagram, Material Balance, CP Option Generation – Technical and Environmental Feasibility analysis – Economic valuation of alternatives - Total Cost Analysis – CP Financing – Preparing a Program Plan – Measuring Progress- ISO 14000.

UNIT- IV

Pollution Prevention and Cleaner Production Awareness Plan – Waste audit – Environmental Statement, carbon credit, carbon sequestration, carbon trading, Life Cycle Assessment - Elements of LCA – Life Cycle Costing – Eco Labelling.

UNIT -V

Availability and need of conventional energy resources, major environmental problems related to the conventional energy resources, future possibilities of energy need and availability. Non-conventional energy sources: Solar Energy-solar energy conversion technologies and devices, their principles, working andapplication.

TEXT BOOKS:

1. 'Pollution Prevention: Fundamentals and Practice' by Paul L Bishop (2000), McGraw

Hill International.

2. 'Cleaner Production Audit' by Prasad Modak, C.Visvanathan and Mandar Parasnis (1995), Environmental System Reviews, No.38, Asian Institute of Technology,Bangkok

3. 'Non-conventional Energy Sources' by RaiG.D.

REFERENCES:

1. 'Pollution Prevention and Abatement Handbook – Towards Cleaner Production' by World Bank Group (1998), World Bank and UNEP, WashingtonD.C.

2. 'Handbook of Organic Waste Conversion' by BewikM.W.M.

3. 'Energy, The Solar Hydrogen Alternative' by BokrisJ.O.

Web Link:

https://nptel.ac.in/courses/105/102/105102195/

III B.Tech II Semester

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3	0	0	3

OFFSHORE STRUCTURES

Course Objectives

The objective of this course is:

1. Acquire knowledge about the analytical models for offshore structure skills to carry out basic tasks regarding dimensioning and structural design of offshore structures.
2. be able to calculate maximum base shear and overturning moments for structure and Estimation of maximum forces on an offshore structure due to operational
3. Know the Possible modes of failure, Eccentric connections and offset connections, Cylindrical and rectangular structural members
4. Understand the behavior of steel at elevated temperature
5. Know the preventive measures of corrosion

Course Outcomes

Upon the successful completion of this course, the students will be able to:

1. Acquire training in the design of jacket platforms, tubular joints and concrete gravity platform. CO4. Estimate the resistance of platforms against fatigue and accidental loads.
2. Attain knowledge in the physics of corrosion and methods to monitor and prevent corrosion.
3. Provide the candidate with the knowledge and skills to carry out basic tasks regarding structural design and dimensioning of marine structures.
4. Sound knowledge on serviceability and safety design criteria, including requirements to overall stability and strength as well as evacuation and escape.
5. Should understand the design rules for offshore structures including offshore wind turbines. Overview of functional, environmental and accidental loads for marine structures

SYLLABUS

UNIT-1

Types of offshore structures and their conceptual development- Fixed, Compliant, Floating-Analytical models for offshore structures- Behavior under static and dynamic loads- Materials and construction of jacket and gravity platforms- Statutory regulations- Allowable stresses- Design methods and Code Provisions- Design specification of API, DNV, Lloyd's and other Classification Societies.

UNIT II

Environmental loads- Wind, wave, current and ice loads- Calculation based on maximum base shear and overturning moments- Design wave height and spectral definition- Morison's Equation-Maximum wave force on offshore structure- Concept of return waves- Principles of static and dynamic analyses of fixed platforms-Use of approximate methods

UNIT III

Introduction to tubular members- Slenderness effect- Column buckling-Tubular joints- Possible modes of failure, Eccentric connections and offset connections. Cylindrical and rectangular structural members- Inplane and multi plane connections- Parameters of inplane tubular joints- Kuang's formulae- Elastic stress distribution- Punching shear stress.

UNIT IV

Design concepts against accidental loads- Fire, Blast and Collision- Behaviour of steel at elevated temperatureFire rating for Hydrocarbon fire- Design of structures for high temperature- Blast mitigation-Blast walls- Collision of boats and energy absorption.

UNIT V

Corrosion- Corrosion mechanism- Types of corrosion- Offshore structure corrosion zones- Biological corrosion- Preventive measures of corrosion- Principles of cathode protection systems- Sacrificial anode method and impressed current method- Online corrosion monitoring- Corrosion fatigue.

TEXTBOOK:

1. SrinivasanChandrasekaran, Dynamic Analysis and Design of Ocean Structures.Springer, 2015.

2. DNV-RP-C203- fatigue Design of Offshore Steel Structures, 2011.

REFERENCES:

3. DNV-RP-C204- Design Against Accidental Loads, 2010.

WEBLINK:

https://nptel.ac.in/courses/114/106/114106011/

III B.Tech II Semester

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THEORY OF ELASTICITY

Course Learning Objectives:

The objective of this course is:

1. To Introduce fundamental elasticity model of deformation in rectangular and polar coordinate.
2. To Give foundation for 2D and 3D study in solid mechanics problems
3. To Introduce to torsion and warping of prismatic structure
4. To Introduce to Stress Tensor – Strain Tensor
5. To Introduce to Torsion of Rolled Profile Sections.

Upon the successful completion of this course, the students will be able to:

1. The more fundamental elasticity model of deformation should replace elementary strength of material analysis.
2. Able to understand theory, formulate and to present solutions to a wide class of problems in 2D and 3D
3. Acquire the foundation for advanced study in areas of solid mechanics
4. Able to understand General Theorems: Differential equations of equilibrium
5. Acquire the foundation for Saint Venants Method

SYLLABUS:

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 - boundary conditions – Strain Displacement Relations - compatibility equations - stress function

UNIT - II Two dimensional problems in rectangular coordinates - solution by polynomials - Saint-Venants principle - determination of displacements - bending of simple beams – Simple Supported and Cantilever Beam.

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 Stress Tensor – Strain Tensor- 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 - solution of torsional problems by energy method - torsion of shafts, tubes, bars etc. Torsion of Rolled Profile Sections.

TEXT BOOKS:

1. Theory of Elasticity by Timoshenko, McGraw-Hill Publications.
2. Theory of Plasticity by J. Chakarbarthy, McGraw-Hill Publications.

REFERENCE BOOKS:

1. Theory of Elasticity by Y.C.Fung. 2. Theory of Elasticity by Gurucharan Singh.

III B.Tech II Semester	**L**	**T**	**P**	**C**
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ENVIRONMENTAL ENGINEERING LAB

Course Learning Objectives:

The course will address the following:

1. Estimation some important characteristics of water and wastewater in the laboratory.
2. It also gives the significance of the characteristics of the water and wastewater.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Estimation some important characteristics of water and wastewater in the laboratory.
2. Draw some conclusion and decide whether the water is potable ornot.
3. Decide whether the water body is polluted or not with reference to the state parameters in the list of experiments.
4. Estimation of the strength of the sewage in terms of BOD and COD.

SYLLABUS:

List of Experiments

1. Determination of pH and Electrical Conductivity (Salinity) of Water and Soil.
2. Determination and estimation of Total Hardness–Calcium &Magnesium.
3. Determination of Alkalinity/Acidity
4. Determination of Chlorides in water and soil.
5. Determination and Estimation of total solids, organic solids and in organic solids and settleable solids by Imhoff Cone.
6. Determination of Iron.
7. Determination of Dissolved Oxygen with D.O. Meter & Wrinklers Method and

B.O.D.

8. Determination of N, P, K values in solid waste
9. Physical parameters – Temperature, Colour, Odour, Turbidity, Taste.
10. Determination of C.O.D.
11. Determination of Optimum coagulant dose.
12. Determination of Chlorine demand.
13. Presumptive Coliform test.

NOTE: At least 10 of the above experiments are to be conducted.

List of Equipments

1) pH meter
2) Turbidity meter
3) Conductivity meter
4) Hot air oven
5) Muffle furnace
6) Dissolved Oxygen meter
7) U–V visible spectrophotometer
8) COD Reflux Apparatus
9) Jar Test Apparatus
10) BOD incubator
11) Autoclave
12) Laminar flow chamber
13) Hazen's Apparatus

Text Books

1. Standard Methods for Analysis of Water and Waste Water – APHA.
2. Chemical Analysis of Water and Soil by KVSG Murali Krishna,Reem Publications, New Delhi.

Reference

1. Relevant IS Codes.
2. Chemistry for Environmental Engineering by Sawyer and Mc.Carty.

III B.Tech II Semester

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1	0	2	2

STAAD.Pro COURSE (Skill advanced course)

COURSE OBJECTIVES

1. To teach the students to understand the details of STAAD.Pro software package.
2. To enable the students to prepare input data for RCC & Steel structures.
3. To enable the students to design different components of structures.

COURSE OUTCOMES

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

1. Understand the details of STAAD.Pro software package.
2. To prepare input data of STAAD.Pro.
3. Run STAAD.Pro for analysis and desing of structures.
4. Design different components of structures.

EXPERIMENTS:

1. Design of simply supported RCC beam.
2. Design of cantilever RCC beam.
3. Design of continuous RCC beam.
4. Design of simply supported Steel beam.
5. Design of continuous Steel beam.
6. Design of RCC columns with diff erent end conditions.
7. Design of Steel columns with diff erent end conditions.
8. Design of steel trusses.
9. Design of RCC portal frames.
10. Design of steel portal frames.

Text Book

1. N. Vazirani & M. M. Ratwani, Analysis of Structures, Khanna Publishers

Reference Books

1. R. L. Jindal, Indeterminate Structures, Tata McGraw Hill Publishing House.
2. G. S. Pandit & Gupta S. P., Structural Analysis (A matrix approach), Tata McGraw Hill Publishing Ltd.
3. Wang C. K., Matrix Method of Structural Analysis, Jon Wiley publications. 4. IS:456 -2000, IS:800-2007.

III B.Tech II Semester

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2	0	0	0

CONSTRUCTION TECHNIQUES AND PRACTICES

(AICTE suggested)

COURSE OBJECTIVES

On successful completion of this course the students should understand the

1. Energy efficient buildings for various zones-Case studies of residential, office buildings and other buildings in each zones.
2. Earthwork - masonry – stone masonry – Bond in masonry - concrete hollow block masonry
3. Dewatering and stand by Plant equipment for underground open excavation.
4. Erection of articulated structures, braced domes and space decks.
5. Equipment for material handling and erection of structures – types of cranes - Equipment for dredging, trenching, tunneling,

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

1. know the different construction techniques and structural systems
2. Understand various techniques and practices on masonry construction, flooring, and roofing.
3. Plan the requirements for substructure construction.
4. Know the methods and techniques involved in the construction of various types of super structures
5. Select, maintain and operate hand and power tools and equipment used in the building construction sites.

UNIT I CONSTRUCTION TECHNIQUES Structural systems - Load Bearing Structure - Framed Structure - Load transfer mechanism – floor system - Development of construction techniques - High rise Building Technology - Seismic effect - Environmental impact of materials

– responsible sourcing - Eco Building (Green Building) - Material used - Construction methods - Natural Buildings - Passive buildings - Intelligent(Smart) buildings - Meaning - Building

automation - Energy efficient buildings for various zones-Case studies of residential, office buildings and other buildings in each zones.

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

UNIT III SUB STRUCTURE CONSTRUCTION Techniques of Box jacking – Pipe Jacking - under water construction of diaphragm walls and basement-Tunneling techniques – Piling techniques - well and caisson - sinking cofferdam - cable anchoring and grouting - driving diaphragm walls, sheet piles - shoring for deep cutting - well points -Dewatering and stand by Plant equipment for underground open excavation.

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

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

TEXTBOOKS :

1. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., "Construction Planning,

Equipment and Methods", 5th Edition, McGraw Hill, Singapore, 1995.

2. Arora S.P. and Bindra S.P., "Building Construction, Planning Techniques and Method of Construction", Dhanpat Rai and Sons, 1997.

3. Varghese, P.C. "Building construction", Prentice Hall of India Pvt. Ltd, New Delhi, 2007.

REFERENCES:

1. Jha J and Sinha S.K., "Construction and Foundation Engineering", Khanna Publishers, 1999.

2. Sharma S.C. “Construction Equipment and Management”, Khanna Publishers New Delhi, 2002.

3. Deodhar, S.V. “Construction Equipment and Job Planning”, Khanna Publishers, New Delhi, 2012.

4. Mahesh Varma, “Construction Equipment and its Planning and Application”, Metropolitan Book Company, New Delhi, 1983.

IV Year - I Semester

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FOUNDATION ENGINEERING

Course Learning Objectives:

The objective of this course is:

1. To impart to the student knowledge of slopes and retaining structures
2. To impart to the student knowledge of types of shallow foundations and theories required for thedetermination of their bearing capacity.
3. To enable the student to compute immediate and consolidation settlements of shallow foundations.
4. To impart the principles of important field tests such as SPT and Plate bearing test.
5. To enable the student to imbibe the concepts of pile foundations and determine their load carryingcapacity.

Course Outcomes:

Upon the successful completion of this course:

1. The student must be able to understand the various types of shallow foundations and decide on their location based on soil characteristics.
2. The student must be able to compute the magnitude of foundation settlement to decide the size of the foundation.
3. The student must be able to use the field test data and arrive at the bearing capacity.
4. The student must be able to design Piles based on the principles of bearing capacity.
5. To enable the student to imbibe the concepts of pile foundations and determine their load carrying capacity.

SYLLABUS:

UNIT – I Stability of Slopes: Infinite and finite earth slopes in sand and clay types offailures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices – Taylor's Stability Number-Stability of slopes of dams and embankments - different conditions.

UNIT – II Earth Retaining Structures: Rankine's & Coulomb's theory of earth pressure –Culmann's graphical method - earth pressures in layered soils.

UNIT-III Shallow Foundations – Bearing Capacity Criteria: Types of foundations and factors to be considered in their location - Bearing capacity – criteria for determination bearing capacity – factors influencing bearing capacity – analytical

methods to determine bearing capacity – Terzaghi's theory - IS Methods.
Settlement Criteria:

Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – Types of foundation settlements and their determination
– allow able settlements of structures.

UNIT –IV Pile Foundations: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae– Pile load tests - Load carrying capacity of pile groups in sands and clays.

UNIT-V Well Foundations: Types – Different shapes of well – Components of well – functions – forces acting on well foundations - Design Criteria – Determination of steining thickness and plug - construction and Sinking of wells – Tilt and shift.

Soil Exploration: Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Pressure meter – planning of Programme and preparation of soil investigation report.

Text Books:

1. Principles of Foundation Engineering, Das, B.M., (2011), 6th edition Cengagelearning
2. Basic and Applied Soil Mechanics, Gopal Ranjan & A.S.R. Rao, New AgeInternational Pvt. Ltd, (2004).

References:

1. Foundation Analysis and Design, Bowles, J.E., (1988), 4th Edition, McGraw-HillPublishing Company, Newyork.
2. Analysis and Design of Substructures by Swami Saran, Sarita Prakashan, Meerut.

Web link

https://nptel.ac.in/courses/105/105/1051051

IV Year - I Semester **L T P C**

30 0 3

PRESTRESSED CONCRETE

Course Learning Objectives:

The objective of this courses:

1. Familiarize Students with concepts of prestressing
2. Equip student with different systems and devices used in prestressing
3. Understand the different losses of prestress including short and long term losses
4. Familiarize students with the analysis and design of prestressed concrete members under flexure, shearand torsion
5. Understand concepts of stress transfer

Course Outcomes:

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

1. Understand the different methods of prestressing
2. Estimate effective prestress including the short and long term losses
3. Analyze and design prestressed concrete beams under flexure and shear
4. Understand the relevant IS Codal provisions for prestressed concrete
5. Analyze & Understand concepts of stress transfer

SYLLABUS:

UNIT-I

Basic concepts of Prestressing- Advantages and Applications of Prestressed Concretes, High Strength Concrete- Permissible Stresses, Shrinkage, Creep, Deformation Characteristics, High strength Steel- Types, Strength- Permissible Stresses- Relaxation of Stress, Cover Requirements.

UNIT-II

Prestressing Systems- Introduction, Tensioning devices, Pre-tensioning Systems, Post tensioning Systems, Basic Assumptions in Analysis of prestress and design, Analysis of prestress, Resultant Stresses at a section- pressure line- Concepts of load balancing- Stresses in Tendons, Crackingmoment.

UNIT-III

Losses of Pre-stressing- Loss of Pre-stress in pre-tensioned and post tensioned members

due to various causes -Elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation stress in steel, slip in anchorage, differential shrinkage- bending of members and frictional losses- Total losses allowed for design

UNIT-IV

Design for Flexural resistance- Types of flexural failure – Code procedures- Design of sections for flexure- Control of deflections- Factors influencing Deflection- Prediction of short term and long termdeflections.

UNIT-V

Design for Shear and Torsion- Shear and Principal Stresses- Design of Shear reinforcements- Codal Provisions- Design for Torsion, Design for Combined bending, shear and torsion.

Text Books

1. Prestressed Concrete, N. Krishna Raju, Tata McGrawhill

2. Prestressed Concrete, S.Ramamrutham

3. Prestressed Concrete Design , M.K. Hurst

References:

1. Prestressed Concrete, P.Dayaratnam

2. Design of Pre stressed concrete structures , T. Y. Lin & Burns, WileyPublications

Web Link: https://nptel.ac.in/courses/105/104/10

IV Year - I Semester

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3	0	0	3

GROUND WATER DEVELOPMENT

Course Learning Objectives:

The course is designed to

1. Appreciate groundwater as an important natural resource.

2.Understand flow towards wells in confined and unconfined aquifers. 3.Understand the principle involved in design and construction of wells.

4.Create awareness on improving the groundwater potential using various recharge techniques. 5.Know the importance of saline water intrusion in coastal aquifers and its control measures.

Course Outcomes

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

1. Estimate aquifer parameters and yield of wells.
2. Analyze radial flow towards wells in confined and unconfined aquifers.
3. Design wells and understand the construction practices.
4. Interpret geophysical exploration data for scientific source finding of aquifers.
5. Determine the process of artificial recharge for increasing groundwater potential.

SYLLABUS:

UNIT – I

Introduction

Groundwater in the hydrologic cycle, groundwater occurrence, aquifer parameters and their determination, general groundwater flow equation.

Well Hydraulics

Steady radial flow and unsteady radial flow to a well in confined and unconfined aquifers, Theis solution, Jocob and Chow's methods, Leaky aquifers.

UNIT – II

Well Design

Water well design-well diameter, well depth, well screen-screen length, slot size, screen diameter and screen selection, design of collector wells, infiltration gallery.

UNIT III

Well Construction and Development

Water wells, drilling methods-rotary drilling, percussion drilling, well construction-installation of well screens-pull-back method, open- hole, bail- down and wash-down methods, well development-mechanical surging using compressed air, high velocity jetting of water, over pumping and back washing, well completion, well disinfection, well maintenance.

UNIT IV

Artificial Recharge

Concept of artificial recharge of groundwater, recharge methods-basin, stream-channel, ditch and furrow, flooding and recharge well methods, recharge mounds and induced recharge.

Saline Water Intrusion

Occurrence of saline water intrusion, Ghyben- Herzberg relation, Shape of interface, control of saline water intrusion.

UNIT – V

Geophysics

Surface methods of exploration of groundwater – Electrical resistivity and Seismic refraction methods, Sub- surface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications.

Basic principles of groundwater modelling- Analog models-viscous fluid models and membrane models, digital models-Finite difference and finite element models, Concepts of groundwater management, basin management by conjunctive use-case studies.

TEXT BOOKS:

1.'Groundwater' by Raghunath H M, New Age International

Publishers, 2005. 2.'Groundwater Hydrology'by Todd D.K., Wiley

India Pvt Ltd., 2014.

3.'Groundwater Hydrology'by Todd D K and L W Mays, CBS Publications, 2005.

REFERENCES:

1.'Groundwater Assessment and Management' by Karanth K R, Tata McGraw Hill Publishing Co., 1987. 2.'Groundwater Hydrology' by Bouwer H, McGraw Hill Book Company, 1976

IV Year - I Semester **L T P C**

3 0 0 3

HYDRAULIC STRUCTURES

Course Learning Objectives:

The course is designed to

1. Introduce the types of irrigation systems
2. Introduce the concepts of planning and design of irrigation systems
3. Discuss the relationships between soil, water and plant and their significance.
4. Understand design methods of erodible and non-erodible canals
5. Know the principles of design of hydraulic structures on permeable foundations.

Course Outcomes:

At the end of the course the student will be

able to 1. Estimate irrigation water

requirements
2. Design irrigation canals and canal network
3. Plan an irrigation system
4. Design irrigation canal structures
5. Plan and design diversion head works

SYLLABUS:

UNIT-I

Irrigation: Necessity and importance, principal crops and crop seasons, types, methods of application, soil- water-plant relationship, soil moisture constants, consumptive use, estimation of consumptive use, crop water requirement, duty and delta, factors affecting duty, depth and frequency of

irrigation, irrigation efficiencies, water logging and drainage, standards of quality for irrigation water, crop rotation.

UNIT-II

Canals: Classification, design of non-erodible canals - methods of economic section and maximum permissible velocity, economics of canal lining, design of erodible canals -Kennedy's silt theory and Lacey's regime theory, balancing depth of cutting.

UNIT III

Canal Structures:

Falls: Types and location, design principles of Sarda type fall and straight

glacis fall. Regulators: Head and cross regulators, design principles

Cross Drainage Works: Types, selection, design principles of aqueduct, siphon aqueduct and

super passage. Outlets: types, proportionality, sensitivity and flexibility

River Training: Objectives and approaches

UNIT-IV

Diversion Head Works: Types of diversion head works, weirs and barrages, layout of diversion head works, components. causes and failures of weirs on permeable foundations, Bligh's creep theory, Khosla's theory, design of impervious floors for subsurface flow, exit gradient.

UNIT-V

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

Dams: Types of dams, selection of type of dam, selection of site for a dam. Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a dam, stability analysis, drainage galleries, grouting.

Spillways: Types, design principles of Ogee spillways, types of spillways crest gates. Energy dissipation below spillways-stilling basin and its appurtenances.

TEXT BOOKS:

1. 'Irrigation and Water Power Engineering'by Punmia B C,P.B.B Lal, A.K. Jain and A.K. Jain (2009), Laxmi Publications Pvt. Ltd., New Delhi.

2. 'Irrigation and Water Resources Engineering'by Asawa G L (2013), New Age International

Publishers. 3.'Irrigation Engineering'by Raghunath H.M (2012), Wiley India.

REFERENCES:

1.'Water Resources Engineering' by Mays L.W (2013), Wiley India Pvt. Ltd, New

Delhi. 2.'Irrigation Engineering' by Sharma R.K. and Sharma, T.K (2012), S.Chand &

Co Publishers.

3.'Water Resources Engineering'by Satyanarayana Murthy Challa (2008), New Age International Publishers.

IV Year - I Semester

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WASTE WATER TREATMENT

Course Learning Objectives:
The objective of this course is:

1. Outline planning and the design of wastewater collection, conveyance
2. and treatment systems for a community/town/city
3. Summarize the appurtenance in sewerage systems and their necessity
4. Teach planning, and design of septic tank and imhoff tank and the
5. disposal of the effluent from these low-cost treatment systems

Course Outcomes:
By the end of successful completion of this course, the students will be able to:

1. Plan and design the sewerage systems
2. Select the appropriate appurtenances in the sewerage systems
3. Identify the critical point of pollution in a river for a specific amount of
4. pollutant disposal into the river
5. Suggest a suitable disposal method with respect to effluent standards.

SYLLABUS:

UNIT – I: **Introduction to Sanitation** – Systems of sanitation – relative merits & demerits – collection and conveyance of waste water – sewerage – classification of sewerage systems- Estimation of sewage flow and storm water drainage – fluctuations – types of sewers - Hydraulics of sewers and storm drains–design of sewers – appurtenances in sewerage – cleaning and ventilation of sewers.

UNIT – II: **Pumping of wastewater**: Pumping stations – location – components– types of pumps and their suitability with regard to wastewaters. **House Plumbing**: Systems of plumbing-sanitary fittings and other accessories– one pipe and two pipe systems – Design of building drainage.

UNIT – III: **Sewage characteristics** – Sampling and analysis of wastewater - Physical, Chemical and Biological Examination-Measurement of BOD and COD - BOD equations Treatment of sewage: Primary treatment-Screens-grit chambers-grease traps– floatation– sedimentation – design of preliminary and primary treatment units.

UNIT – IV: Secondary treatment: Aerobic and anaerobic treatment process comparison. **Suspended growth process**: Activated Sludge Process, principles, designs, and operational problems, modificationsof Activated Sludge Processes, Oxidation ponds, Aerated Lagoons.

UNIT V: Miscellaneous Treatment Methods: Nitrification and Denitrification – Removal of Phosphates –UASB–Membrane reactors-Integrated fixed film reactors. Anaerobic Processes: Septic Tanks and Imhoff tanks- –Reuse and disposal of septic tank effluent.
Bio-solids (Sludge) management: Characteristics-SVI, handling and treatment of sludge-thickening – anaerobic digestion of sludge, Sludge Drying Beds, **Disposal of sewage**: Methods of disposal – disposal into water bodies- Oxygen Sag Curve-Disposal into sea, disposal on land- sewage sickness.

Text Books:

1. Wastewater Engineering Treatment and Reuse, Metcalf & Eddy, Tata McGraw-Hill edition.
2. Industrial Water and Wastewater Management, K.V.S.G. Murali Krishna.
3. Elements of Environmental Engineering, K. N. Duggal, S. Chand & Company Ltd. New Delhi, 2012.

References:

1. Environmental Engineering, Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985
2. Wastewater Treatment for Pollution Control and Reuse, Soli. J Arceivala, Sham R Asolekar, Mc-GrawHill, NewDelhi; 3rd Edition.

Web link:

https://nptel.ac.in/courses/103/107/103107084

IV Year - I Semester **L T P C**

3 0 0 3

GROUND IMPROVEMENT TECHNIQUES

Course Learning Objectives:

The objective of this course is:

1. To enable the student to find out the properties of the soil and classify it.
2. To impart the concept of Densification of soils
3. To Understand the difference between dry and Submerged soil strength
4. To enable the students to differentiate between compaction and consolidation & water drainingtechniques
5. To enable the student to understand the concept of strength of soils through Reinforcement.

Course Outcomes:

Upon the successful completion of this course

1. The student must know the definition of the various parameters related to soil strength & density.
2. Attaining knowledge on methods attaining the desirable properties of the soils using compactiontechniques.
3. Attaining knowledge on methods attaining the desirable properties of the soils using Drainage
4. Attaining knowledge on methods of dewatering the soils using Advanced techniques
5. The student should be able to apply the above concepts in day-to-day civil engineering practice.

UNIT - I

Introduction to Engineering Ground Modification: Need and objectives, Identification of soil types, In situ and laboratory tests to characterize problematic soils; Mechanical, Hydraulic, Physico-chemical, Electrical, Thermal methods, etc. and their applications.

UNIT - II

Mechanical Modification – Principles of soil densification – Properties of Compacted soil, Compaction control tests, Specification of compaction requirements, Blasting Vibrocompaction, Dynamic Tamping and Compaction piles.

UNIT - III

Hydraulic Modification – Objectives and techniques, traditional dewatering methods and their choice, Design of dewatering system, Electro-osmosis, Filtration, Drainage and seepage control with Geosynthetics, Preloading and vertical drains, Electro-kinetic dewatering.

UNIT - IV

Physical and Chemical Modification – Modification by admixtures, Shotcreting and Guniting Technology, Modification at depth by grouting, Crack Grouting and compaction grouting, Jet grouting, Thermal Modification, Ground freezing.

UNIT - V

Modification by Inclusions and Confinement - Soil reinforcement, reinforcement with strip, bar, mesh, sheet and grid reinforced soil. In-situ ground reinforcement, ground anchors, rock bolting and soilnailing.

TEXT BOOKS:

1. Hausmann, M. R. (1990) – Engineering Principles of Ground Modifications, McGraw Hillpublications
2. Patra, N.R. (2012)– Ground Improvement Techniques, Vikas Publications
3. Purushothama Raj (1995) – Ground Improvement Techniques, Laxmi Publications, India

REFERENCES:

1. M. P. Moseley and K. Krisch (2006) – Ground Improvement, 2nd Edition, Taylor and Francis.
2. K. Krisch & F. Krisch (2010) – Ground Control and Improvement, John Wiley & Sons 1994.
3. Nicholson, P.G. (2015). Soil Improvement and Ground Modification methods, Elsevier Publishers.

Web Link

https://nptel.ac.in/courses/105/108/105108075/

IV Year - I Semester **L T P C**

3 0 0 3

EARTH AND ROCKFILL DAMS AND SLOPE STABILITY

Course Objectives:

1. Have an understanding of seismic design concepts and current practices for earth dams and other similar structures to enable them to plan and direct the construction activity appropriately.
2. Understand the soil dynamic testing procedure and methodology of seismic design to be able to execute a proper design.
3. Have a clear understanding of design methodology and the interpretation in the seismic codes.
4. To enable the students to analyze problems with Bishop and Morgenstern technique
5. To enable the student to understand the concept of Rockfill embankments, Earth-core Rockfill dams

Course Outcomes:

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

1. Describe the behavior of natural and engineered soil / rock slopes under various weather and engineering conditions.
2. Explain the factors that may affect the stability of slopes.
3. Select an appropriate slope stability analysis method subject to geometry of slope, material properties, and uncertainty of observations.
4. Assess the potential landslide risk of slopes.
5. Assess the Upstream & Downstream slopes.

UNIT - I

Earth and Rockfill Dams: General features, Selection of site; Merits and demerits of the earth and rock fill dams, Classification of earth dams, Causes of failure, Safe design criteria. Instrumentation in earth dams: Pore pressure measurements, Settlement gauges, Inclinometers, Stress measurements, Seismic measurements.

UNIT - II

Failures, Damages and Protection of Earth Dams: Nature and importance of failure, Piping through embankment and foundations, Methods of seepage control through embankments and foundations, Design Criteria for filters, Treatment of upstream and downstream of slopes, Drainage control, Filter design.

UNIT - III

Slope Stability Analysis: Types of Failure: Failure surfaces - Planar surfaces, Circular surfaces, Non-circular surfaces, Limit equilibrium methods, Total stress analysis versus effective Stress analysis, Use of Bishop's pore pressure parameters, Short term and Long term stability in slopes. Taylor Charts.

UNIT - IV Methods of Slope Stability: Method of Slices, Effect of Tension Cracks, Vertical Cuts. Bishop's Analysis, Bishop and Morgenstern Analysis, Non-circular Failure Surfaces: Janbu Analysis, Sliding Block Analysis, Seismic stability, Stabilization of slopes: Soil reinforcement (geosynthetics/soil nailing/micro piles etc), soil treatment (cement/lime treatment), surface protection (vegetation/erosion control mats/shotcrete).

UNIT - V Rockfill Dams: Requirements of compacted rockfill, Shear strength of rockfill, Rockfill mixtures, Rockfill embankments, Earth-core Rockfill dams, Stability, Upstream & Downstream slopes.

TEXT BOOK:

1. Sherard, Woodward, Gizienski and Clevenger. Earth and Earth-Rock Dams. John Wiley &. Sons. 1963

REFERENCES:

1. Bharat Singh and Sharma, H. D. – Earth and Rockfill Dams, 1999

2. Sowers, G. F. and Salley, H. I. – Earth and Rockfill Dams, Willams, R.C., and Willace, T.S. 1965.

3. Abramson, L. W., Lee, T. S. and Sharma, S. - Slope Stability and Stabilization methods – John Wiley & sons. (2002)

4. Bromhead, E. N. (1992). The Stability of Slopes, Blackie academic and professional, London.

5. Christian, Earth & Rockfill Dams – Principles of Design and Construction, Kutzner Published Oxford and IBH.

6. Ortiago, J. A. R. and Sayao, A. S. F. J. - Handbook of Slope Stabilization, 2004.

IV Year - I Semester	**L**	**T**	**P**	**C**
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Finite Element Method

Course objective

The objective of this course is:

1. To enable the student to understand the Stresses and Equilibrium
2. To impart the concept of Elements and shape functions and natural coordinates
3. To Understand the Frame element, Beam element, problems for various loadings and boundary conditions.
4. To enable the students to solve Axisymmetric formulation finite element modeling of triangular and quadrilateral element.
5. To enable the student to understand the concept of Element mass matrices.

Course Outcome:

After learning the course, the students should be able to:

1. Derive element properties and analyze structure using finite element method,
2. Solve realistic engineering problems through computational simulations using finite element code,
3. Develop computer program for structural analysis using finite element technique.
4. Solve Bar elements, uniform bar elements, uniform section
5. Derive element matrices for two dimensional problems

Unit 1

Introduction: Basic Concepts, Background Review: Stresses and Equilibrium, Plane stress, Plane strain, Potential energy and Equilibrium. Rayleigh-Ritz Method, Galerkin's Method, Simple applications in structural Analysis.

Unit-2

Construction or discrete models-sub domains and nodes-simple elements for the FEM-Simplex, complex and multiples elements Polynomial selection -illustrative examples Elements and shape functions and natural coordinates, Use of local and natural coordinates, compatibility and convergence requirements of shape functions.

Unit 3

Fundamentals of Finite Element Method: Construction of shape functions for bar element and beam element, Bar elements, uniform bar elements, uniform section, mechanical and thermal loading, varying section, truss analysis, Frame element, Beam element, problems for various loadings and boundary conditions.

Unit 4

Theory of Isoparametric Elements and Axisymmetric: Isoparametric, sub parametric and super-parametric elements, characteristics of Isoparametric quadrilateral elements, structure of computer program for FEM analysis, description of different modules, pre and post processing, Axisymmetric formulation finite element modeling of triangular and quadrilateral element.

Unit 5

Field Problems: Heat transfer problems, Steady state fin problems, 1D heat conduction governing equation, Derivation of element matrices for two dimensional problems, Dynamic consideration- Formulation-Hamilton's principle, Element mass matrices.

Text Books:

Finite Elements in engineering Chandrupatla T. R PHI 3rd edition, 2002
Finite element Analysis Bhavikatti New Age International 3rd edition,2015

References:

1. T. J. R. Hughes: The Finite Element Method: Linear Static and Dynamic Finite Element Analysis, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1987

2. F. Hartmann (Author), Casimir Katz (Author): Structural Analysis with Finite Elements, 2nd Edition, Springer-Verlag, Berlin Heidelberg, 2007

3. A. Öchsner, M. Merkel: One-Dimensional Finite Elements, An Introduction to the FE Method, Springer, 2013

4. J. N. Reddy: An Introduction to the Finite Element Method, McGraw-Hill Education, 2005

5. J. N. Reddy: An Introduction to Nonlinear Finite Element Method, Oxford University Press, 2004

IV Year - I Semester	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

TRANSPORT PLANNING

Course objective

1. Recall basic concepts and methods of urban transportation planning in the India.
2. Summarize methods of designing, conducting and administering surveys to provide the data required for transportation planning.
3. Examine and apply travel demand modelling, Mode Choice Modelling and Traffic Assignment Modelling.
4. Formulate the need of land use modelling and illustrate land use models for urban transportation planning.

Course Outcome:

After completion of the course the student will be able to

1. Design and conduct surveys to provide the data required for transportation planning.
2. Prepare zonal demand generation and attraction regression models.
3. Prepare demand distribution models (gravity models) and modal split models for mode choice analysis.
4. Develop and calibrate trip generation rates for specific types of land use developments.
5. Compare among planning alternatives that best integrate multiple objectives such as technical feasibility and cost minimization.

Unit 1: Land use and Transportation System: Introduction-Urban system Components-Concepts and definitions-Criteria for measuring urban sprawl— Location theory-urban growth or decline

Unit 2: Transportation Planning Process: Introduction-Definition-Factors to be considered; Land use transportation planning; systems approach-Stages-Inventory of Existing Conditions-Difficulties in implementation.

Unit 3: Transport Surveys: Basic Movements- Study Area-Zones-Surveys- Planning of different types of surveys and interpretation, Travel demand; Traffic surveys for mass transit system planning

Unit 4: Trip Generation and Distribution: Factors governing trip generation and attraction – Application of Regression Analysis- Methods of trip distribution; Growth and Synthetic Models Calibration and Application of gravity model.-Category analysis. Problems.

Unit 5: Modal Split and Assignment: Factors affecting modal split; Modal split in transport planning; Principles of traffic assignment; assignment techniques. Problems

REFERENCE BOOKS:

1. Kadiyali, L. R., `Traffic Engineering and Transportation Planning' - Khanna Publication, New Delhi, 2009

2. JotinKhisty and B. Kent Lall "Transportation Engineering –An Introduction- PHI, New Delhi, 3rd Indian Edition, 2006.

3. Hutchinson, B.G., `Principles of Urban Transport System Planning' - McGraw Hill Book Co., London, UK, 1982.

4. Institute of Traffic Engineers - An Introduction to Highway Transportation Engineering 'New York., 1982

IV Year - I Semester **L T P C**

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REMOTE SENSING AND GIS APPLICATIONS

Course Learning Objectives:

The course is designed to

1. Introduce the basic principles of Remote Sensing and GIS techniques.
2. learn various types of satellite sensors and platforms
3. learn concepts of visual and digital image analyses
4. understand the principles of spatial analysis
5. appreciate application of RS and GIS to Civil engineering

Course outcomes

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

1. Be familiar with ground, air and satellite based sensor platforms.
2. interpret the aerial photographs and satellite imageries
3. create and input spatial data for GIS application
4. apply RS and GIS concepts in water resources engineering
5. applications of various satellite data

SYLLABUS:

UNIT – I

Introduction to remote sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces, Characteristics of remote sensing systems

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, spaceborne remote sensing, image data characteristics.

UNIT – II

Image analysis: Introduction, elements of visual interpretations, digital image processing-image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.

UNIT – III

Geographic Information System: Introduction, key components, application areas of GIS, map projections.

Data entry and preparation: spatial data input, raster data models, vector data models.

UNIT – IV

Spatial data analysis: Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators.

RS and GIS applications General: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications.

UNIT – V

Applications of Hydrology, Water Resources and Disaster Management: Flood zoning and mapping, groundwater prospects and potential recharge zones, watershed management and disaster management with case studies.

TEXT BOOKS:

1. Remote sensing and GIS, Bhatta B (2008) , Oxford University Press

2. Remote Sensing and Image Interpretation, Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013), Wiley India Pvt. Ltd., New Delhi

3. Fundamentals of Geographic Information Systems, Demers, M.N, Wiley India Pvt. Ltd, 2013.

REFERENCES:

1. Fundamentals of Remote Sensing, George Joseph, Universities Press, 2013.

2. Concepts and Techniques of Geographical Information System, Chor Pang Lo and A K W Yeung, Prentice Hall (India), 2006

3. Remote Sensing and its Applications, Narayan LRA, Universities Press, 2012.

IV Year - I Semester **L T P C**

3 0 0 3

REPAIRAND REHABILITATION OF STRUCTURES

Course Learning Objectives: The objective of this course is:

1. Familiarize Students with deterioration of concrete in structures
2. Equip student with concepts of NDT and evaluation
3. Understand failures and causes for failures in structures
4. Familiarize different materials and techniques for repairs
5. Understand procedure to carry out Physical evaluation of building sand prepare report.

Course Outcomes:

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

1. Explain deterioration of concrete in structures
2. Carry out analysis using NDT and evaluate structures
3. Assess failures and causes of failures in structures
4. Carry out Physical evaluation and submit report on condition of the structure.
5. Carry out grouting and precautionary measures of the structures.

SYLLABUS:

UNIT-I

Deterioration of concrete in structures: Physical processes of deterioration like Freezing and Thawing, Wetting and Drying, Abrasion, Erosion, Pitting, Chemical processes like Carbonation, Chloride ingress, Corrosion, Alkali aggregate reaction, Sulphate attack Acid attack, temperature and their causes, Mechanism, Effect, preventive measures. - Cracks: Cracks in concrete, type, pattern, quantification, measurement & preventive measures.

UNIT-II

Non- Destructive Testing-Non destructive test methods for concrete including Rebound hammer, Ultrasonic pulse velocity, Rebar locator, Corrosion meter, Penetration resistance and Pull-outtest, Core cutting- Corrosion: Methods for corrosion measurement and assessment including half-cell potential andresistivity, Mapping of data.

UNIT-III

Failure of buildings: Definition of building failure-types of failures- Causes of Failures-Faulty Design, Accidental over Loading, Poor quality of materialandPoorConstructionpractices-Firedamage- Methodologyforinvestigation of failures-diagnostic testing methods and equipment's-repair of cracks in concrete.

UNIT-IV

Materials for repair and rehabilitation -Admixtures- types of admixtures- purposes of using admixtures- chemical composition- Natural admixtures- Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates-Concrete behavior under corrosion, disintegrated mechanisms – moisture effects and thermal effects–Visual investigation-Acoustical emission methods – Corrosion activity measurement- chloride content – Depth of carbonation- Impact echo methods- Ultrasound pulse velocity methods- Pullout tests.

UNIT:V

Repair Techniques: Grouting, Jacketing, Shotcreting, externally bonded plates, Nailing, Under pinning and under water repair; Materials, Equipment's, Precaution sand Processes. Case studies: related to rehabilitation of bridge piers, dams, canals, heritage structures, corrosion and erosion damaged structures.

TEXTBOOKS:

1. 'Maintenance & Repair of Civil Structures' by B.L.Gupta & Amit Gupta.
2. 'Rehabilitation of Concrete Structures' by B.Vidivelli, StandardPublishers.

REFERENCES:

1. 'Concrete Structures – protection Repair and Rehabilitation' by R.Doodge Woodson, BH Publishers
2. 'Concrete Bridge Practice Construction, Maintenance & Rehabilitation' byV. K. Raina.

WEB LINK:

https://nptel.ac.in/courses/105/106/105

IV Year - I Semester

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EARTHQUAKE RETAINING STRUCTURES

Course Objective:

To provide a coherent development to the students for the courses in sector of earthquake

1. Engineering To present the foundations of many basic engineering concepts related earthquake
2. Engineering To give an experience in the implementation of engineering concepts which are applied infield of earthquake engineering.
3. To involve the application of scientific and technological principles of planning, analysis,
4. Design of buildings according to earthquake design philosophy.
5. Analysis of structure by various methods.

Course Outcomes:

1. The students will gain an experience in the implementation of Earthquake Engineering on engineering concepts which are applied in field Structural Engineering.
2. The students will get a diverse knowledge of earthquake engineering practices applied to real life problems
3. The students will learn to understand the theoretical and practical aspects of earthquake engineering along with the planning and design aspects.
4. The students will learn Analysis, Designing and Detailing Structure Considering Earthquake Loads.
5. The students will learn to understand the Classroom participation and involvement in solving the problems.

UNIT-I:

Introduction to Dynamic Loads Static Load v/s Dynamic Load, Types of Dynamic forces, Force Control and Displacement Control

UNIT-II:

Basics of Seismology Earth and its interior, Plate Tectonics, Convection Currents, The Earth quake, Inter Plate Earthquake (Convergent Boundaries, Divergent Boundaries and Transform Boundaries), Intra Plate Earthquake (Faults and Types of Faults), Seismic Waves, Basic Terminology, Measuring Units and Instruments

UNIT-III:

Behavior of Structures During Earthquake and Earthquake Resistant Features of Structure a) Inertia forces in structures b) Behavior of Brick Masonry Structures: Behavior of Brick

Masonry Walls, Box Action, Different types of Bands c) Behavior of Stone Masonry Structures: Behavior of Stone Masonry Walls, Earthquake Resistant Features of Stone Masonry Structures

UNIT IV:

Fundamentals of Earthquake Vibrations of Structures Equation of Motion (By Newton's Law and By D'Alembert's Principle), Degrees of Freedom, Simplified Single Degree of Freedom, Mathematical Modeling, Equation of Motion for Free Vibration for Damped and Un damped System (Single Degree of Freedom System), Equation of Motion for Forced Vibration for Damped and Un damped System (Single Degree of Freedom System), Logarithmic Decrement

UNIT V:

Earthquake Load Analysis on Structures Introduction to methods of Earthquake Load Analysis (Linear Static, Linear Dynamic, Non-Linear Static, Non-Linear Dynamic) Analysis of Structure by Linear Static Method (Seismic Coefficient Method) Analysis of Structure by Linear Dynamic Method (Random Response Method)

Text Books :

1. Earthquake Resistant Design of Structures By Pankaj Agarwal & Manish Shrikhande, PHI Publications
2. Manish Shrikhande& Pankaj Agrawal; Earthquake Resistant Design of Structures, PHI Publication, New Delhi
3. S. K. Duggal; Earthquake Resistance Design of Structures; Oxford University Press, New Delhi

Reference Books :

1. A. K. Chopra; Dynamics of Structures, Pearson, New Delhi
2. IITK-bmtpc, Earthquake Tips "Learning Earthquake Design and Construction" by C.V.R.Murthy,Building Material and Technology Promotion Council

Web Link:

1. https://nptel.ac.in/courses/145/106/11050614

IV Year - I Semester	**L**	**T**	**P**	**C**
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CONSTRUCTION TECHNOLOGY AND MANAGEMEN

Course Learning Objectives:

The objective of this courses:

1. To introduce to the student the concept of project management including network drawing and monitoring
2. To introduce various equipment's like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery, related to constriction.
3. To introduce the importance of safety in construction projects
4. Methods of production of aggregate products and concreting
5. Usage of machinery required for the works

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Appreciate the importance of construction planning
2. Understand the functioning of various earth moving equipment
3. Know the methods of production of aggregate products and concreting and usage of machinery required for the works.
4. Apply the gained knowledge to project management and construction techniques
5. Trucks and handling equipment, aggregate production and construction equipment and machinery

SYLLABUS:

UNIT- I Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling - monitoring – bar charts – milestone charts – critical Path Method
–Applications

UNIT -II Project Evaluation and Review Technique – cost analysis - updating – crashing for optimum cost – crashing for optimum resources – allocation of resources

UNIT- III Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers

UNIT –IV Hoisting and earthwork equipment – hoists – cranes – tractors - bulldozers – graders –Scrapers– draglines - clamshell buckets

UNIT -V Concreting equipment – crushers – jaw crushers – gyratory crushers – impact crushers – selection of crushing equipment - screening of aggregate – concrete mixers –

mixing and placing of concrete – consolidating and finishing
Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection

– quality control and safety engineering

Text Books:

1. Construction Planning Equipment and Methods, Peurifoy and Schexnayder ,Shapira, Tata Mcgrawhill
2. Construction Project Management Theory and Practice, Kumar Neeraj Jha (2011), Pearson.
3. Construction Technology, SubirK. Sarkar and SubhajitSaraswati, Oxford University press.

References:

1. Construction Project Management - An Integrated Approach, Peter Fewings ,Taylor andFrancis
2. Construction Management Emerging Trends and Technologies, TreforWilliams , Cengagelearning.
3. Hand Book of Construction Management, P. K. Joy, Trinity Press Chennai, New Delhi.

Web Link:

1. https://nptel.ac.in/courses/105/103/10

IV Year - I Semester **L T P C**

3 0 0 3

BRIDGE ENGINEERING

Course Learning Objectives:

The objective of this courses:

1. Familiarize Students with different types of Bridges and IRC standards
2. Equip student with concepts and design of Slab Bridges, T Beam Bridges,Box Culverts
3. Understand concepts of design of Plate Girder Bridges
4. Familiarize with different methods of inspection of bridges and maintenance
5. Understand types of bridges

Course Outcomes:

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

1. Explain different types of Bridges with diagrams and Loading standards
2. Carryout analysis and design of Slab bridges, T Beam bridges, Box culvers and suggest structural detailing
3. Carryout analysis and design of Plate girder bridges
4. Organize for attending inspections and maintenance of bridges and prepare reports.
5. Analyze types of bridges

SYLLABUS:

UNIT-I Introduction- Bridges- Types- Slab bridges, T Beam, Arch bridges, Cable Stayed bridges, prestressed concrete bridges, Truss Bridges, Culverts, - Nomenclature- Selection of Bridge Site- Economical span- Abutments pier and end connections- types of foundations- Open, Pile, Well Foundations, Bearings – Types- Introduction to Loading standards- Railway and IRC Loading

UNIT-II Slab bridges- Wheel load on slab- effective width method- slabs supported on two edges- cantilever slabs- dispersion length- Design of interior panel of slab- Guyon's – Massonet Method – Hendry- Jaegar Methods- Courbon's theory- Pigeaud's method

UNIT-III T-Beam bridges- Analysis and design of various elements of bridge –Design of deck slab, Longitudinal girders, Secondary beams- Reinforcement detailing

UNIT-IV Plate Girder Bridges: Elements of plate girder and their design-web- flange-intermedia testiffener- vertical stiffeners- bearing stiffener- Splices, Design problem with detailing

UNIT-V Box Culverts: Loading – Analysis and Design- Reinforcement detailing.

Text Books

1. Essentials of Bridge Engineering, Jhonson VictorD
2. Design ofBridge Structures, T. R. Jagadeesh, M.A. Jayaram,PHI
3. Design of Bridges, N. Krishna Raju, Tata McGrawHill

References:

1. Design of Concrete Bridges, Aswini, Vazirani,Ratwani
2. Design of Steel Structures, B. C. Punmai, Jain & Jain, Lakshmi Publications
3. Bridge Engineering, S Ponuswamy

Web Link:

https://nptel.ac.in/courses/105/105/1051

IV Year - I Semester **L T P C**

3 0 0 3

URBAN PLANNING AND DEVELOPMENT

Course OBJECTIVE:

1. To enable students to have the knowledge on planning process and to introduce to the students. about the regulations and laws related to Urban Planning.
2. To understand Delineation of Planning Areas, Surveys and Stages in Planning Process.
3. To understand the development of small town and smart cities-case studies.
4. To understand the financing of Urban Development Projects.
5. To understand the Town and Country Planning Act, Land Acquisition and Resettlement Act

Course Outcomes:

The students completing the course will have the ability to

1. Describe basic issues in urban planning
2. Formulate plans for urban and rural development and
3. Plan and analyze socio economic aspects of urban and rural planning
4. Design of urban development projects.
5. Manage urban development projects.

UNIT I BASIC ISSUES

Definition of Human settlement, Urban area, Town, City, Urbanization, Suburbanization, Urban sprawl, Peri - urban areas, Central Business District (CBD), Classification of urban areas – Trend of Urbanization at International, National, Regional and State level.

UNIT II PLANNING PROCESS

Principles of Planning – Types and Level of Plan, Stages in Planning Process – Goals, Objectives, Delineation of Planning Areas, Surveys and Questionnaire Design.

UNIT III DEVELOPMENT PLANS, PLAN FORMULATION AND EVALUATION

Scope and Content of Regional Plan, Master Plan, Detailed Development Plan, Development Control Rules, Transfer of Development Rights , Special Economic Zones- Development of small town and smart cities-case studies

UNIT IV PLANNING AND DESIGN OF URBAN DEVELOPMENT PROJECTS

Site Analysis, Layout Design, Planning Standards, Project Formulation – Evaluation, Plan Implementation, Constraints and Implementation, Financing of Urban Development Projects.

UNIT V LEGISLATION, DEVELOPMENTAND MANAGEMENT OF URBAN SYSTEM

Town and Country Planning Act, Land Acquisition and Resettlement Act etc., Urban Planning Standards and Regulations, Involvement of Public, Private, NGO, CBO and Beneficiaries.

TEXTBOOKS:

1. Goel, S.L Urban Development and Management, Deep and Deep publications, New Delhi 2002
2. George Chadwick, A Systems view of planning, Pergamon press, Oxford 1978
3. Singh V.B, Revitalised Urban Administration in India, Kalpaz publication, Delhi, 2001
4. Edwin S.Mills and Charles M.Becker, Studies in Urban development, A World Bank publication, 1986

IV Year - I Semester **L T P C**

30 0 3

INTELLECTUAL PROPERTY RIGHTS & PATENTS

Objectives:

1. To know the importance of Intellectual property rights.
2. It plays a vital role in advanced Technical and Scientific disciplines.
3. Imparting IPR protections and regulations for further advancement.
4. The students can familiarize with the latest developments.
5. To understand the Employee Confidentiality Agreement and Trade Secret Law

Outcome:

1. IPR Laws and patents pave the way for innovative ideas.
2. The patents are instrumental for inventions to seek Patents.
3. Student get an insight on Copyrights, Patents and Software patents.
4. The copyrights are instrumental for further advancements.
5. Maintaining Trade Secret and Physical Security

Unit I

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics - Types of Intellectual Property - Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement - Regulatory – Over use or Misuse of Intellectual Property Rights - Compliance and Liability Issues.

Unit II

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law –Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of performers – Copyright Formalities and Registration – Limitations – Infringement of Copyright – International Copyright Law Semiconductor Chip Protection Act.

Unit III

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent Searching – Patent Cooperation Treaty – New developments in Patent Law- Invention Developers and Promoters.

Unit IV

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law.

Unit V

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation
– Employee Confidentiality Agreement – Trade Secret Law – Unfair Competition – Trade Secret Litigation
– Breach of Contract – Applying State Law.

TEXT BOOKS:

1. Deborah E.Bouchoux: "Intellectual Property". Cengage learning , New Delhi
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western's Special Topics Collections

REFERENCE BOOKS:

1. Prabhuddha Ganguli: ' Intellectual Property Rights" Tata Mc-Graw – Hill, New Delhi
2. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi
3. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.

IV Year - I Semester **L T P C**

0 0 3 2

ETABS
(Skilled Oriented Course)

Course Learning Objectives:

The course is designed to

1. Learn to analyze 2 D frame steel tubular truss using structural analysis software
2. Learn to analyze 3D frame steel tubular truss using structural analysis software
3. Learn to analyze 2 D and 3D frame RCC frame using structural analysis software
4. Learn to analyze design of beams at various loading and support condition
5. Learn to analyze simple towers

Course outcomes:

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

1. Understand the stresses and forces output
2. Read the design output
3. Understand steel detailing
4. Understand the quantities
5. Use structural analysis software to analyze and design 2d and 3d frames

EXPERIMENTS:

1. Introduction to ETABS

2. Creating model: using grid system, assigning supports, assigning loads, assigning properties.

3. Assigning load combinations as per limit state of collapse and limit state of serviceability

4. Multistoried building subjected to wind loads

5. Multistoried building subjected to earth quake loads as per IS:1893-2016 load combinations

6. Complete design of multistoried building as per Indian codes

7. Analysis of output

8. Making project report using ETABS

REFERNCE BOOKS:

1. ETABS 2016 Black Book By Gaurav Verma

2. CSI Analysis Reference Manual for Sap2000, Etabs

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
UNIVERSITY COLLEGE OF ENGINEERING VIZIANAGARAM
DEPARTMENT OF CIVIL ENGINEERING

B.Tech. COURSE STRUCTURE (R20)

SUBJECTS OFFERED by CIVIL ENGINEERING for HONORS DEGREE

s.no	Subject name	Offered By
Pool-1		
1	Advanced concrete technology	CE
2	Matrix analysis of structures	CE
3	Disaster management and mitigation measures	CE
4	Structural dynamics	CE
Pool-2		
1	Earthquake Resistant Design of Structures	CE
2	Bridge engineering	CE
3	Foundation engineering	CE
4	Rock mechanics	CE
Pool-3		
1	Intelligent transport systems	CE
2	Pavement Analysis design	CE
3	Advanced Pavement Materials	CE
4	Computer simulation in traffic engineering	CE
Pool-4		
1	Construction project management	CE
2	Water shed management	CE
3	Soil structure interaction	CE
4	Advanced surveying	CE

POOL-1

ADVANCED CONCRETE TECHNOLOGY

Course Learning Objectives:

The objective of this course is:

1. Learn the fundamental concepts of Bogues compounds and structures of cement.
2. Learn the concepts of Admixtures and types.
3. Learn Mix design and applications of Mix Design.
4. Learn the concepts of Durability of concrete
5. Learn different tests on hardened concrete

Course Outcomes:

Upon completion of the course, the student will be able to

1. Understand the fundamental concepts of Bogues compounds and structures of cement.
2. The concepts of Admixtures and types.
3. Understanding Mix design and applications of Mix Design.
4. The student will know about Durability of concrete
5. Performing and understanding different tests on hardened concrete

SYLLABUS:

UNIT- I

Importance of Bogue's compounds, Structure of a Hydrated Cement Paste, Volume of hydrated product, porosity of paste and concrete, transition Zone, Elastic Modulus, factors affecting strength and elasticity of concrete, Rheology of concrete in terms of Bingham's parameter.

UNIT- II

CHEMICAL ADMIXTURES- Mechanism of chemical admixture, Plasticizers and super Plasticizers and their effect on concrete property in fresh and hardened state, Marsh cone test for optimum dosage of super plasticizer, retarder, accelerator, Air-entraining admixtures, new generation super plasticiser.

MINERAL ADMIXTURE-Fly ash, Silica fume, GCBS, and their effect on concrete property in fresh state and hardened state.

UNIT - III

MIX DESIGN - Factors affecting mix design, design of concrete mix by BIS method using IS10262 and current American (ACI)/ British (BS) methods. Provisions in revised IS10262- 2004.

UNIT - IV

DURABILITY OF CONCRETE - Introduction, Permeability of concrete, chemical attack, acid attack, efflorescence, Corrosion in concrete. Thermal conductivity, thermal diffusivity, specific heat. Alkali Aggregate Reaction, IS456-2000 requirement for durability.

UNIT - V

Test on Hardened concrete -Effect of end condition of specimen, capping, H/D ratio, rate of loading, moisture condition. Compression, tension and flexure tests. Tests on composition of hardened concrete-cement content, original w/c ratio. NDT tests concepts-Rebound hammer, pulse velocity methods.

TEXT BOOKS:

1. Properties of Concrete- Neville, A.M. - ELBS Edition, Longman Ltd., London
2. Concrete Technology- M.S. Shetty

REFERENCE BOOKS:

1. Concrete Technology- A.R. Santhakumar,-Oxford University Press.
2. Concrete Mix Design- N. Krishna Raju - Sehgal Publishers

MATRIX ANALYSIS OF STRUCTURES

Course Learning Objectives:

The objective of this course is:

1. Learn the fundamental concepts of matrix structural mechanics, such as the stiffness method.
2. The concepts of structural analysis learnt in mechanics of solids and structures course.
3. Understanding the analysis of statically determinate and indeterminate structures such as trusses, beams, frames and plane stress problems.
4. Learn the concepts of the stiffness method and apply it to a variety of structural problems involving trusses, beams, frames, and plane stress.
5. Learn the concepts of the trusses and frames

Course Outcomes:

Upon completion of the course, the student will be able to

1. Perform the structural analysis of determinate and indeterminate structures using classical compatibility methods, such as method of consistent deformations, force and equilibrium methods.
2. Perform structural analysis using the stiffness method.
3. Solve multiple degree of freedom two dimensional problems involving trusses, beams, frames and plane stress.
4. Aware of the stiffness method and apply it to a variety of structural problems involving trusses, beams, frames, and plane stress
5. Aware of the trusses and frames

SYLLABUS:

UNIT-I

Introduction of Matrix methods of analysis – Properties of Matrices, singular matrix, Rank of a Matrix and Rank deficiency- Static indeterminacy and Kinematic indeterminacy – Degree of freedom – Structure idealization- stiffness and flexibility methods – Suitability.

UNIT-II

Generation Element stiffness matrix for truss element, beam element and torsional element- Element force

- displacement equations.

UNIT-III

Stiffness method for beam Elements – Element and global stiffness equation – coordinate transformation and global assembly – structure stiffness matrix equation – analysis of continuous beams.

UNIT-IV

Stiffness method for plane trusses and Grid elements – development of stiffness matrix – coordinate transformation. Examples of pin jointed trusses and simple grid problems.

UNIT-V

Space trusses and frames - Member stiffness for space truss and space frame– Transformation matrix from Local to Global – Analysis of simple trusses, beams and frames.

TEXT BOOK :

1. 'Matrix Methods of Structural Analysis' by Pundit and Gupta
2. 'Matrix Methods of Structural Analysis'by Weaver and Gere, CBS Publishers.

REFERENCES:

1. 'Matrix analysis of structures' by Robert E Sennet- Prentice Hall- Englewood cliffs-New Jercy.
2. 'Advanced structural analysis' by Dr. P. Dayaratnam- Tata Mc Graw hill publishing company

DISASTER MANAGEMENT AND MITIGATION MEASURES

Course Learning Objectives:

The objective of this course is:

1. Develop an understanding of why and how the modern disaster manager is involved with pre- disaster and post-disaster activities.
2. Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Understand how the phases of each are parallel and how they differ.
3. Understand the 'relief system' and the 'disaster victim.'
4. Describe the three planning strategies useful in mitigation.
5. Identify the regulatory controls used in hazard management.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Affirm the usefulness of integrating management principles in disaster mitigation work
2. Distinguish between the different approaches needed to manage pre- during and post- disaster periods
3. Explain the process of risk management
4. Relate to risk transfer
5. Understand the tools of post-disaster management.

SYLLABUS:

UNIT-I

Natural Hazards and Disaster Management: Introduction of DM – Inter disciplinary - nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: floods, draughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

UNIT-II

Man Made Disaster and Their Management Along with Case Study Methods Of The Following: Fire hazards – transport hazard dynamics –solid waste management – post disaster – bio terrotirism - threat in mega cities, rail and air craft's accidents, and Emerging infectious diseases & Aids and their management.

UNIT-III

Role Of Technology In Disaster Managements: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations-roads and bridges- mitigation programme for earth quakes –flowchart, geospatial information in agriculture drought assessment

UNIT-IV

Education And Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery - Community based disaster management and social capital-Designing resilience- building community capacity for action.

UNIT-V

Multi-sectional Issues: Impact of disaster on poverty and deprivation- Climate change adaptation and human health -Exposure , health hazards and environmental risk-Forest management and disaster risk reduction.- Institutional capacity in disaster management - The Red cross and red crescent movement.- Corporate sector and disaster risk reduction-A community focused approach.

TEXT BOOKS:

1. 'Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy(2009),Universities press.
2. 'Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.

REFERENCE BOOKS:

1. 'Disaster Management' edited by H K Gupta (2003),Universities press.
2. 'Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007)

STRUCTURAL DYNAMICS

Course Learning Objectives:

The objective of this course is:

1. Develop an understanding of why and how the structural dynamics is used.
2. Develop an awareness of theory of vibrations
3. Understand the Degree of freedoms
4. Describe the Vibrational analysis
5. Describe Earthquake analysis.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Affirm the usefulness of structural dynamics.
2. Distinguish between the different approaches needed to understand the Vibrations and Dynamics
3. Explain the Degree of freedoms
4. Vibrational analysis practical Exposure is learned
5. Understand Earthquake analysis

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

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: Introduction - Excitation by rigid base translation - Lumped mass approach - SDOF and MDOF systems - I. S. Code methods of analysis for obtaining response of multi storeyed buildings.

TEXTBOOKS:

1. Dynamics of Structures by Clough & Penzien, McGraw Hill, New York
2. Structural Dynamics by Mario Paz, C.B.S Publishers, New Delhi.

REFERENCES:

1. Dynamics of Structures by Anil K. Chopra, Pearson Education (Singapore), Delhi.
2. I.S: 1893 - 1984, “Code of practice for Earthquake resistant design of Structures” and latest I.S: 1893

   - 2002 (version) Part-1

POOL-2

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

Course Learning Objectives:

The objective of this course is:

1. Learn the fundamental concepts of Engineering seismology.
2. The concepts of structural analysis learnt in mechanics of solids and Earthquake structures course.
3. Understanding the analysis of reinforced concrete design.
4. Learn the concepts of the Structural walls and non-structural elements.
5. Learn the concepts of the ductility considerations inn Earthquake design.

Course Outcomes:

Upon completion of the course, the student will be able to

1. Understand engineering seismology
2. Perform structural analysis using the stiffness method & Earthquake structures course
3. Learn analysis of reinforced concrete design.
4. Aware of the Structural walls and non-structural elements.
5. Aware of the ductility considerations inn Earthquake design.

SYLLABUS

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.

UNIT - II

Conceptual design: Introduction-Functional planning-Continuous load path-Overall form-simplicity and symmetry-elongated shapes-stiffness . Introduction to earthquake resistant design: Seismic design requirements-regular and irregular configurations-basic assumptions-design earthquake loads-basic load combinations-permissible stresses- seismic methods of analysis-factors in seismic analysis-equivalent lateral force method- dynamic analysis-response spectrum method-Time history method.

UNIT - III

Reinforced Concrete Buildings: Principles of earthquake resistant deign of RC members- Structural models for frame buildings- Seismic methods of analysis- Seismic deign methods- IS code based methods for seismic design.

UNIT - IV

Structural Walls and Non-Structural Elements: Strategies in the location of structural walls- sectional shapes- variations in elevation- cantilever walls without openings

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.

TEXT BOOKS:

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.

REFERENCES:

1. Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly, John Wiley & Sons
2. Earthquake –Resistant Design of Masonry Building –Miha Tomazevic, Imperial college Press.

BRIDGE ENGINEERING

Course Learning Objectives:

The objective of this course is:

1. Learn the fundamental concepts of Concrete Bridges
2. The concepts of Solid slab Bridges
3. Understanding the analysis and design of Girder Bridges
4. Learn the concepts of the Pre stressed concrete bridges
5. Learn the concepts of Analysis of bridge decks.

Course Outcomes:

Upon completion of the course, the student will be able to

1. Understand concepts of Concrete Bridges
2. Understand Solid slab Bridges
3. Learn analysis and design of Girder Bridges.
4. Aware of the Pre stressed concrete Bridges
5. Aware of the concepts of Analysis of bridge decks.

SYLLABUS

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-Sesmic loads - 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 prestressed concrete member-Concrete cover and spacing of pre- stressing steel-Slender beams

UNIT V

Analysis of Bridge Decks: Harmonic analysis and folded plate theory-Grillage analogy- Finite strip method and FEM. Sub-srtucture of bridges: Substructure- Beds block-Piers- Pier Dimensions- Design loads for piers- Abutments- Design loads for Abutments.

TEXT BOOKS:

1.Design of Concrete Bridges by M.G.Aswani, V.N.Vazirani and M.M.Ratwani. 2.Bridge Deck Behaviour by E.C.Hambly

REFERENCES:

1. Concrete Bridge Design and Practice by V.K.Raina.
2. Dynamics of Structures by Clough & Penzien, McGraw Hill, New York

FOUNDATION ENGINEERING

Course Learning Objectives:

The objective of this course is:

1. To enable the student to appreciate how Meyerhof's general bearing capacity equations are important over Terzaghi's bearing capacity equation.
2. To teach the student special methods of computation of settlements and the corrections to be applied to settlements.
3. To enable the student to understand the advanced concepts of design of pile foundations.
4. To teach the student the problems posed by expansive soils and the foundation practices appropriate to expansive soils.
5. To enable the student to learn the difference between isolated and combined footings, the determination of bearing capacity of mats and proportioning of footings.

Course Outcomes:

Upon successful completion of this course, student will be able to

1. Compute the safe bearing capacity of footings subjected to vertical and inclined loads.
2. Understand the advanced methods of settlement computations and proportion foundation footings.
3. Appreciate the methods of computing the pull-out capacity and negative skin friction of piles and compute the settlements of pile groups in clays.
4. Appreciate the problems posed by expansive soils and the different foundation practices devised.
5. Appreciate the difference between isolated footings and combined footings and mat foundations.

SYLLABUS:

UNIT-I

Bearing capacity of Foundations using general bearing capacity equation – Meyerhof's, Brinch Hansen's and Vesic's methods.

UNIT-II

Settlement analysis: Immediate settlement of footings resting on granular soils – Schmertmann & Hartman method – De Beer and Martens method - Immediate settlement in clays – Janbu's method – correction for

consolidation settlement using Skempton and Bjerrum's method – Correction for construction period.

UNIT-III

Mat foundations – Purpose and types of isolated and combined footings – Mats/ Rafts – Proportioning of footings – Ultimate bearing capacity of mat foundations – allowable bearing capacity of mats founded in clays and granular soils – compensated rafts

UNIT-IV

Earth-retaining structures – cantilever sheet piles – anchored bulkheads – fixed and free earth support methods

– design of anchors – braced excavations – function of different components – forces in ties – stability against bottom heave.

UNIT-V

Pile foundations – single pile versus group of piles – load-carrying capacity of pile groups – negative skin friction (NSF) -settlement of pile groups in sands and clays – laterally loaded piles in granular soils – Reese and Matlock method.

TEXT BOOKS:

1. 'Soil Mechanics and Foundation Engineering' by VNS Murthy, CBS Publishers. 2.'Principles of Foundation Engineering' by BM Das, Thomson Brooks/Cole.

REFERENCE BOOKS:

1. 'Foundation Analysis and Design' by JE Bowles, John Wiley.
2. Basic and applied soil mechanics' by Gopal Ranjan and ASR Rao, New Age Publishers.

ROCK MECHANICS

Course Learning Objectives:

The objective of this course is:

1. Learn the Classification on intact rock and rock masses.
2. The concepts of Filed shear test
3. Understanding the analysis and design underground openings
4. Learn the concepts strength and deformability of jointed rock mass.
5. Learn the concepts of Stability of rocks.

Course Outcomes:

Upon completion of the course, the student will be able to

1. Understand concepts of Classification on intact rock and rock masses.
2. Understand Filed shear test and Insitu stress methods
3. Learn analysis of Underground openings
4. Aware of the strength and deformability of jointed rock mass
5. Aware of the concepts of Stability of rocks

SYLLABUS

UNIT I

Classification of Intact rock and Rock masses, Strength and modulus from classifications. Physico mechanical properties, Laboratory tests for various physical and mechanical properties.

UNIT II

Field shear test, Deformability tests in rock mass, State of stress in the ground. Insitu stress, various methods of stress measurement, Hydrofracturing technique, Flat jack technique, Overcoring technique.

UNIT III

Underground opening in infinite medium, Elastic and elasto-plastic approach. Stress concentration for different shapes of opening, Zone of influence.

UNIT IV

Strength and deformability of jointed rock mass, Fracture strength of jointed rock mass. Shear strength of Rock joints, Deformability of Rock joints, Concept of joint compliance.

UNIT V

Stability of rock slopes, Modes of failure, Plane failure, Wedge failure, Circular failure, Toppling failure.

TEXT BOOKS:

1. Introduction to Rock Mechanics by R.E.Goodman, John Wiley & Sons.

2. Engineering in Rocks for Slopes, Foundation and Tunnels, Editor T.Ramamurthy, Prentice Hall India Pvt. Ltd.

REFERENCES:

1. Fundamentals of Rock Mechanics, Fourth Edition, by Jaeger, Cook and Zimmerman, Blackwell Publishing.

2. Rock mechanics and the design of structures in rock, L. Obert and Wilbur I. Duvall, John Wiley & Sons, Inc.

POOL-3

INTELLIGENT TRANSPORTATION SYSTEMS

Course Objectives:

The objective of this course is to:

1. To learn the fundamentals of ITS
2. To understand the role of telecommunication in ITS
3. To study the ITS functional areas
4. To implement ITS in traffic operations
5. To have an overview of ITS implementation in developing countries

Course Outcomes:

Upon completion of this course, the students should be able to:

1. Understand the sensor and communication technologies
2. To understand engineering technologies used in ITS
3. To apply various ITS methods in traffic operations
4. To analyze the role of ITS in-traffic Operations
5. Define the significance of ITS under Indian conditions

SYLLABUS:

UNIT I:

Introduction to Intelligent Transportation Systems (ITS) – Definition of ITS and Identification of ITS Objectives, Historical Background, Benefits of ITS - ITS Data collection techniques – Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), Geographic Information Systems (GIS), video data collection.

UNIT II:

Telecommunications in ITS – Importance of telecommunications in the ITS system, Information Management, Traffic Management Centres (TMC). Vehicle – Road side communication – Vehicle Positioning System.

UNIT III:

ITS functional areas – Advanced Traffic Management Systems (ATMS), Advanced Traveler Information Systems (ATIS), Commercial Vehicle Operations (CVO), Advanced Vehicle Control Systems (AVCS), Advanced Public Transportation Systems (APTS), Advanced Rural Transportation Systems (ARTS).

UNIT IV:

ITS User Needs and Services – Travel and Traffic management, Public Transportation Management, Electronic Payment, Commercial Vehicle Operations, Emergency Management, Advanced Vehicle safety systems, Information Management.

UNIT V:

Automated Highway Systems - Vehicles in Platoons – Integration of Automated Highway Systems. ITS Programs in the World – Overview of ITS implementations in developed countries, ITS in developing countries.

TEXT BOOK:

1. ITS Hand Book 2000: Recommendations for World Road Association (PIARC) by Kan Paul Chen, John Miles.

2. Sussman, J. M., Perspective on ITS, Artech House Publishers, 2005.

REFERENCES:

1. National ITS Architecture Documentation, US Department of Transportation, 2007 (CD-ROM).

PAVEMENT ANALYSIS & DESIGN

Course Objectives:

1. To understand Typical highway pavement structures
2. To understand stresses and strains due to loading
3. To evaluate Stresses in pavements
4. To design flexible pavement
5. To design rigid pavement

Course Outcomes:

1. Analyze the stresses and strains in a flexible pavement using multi-layered elastic theory.
2. Analyze stresses and strains in a rigid pavement using Westergaard's theory.
3. Design a flexible pavement using IRC, Asphalt Institute, and AASHTO methods.
4. Design a rigid pavement using IRC, and AASHTO methods.
5. Design of joints, Dowel & tie bars

SYLLABUS

UNIT- I:

Factors Affecting Pavement Design: Variables Considered in Pavement Design, Types of Pavements, Functions of Individual Layers, Classification of Axle Types of Rigid Chassis and Articulated Commercial Vehicles, Legal Axle and Gross Weights on Single and Multiple Units, Tire Pressure, Contact Pressure, EAL and ESWL Concepts, Traffic Analysis: ADT, AADT, Truck Factor, Growth Factor, Lane Distributions & Vehicle Damage Factors, Effect of Transient & Moving Loads.

UNIT- II:

Stresses In flexible Pavement: Vehicle-Pavement Interaction: Transient, Random & Damping Vibrations, Steady State of Vibration, Experiments on Vibration, Stress Inducing Factors in Flexible and Rigid pavements; Stress In Flexible Pavements: Visco-Elastic Theory and Assumptions, Layered Systems Concepts, Stress Solutions for One, Two and Three Layered Systems, Fundamental Design Concepts;.

UNIT- III:

Stresses in Rigid Pavements: Westergaard's Theory and Assumptions, Stresses due to Curling, Stresses and Deflections due to Loading, Frictional Stresses, and Stresses in Dowel Bars & Tie Bars.

UNIT-IV:

Design of Flexible Pavements: Factors effecting Design. Deflection studies in Flexible Pavements. Present Serviceability Index. IRC guidelines for Flexible Pavements. Pavement Performance and methods- AASHTO and Asphalt Institute Method. Need for Overlays, Overlays design methods for

Flexible and Rigid pavements.

UNIT – V:

Design Of Rigid Pavements: Factors effecting Design – Wheel load & its repetition, subgrade strength &proportion, strength of concrete- modulus of elasticity. Reinforcement in slab. Design of joints. Design of Dowel bars. Design of Tie bars. IRC and AASHTO methods of Rigid Pavement design

Text Book:

1. Yoder and Witczak, *Priniciples of Pavement Design*, John Wiley and Sons

2. Yang. H. Huang, *Pavement Analysis and Design*, Second Edition, Prentice Hall Inc.

References:

1. Rajib B. Mallick and Tahar El-Korchi, *Pavement Engineering - Principles and Practice*, CRC Press (Taylor and Francis Group)

2. W.Ronald Hudson, Ralph Haas and Zeniswki , *Modern Pavement Management*, Mc Graw Hill and Co.

ADVANCED PAVEMENT MATERIALS

Course Objectives:

The objective of this course is to:

1. To study the properties and test on aggregate,
2. To study the bituminous materials,
3. To study various Cement materials PCC mix design
4. To study the use of Composite materials
5. To study the use of recycled materials

Course Outcomes:

Upon completion of this course, the students should be able to:

1. Understand the properties and test procedures of aggregate in pavement design
2. Know the different types of bituminous pavement construction and its principle
3. Understand the Cementing materials & PCC mix design
4. To analyze the importance in use of composite materials
5. To evaluate the cost and environmental benefits of recycled waste products

SYLLABUS:

UNIT I:

Aggregate: Nature and properties – aggregate requirements – types and processing – aggregates for pavement base – aggregate for bituminous mixture – aggregate for Portland Cement Concrete – lightweight aggregate – tests on aggregate – specification.

UNIT II:

Bituminous Materials: conventional and modified binders – production – types and grade – physical and chemical properties and uses – types of asphalt pavement construction – principles of bituminous pavement construction – tests on bituminous materials. Bituminous Mix design

– modified mixtures – temperature susceptibility and performance.

UNIT III:

Cement /concrete based materials: Cement – properties – PCC mix design and properties – modified PCC – Mix Design – Behaviour – Performance – Tests on Cement and Concrete mixes. High Performance Concrete – low shrinkage – increased strength.

UNIT IV:

Composites, Plastics and Geosynthetics: Plastics and polymerization process – properties – durability and chemical composition – Reinforced Polymer Composites – Geosynthetics – Dry

Powdered Polymers – Enzymes.

UNIT V:

Reclaimed / Recycled Waste Products: Reclaimed Materials – waste products in civil engineering applications – effect of waste products on materials, structure and properties – self healing and smart materials – locally available materials.

TEXT BOOKS:

1. P. T. Sherwood, Alternative Materials in Road Construction, Thomas Telford Publication, London

2. RRL, DSIR, Soil Mechanics for Road Engineers, HMSO, London

REFERENCES:

1. Koerner, R. M. Designing with Geosynthetics, Prentice Hall, Englewood Cliffs, New Jersey, U.S.A.

2. Shan Somayaji, Civil Engineering Materials, second edition, Prentice Hall Inc.

COMPUTER SIMULATION IN TRAFFIC ENGINEERING

Course Objectives:

The objective of this course is to:

1. To be introduced to systems approach and understand various methods
2. To learn the fundamentals of simulation and the GPSS language.
3. To learn the application of GPSS
4. To learn the implementation of GA & Fuzzy Logic
5. To be introduced to advanced computational techniques such as CAD

Course Outcomes:

Upon completion of this course, the students should have:

1. Understand various working models
2. Working knowledge of simulation and GPSS programming.
3. Application of GPSS
4. Good understanding of GA applications & Fuzzy Logic
5. The ability to apply CAD

SYLLABUS:

UNIT I:

Introduction to systems approach - Typical transportation systems - Mathematical models. Fundamentals of simulation - Monte Carlo method - Continuous and discrete models - Simulation languages. Probability concepts - Random numbers - Pseudo random generators – Arrival patterns - Service time distributions – Manual simulation of simple queuing system **UNIT II:**

GPSS Fundamentals - Creating and moving transactions - Queues and facilities – Event scheduling – Standard numerical attributes – Parameters and save values - Functions – Priority

- Preemption - Collection of statistics - Report preparation. Internal logic of GPSS processor - Program control statements.

UNIT III:

Applications of GPSS - Simple queuing problems - Inventory problems - Simulation of ports - Railway platforms and level crossings - Traffic signals Analysis of simulation results - Model validation - Replication of random conditions - Time series analysis.

UNIT IV:

Genetic Algorithm - Terminology in GA – Strings, Structure, Parameter string – Data

Structures – Operators - Algorithm – Application in Transportation. Fuzzy Logic.

UNIT V:

Computer Aided Drafting - DBMS concepts - Civil Engineering Databases – Data entry & Reports. Spreadsheet concepts – Worksheet calculations in Civil Eng, - Regression & Matrix Inversion, SPSS.

TEXT BOOK:

1. Gordon, G., System Simulation, Prentice-Hall of India
2. GPSS/PC, User Manual, Minuteman Software, USA

REFERENCES:

1. David E. Goldberg, Genetic Algorithms in Search, Optimisation and Machine Learning, Addison-Wesley
2. J.M. Zurada, .Introduction to artificial neural systems., Jaico Publishers.

Pool-4

CONSTRUCTION PROJECT MANAGEMENT

Course Learning Objectives:

The objective of this course is:

1. To introduce to the student the concept of project management including network drawing and monitoring
2. To introduce various equipment's like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery, related to constriction.
3. To introduce the importance of safety in construction projects
4. To introduce Hoisting and earthwork equipment's
5. To introduce Construction methods, earthwork, piling, placing of concrete

Course Outcomes:

1. Upon the successful completion of this course, the students will be able to:
2. Appreciate the importance of construction planning
3. Understand the functioning of various earth moving equipment
4. Know the methods of production of aggregate products and concreting and usage of machinery required for the works.
5. Apply the gained knowledge to project management and construction techniques

SYLLABUS:

UNIT- I Construction project management and its relevance – qualities of a project manager

– project planning – coordination –scheduling - monitoring – bar charts – milestone charts – critical Path Method – Applications

UNIT -II Project Evaluation and Review Technique – cost analysis - updating – crashing for optimum cost – crashing for optimum resources – allocation of resources

UNIT- III Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers

UNIT –IV Hoisting and earthwork equipment – hoists – cranes – tractors - bulldozers – graders

– scrapers– draglines - clamshell buckets.

UNIT -V Concreting equipment – crushers – jaw crushers – gyratory crushers – impact crushers – selection of crushing equipment - screening of aggregate – concrete mixers – mixing and placing of concrete – consolidating and finishing Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering

Text Books:

1. Construction Planning Equipment and Methods, Peurifoy and Schexnayder , Shapira, Tata Mcgrawhill
2. Construction Project Management Theory and Practice, Kumar Neeraj Jha (2011), Pearson.
3. Construction Technology, Subir K. Sarkar and Subhajit Saraswati, Oxford University press.
4. Project Planning and Control with PERT and CPM, B. C. Punamia and K K Khandelwal, Laxmi Publications Pvt Ltd. Hyderabad.

References:

1. Construction Project Management - An Integrated Approach, Peter Fewings , Taylor and Francis
2. Construction Management Emerging Trends and Technologies, Trefor Williams , Cengage learning.
3. Hand Book of Construction Management, P. K. Joy, Trinity Press Chennai, New Delhi.

WATER SHED MANAGEMENT

Course Learning Objectives:

The objective of this course is:

1. To introduce to the student the concept of multidisciplinary approach for watershed management
2. To introduce about drainage, land use, vegetation, geology, soils, hydrology.
3. To introduce the importance of Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control.
4. To introduce surface flow harvesting, subsurface flow harvesting, stop dams.
5. To introduce Reclamation of saline and alkaline soils.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Implement the concept of watershed development
2. Analyze the basic data on watersheds
3. Know the methods of Measures to Control Erosion
4. Apply the gained knowledge regarding techniques of rain water harvesting.
5. Understand Land use and Land capability classification

UNIT-I : Introduction

: Concept of watershed development, objectives of watershed development, need for watershed development, Integrated and multidisciplinary approach for watershed management.

UNIT-II : Characteristics of Watersheds

: Size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics, basic data on watersheds.

UNIT-III : Principles of Erosion:

Types and causes of erosion, factors affecting erosion, estimation of soil loss due to erosion- Universal soil loss equation. Measures to Control Erosion: Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, check dams , rock-fill dams, brushwood dam, Gabion.

UNIT-IV: Water Harvesting:

Techniques of rain water harvesting- rain water harvesting from roof top, surface flow harvesting, subsurface flow harvesting, stop dams, farm ponds and dugout ponds, percolation tanks.

UNIT-V: Land Management:

Land use and Land capability classification, management of forest, agricultural, grassland and wild land, land grading operation, Reclamation of saline and alkaline soils.

TEXT BOOKS

'Watershed Management' by Das MM and M.D Saikia, PHI Learning Pvt. Ltd, 2013. 'Land and Water Management' by Murthy.VVN, Kalyani Publications, 2007.

'Watershed Management' by Murthy J V S, New Age International Publishers, 2006.

REFERENCES

'Water Resource Engineering'by Wurbs R A and James R A, Prentice Hall Publishers, 2002. 'Watershed Hydrology' by Black P E, Prentice Hall, 1996.

SOIL STRUCTURE INTERACTION

Course Objectives:

1. To understand the behavior of soil and its interaction analysis with the structure.
2. to understand the Beam Behavior on Soil
3. To understand Elastic Continuum
4. To understand the loading of Axial & Lateral Load on Pile groups
5. To understand the effect of Foundation on soil

Course Outcomes:

1. Can analyze soil-structure interaction considering different models
2. To analyze the behavior of beams for various soil conditions and for different structures
3. To determine the effect of Elasticity of Soil under foundation
4. To analyze the loading effect on Pile Group
5. To determine the effect at soil structure due to different loading conditions

SYLLABUS

Unit-I : Soil-Foundation Interaction:

Introduction to soil-foundation interaction problems, Soil behaviour, Foundation behaviour, Interface behaviour, Scope of soil foundation interaction analysis, soil response models, Winkler, Elastic continuum, Two parameter elastic models, Elastic- plastic behaviour, Time dependent behaviour.

Unit-II : Beam on Elastic Foundation- Soil Models:

Infinite beam, Two-parameters models, Isotropic elastic half space model, Analysis of beams of finite length, combined footings.

Unit-III : Plates on Elastic Continuum:

Thin and thick rafts, Analysis of finite plates, Numerical analysis of finite plates.

Unit-IV: Analysis of Axially and Laterally Loaded Piles and Pile Groups:

Elastic analysis of single pile, Theoretical solutions for settlement and load distributions, Analysis of pile group, Interaction analysis, Load distribution in groups with rigid cap,

Load deflection prediction for laterally loaded piles, Subgrade reaction and elastic analysis, Interaction analysis, Pile-raft system,

Unit-V : Ground – Foundation

Structure Interaction: Effect of structure on ground-foundation interaction, Static and dynamic loads.

TEXTBOOKS:

1. Selvadurai, A. P. S. – Elastic Analysis of Soil – Foundation Interaction,
2. Rolando P. Orense, Nawawi Chouw & Michael J. Pender – Soil – Foundation- Structure Interaction.

REFERENCES:

1. Poulos, H. G., and Davis, E. H. – Pile Foundation Analysis and Design
2. Bowles, J. E. – Foundation Analysis & Design
3. Das, B. M. – Principles of Foundation Engineering 5th Edition Nelson Engineering

WEBLINK

https://nptel.ac.in/courses/105/105/105105200/

ADVANCED SURVEYING

OBJECTIVE:

1. To understand the use of Astronomy
2. To understand the Vertical and titled photographs distortion in aerial photographs.
3. To understand the practical applications of total station
4. To understand the Field work procedure in GPS surveying
5. To understand the Rout surveys for highways, railways and waterways

Course Outcomes:

On completion of this course, the student shall be able to

1. Know the astronomical surveying
2. Do the photogrammetric surveying and interpretation
3. Solve the field problems with total station
4. Know the GPS surveying and the data processing
5. Understand the route surveys and tunnel alignments

UNIT I ASTRONOMICAL SURVEYING

Astronomical terms and definition – Motion of sun and stars – Celestial co-ordinate System - Time system - Nautical Alamance – Apparent attitude and corrections – Field observations and determinations of time, longitude, latitude and azimuth by attitude and Hour angle method.

UNIT II AERIAL SURVEYING

Terrestrial Photogrammetry – Terrestrial stereo photogrammetry – Aerial photogrammetry – overlaps – scale of photographs – Vertical and titled photographs distortion in aerial photographs – stereostopic vision - photo interpretation – Applications.

UNIT III TOTAL STATION SURVEYING

Classification – basic measuring and working principles of an Electro – optical and Microwave total station- sources of errors in Electro – optical and Microwave total station – Care and Maintenance of total station – trilateration – Applications.

UNIT IV GPS SURVEYING

Basic concepts – Space, Control and User segments – Satellite configuration – Signal structure

–Orbit determination and representation – Antispoofing and selective availability – hand held and geodetic receivers – Field work procedure – Data processing Applications.

UNIT V MISCELLANEOUS

Reconnaissance – Rout surveys for highways, railways and waterways – simple, compound, reverse, transition and vertical curve – setting out methods - hydrographic surveying – tides – MSL – Sounding methods – measurement of current and discharge – Tunnel alignment and setting out – Settlement and Deformation studies.

TEXT BOOKS:

1. James M.Anderson and Edward M.Mikhail, " Surveying, Theory and Practice", 7 th Edition,
McGraw Hill, 2001.
2. Bannister and S.Raymond, "Surveying", 7th Edition, Longman 2004.
3. Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 3rd Edition, 2004.
4. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1993

REFERENCES:

1. Roy S.K., "Fundamentals of Surveying", 2nd Edition, Prentice Hall of India, 2004.
2. Arora K.R. "Surveying Vol I & II", Standard Book House, 10th Edition 2008.
3. Guocheng Xu, GPS Theory, Algorithms and Applications, Springer – Verlag, Berlin, 2003.
4. Seeber G, Satellite Geodesy, Water De Gruyter, Berlin,1998

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
UNIVERSITY COLLEGE OF ENGINEERING
VIZIANAGARAM
DEPARTMENT OF CIVIL ENGINEERING

B.Tech. COURSE STRUCTURE (R20)
SUBJECTS OFFERED by CIVIL ENGINEERING for MINORS DEGREE

s.no	Subject name	Offered By
Pool-1		
1	Repair and rehabilitation of structures	CE
2	Building planning and drawing	CE
3	Building materials	CE
4	Structural analysis	CE
Pool-2		
1	Concrete technology	CE
2	Fundamentals in foundation engineering	CE
3	Ground improvement techniques	CE
4	Soil mechanics	CE
Pool-3		
1	Environmental impact assessment	CE
2	Basics in surveying	CE
3	Solid waste management	CE
4	Water supply engineering	CE
Pool-4		
1	Highway engineering	CE
2	Transport systems	CE
3	Green buildings	CE
4	Traffic engineering	CE

Pool-1

REPAIR AND REHABILITATION OF STRUCTURES

Course Learning Objectives:

The student should able to understand the concepts of

1. Various aspects of Inspection, Assessment procedure for evaluating a damaged structure imparting the planning aspects of residential buildings and public buildings.
2. Different types, causes – Effects due to climate, temperature, Sustained elevated temperature.
3. Vacuum concrete, Self-compacting concrete, Geopolymer concrete, Reactive powder concrete,
4. Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, cathodic protection.
5. Leakage, earthquake – DEMOLITION TECHNIQUES - Engineered demolition methods

   - Case studies.

Course Outcomes:

Upon the successful completion of this course, the students will be able to understand:

1. Maintenance, Repair and Rehabilitation, Facets of Maintenance
2. Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete
3. Polymer concrete, Sulphur infiltrated concrete, Fibre reinforced concrete
4. Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion.
5. Strengthening of Structural elements, Repair of structures distressed due to corrosion

UNIT I MAINTENANCE AND REPAIR STRATEGIES

Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

UNIT II STRENGTH AND DURABILITY OF CONCRETE

Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete - Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion - Effects of cover thickness.

UNIT III SPECIAL CONCRETES

Polymer concrete, Sulphur infiltrated concrete, Fibre reinforced concrete, High strength concrete, High performance concrete, Vacuum concrete, Self compacting concrete, Geopolymer concrete, Reactive powder concrete, Concrete made with industrial wastes.

UNIT IV TECHNIQUES FOR REPAIR AND PROTECTION METHODS

Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques – Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, cathodic protection.

UNIT V REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES

Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, Leakage, earthquake – DEMOLITION TECHNIQUES - Engineered demolition methods - Case studies.

Text Books:

1. Shetty.M.S.ConcreteTechnology-Theory and Practice,S.Chandand Company, 2008.
2. Vidivelli.B Rehabilitation of Concrete Structures Standard Publishes Distribution.1st edition 2009.
3. Varghese.P.C Maintenance Repair and Rehabilitation and Minor works of building,
   Prentice Hall India Pvt Ltd 2014.
4. Dodge Woodson.R Concrete Structures, Protection, Repair and Rehabilitation, Butterworth- Heinemann,Elsevier,New Delhi 2012

References:

1. DovKominetzky.M.S.,-Design and Construction Failures, Galgotia, Publications Pvt.Ltd.,2001

2. Ravishankar.K. Krishnamoorthy.T.S, Structural Health Monitoring, Repair And Rehabilitation of Concrete Structures, Allied Publishers, 2004.
3. Hand book onSeismic Retrofit of Buildings,CPWD and Indian Buildings Congress, Narosa Publishers, 2008.
4. Hand Book on Repair and Rehabilitation of RCC Buildings-Director General works CPWD ,Govt of India , New Delhi-2002

BUILDING PLANNING AND DRAWING

Course Learning Objectives:

The student should able to understand the concepts of

1. Initiating the student to different building bye-laws and regulations.
2. Imparting the planning aspects of residential buildings and public buildings.
3. Giving training exercises on various signs and bonds and different building units.
4. Imparting the skills and methods of planning of various buildings.
5. Elevations and Cross Sections of given sloped and flat roof buildings

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Plan various buildings as per the building by-laws.
2. Distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.
3. Learn the skills of drawing building elements and plan the buildings as per requirements.

UNIT I: Building Byelaws and Regulations Introduction- terminology- objectives of building byelaws- floor area ratio- floor space index- principles under laying building bye laws- classification of buildings- open space requirements – built up area limitations- height of buildings- wall thickness – lightening and ventilation requirements.

UNIT II: Residential Buildings Minimum standards for various parts of buildings- requirements of different rooms and their grouping- characteristics of various types of residential buildings and relationship between plan, elevation and forms and functions

UNIT III: Public Buildings Planning of educational institutions, hospitals, dispensaries, office buildings, banks, industrial buildings, hotels and motels, buildings for recreation, Landscaping requirements.

UNIT IV: Sign Conventions And Bonds Brick, stone, plaster, sand filling, concrete, glass, steel, cast iron, copper alloys, aluminum alloys etc., lead, zinc, tin etc., earth, rock, timber and marbles.

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

UNIT V: Doors, Windows, Ventilators and Roofs Panelled door, panelled and glazed door, glazed windows, paneled windows, swing ventilators, fixed ventilators, coupled roof, collar roofs. King Post truss, Queen Post truss Sloped and flat roof and buildings: drawing plans, Elevations and Cross Sections of given sloped and flat roof buildings.

Text Books:

1. Planning, designing and Scheduling, Gurucharan Singh and Jagadish Singh

2. Building planning and drawing by M. Chakravarthi.

3. 3. 'A' Series & 'B' Series of JNTU Engineering College, Anantapur,

References:

1. Building drawing, M G Shah, C M Kale and S Y Patki, Tata McGraw Hill, New Delhi.

2. Principles of Building Drawing, M G Shah and C M Kale, Trinity Publications, New Delhi.

3. Civil Engineering drawing and House planning, B. P. Verma, Khanna publishers, New Delhi.

4. Civil Engineering Building practice, Suraj Singh: CBS Publications, New Delhi, and Chennai.

5. Building Materials and Construction, G. C Saha and Joy Gopal Jana, Mcgraw Hill Education India Ltd. New Delhi.

BUILDING MATERIALS

Course Learning Objectives:

The student should able to understand the concepts of:

1. Initiating the student with the knowledge of basic building materials and their properties.
2. Imparting the knowledge of course pattern in masonry construction and flat roofs and techniques of forming foundation, columns, beams, walls, sloped and flat roofs.
3. The student is to be exposed to the various patterns of floors, walls, different types of paints and varnishes.
4. Imparting the students with the techniques of formwork and scaffolding.
5. The students should be exposed to classification of aggregates, moisture content of the aggregate.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. The student should be able to identify different building materials and their importance in building construction.
2. The student is expected to differentiate brick masonry, stone masonry construction and use of lime and cement in various constructions.
3. The student should have learnt the importance of building components and finishings.
4. The student is expected to know the classification of aggregates, sieve analysis and moisture content usually required in building construction.

UNIT I: Stones, Bricks And Tiles Properties of building stones – relation to their structural requirements, classification of stones – stone quarrying – precautions in blasting, dressing of stone, composition of good brick earth, various methods of manufacturing of bricks. Characteristics of good tile - manufacturing methods, types of tiles. Uses of materials like Aluminium, Gypsum, Glass and Bituminous materials

UNIT II Masonry Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and partition walls. Wood: Structure – Properties- Seasoning of timber- Classification of

various types of woods used in buildings- Defects in timber. Alternative materials for wood – Galvanized Iron, Fiber Reinforced Plastics, Steel, Aluminium.

UNIT III: Lime And Cement Lime: Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime. Cement: Portland cement- Chemical Composition – Hydration, setting and fineness of cement. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of cement concrete and their importance – various tests for concrete.

UNIT IV: Building Components Lintels, arches, vaults, stair cases – types. Different types of floors – Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs – King and Queen post Trusses. R.C.C Roofs, Madras Terrace and Pre fabricated roofs.

UNITV: Finishings Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering. Paints: Constituents of a paint – Types of paints – Painting of new/old wood- Varnish. Form Works and Scaffoldings.

Text Books:

1. Building Materials, S. S. Bhavikatti, Vices publications House private ltd.
2. Building Construction, S. S. Bhavikatti, Vices publications House private ltd.
3. Building Materials, B. C. Punmia, Laxmi Publications private ltd.
4. Building Construction, B.C. Punmia, Laxmi Publications (p) ltd.

References:

1. Building Materials, S. K. Duggal, New Age International Publications.
2. Building Materials, P. C. Verghese, PHI learning (P) ltd.
3. Building Materials, M. L. Gambhir, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
4. Building construction, P. C. Verghese, PHI Learning (P) Ltd.

STRUCTURAL ANALYSIS

Course Learning Objectives:

The student should able to understand the concepts of:

1. To give preliminary concepts of assessment of bending moment and shear force in Propped cantilevers, fixed beams and continuous beams due to various loading conditions.
2. To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions
3. The procedure for development of slope deflection equations and to solve application to continuous beams with and without settlement of supports.
4. The concepts of moving loads and influence lines
5. Understand the concepts of maximum SF and BM at a given section when loads of varying spans rolling loads of Pratt and Warren trusses.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Distinguish between the determinate and indeterminate structures.
2. Identify the behaviour of structures due to the expected loads, including the moving loads, acting on the structure.
3. Estimate the bending moment and shear forces in beams for different fixity conditions.
4. Analyze the continuous beams using various methods -, three moment method, slope deflection method, energy theorems.
5. Draw the influence line diagrams for various types of moving loads on beams/bridges.

Syllabus:

UNIT – I Propped Cantilevers: Analysis of propped cantilevers-shear force and Bending moment diagrams-Deflection of propped cantilevers.

UNIT – II Fixed Beams – Introduction to statically indeterminate beams with U. D. load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads - shear force and Bending moment diagrams-Deflection of fixed beams including effect of sinking of support, effect of rotation of a support.

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

UNIT-IV Slope-Deflection Method: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

UNIT – V 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- Deflections of simple beams and pin jointed trusses.

Text Books:

1. Basic Structural Analysis, C. S. Reddy Tata Mc.Graw-Hill, New Delhi.

2. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi

3. Analysis of Structures- Vol. I and II, V. N. Vazirani and M. M. Ratwani, Khanna Publishers, New Delhi

References:

1. Theory of Structures, B. C Punmia, A. K Jain & Arun K. Jain, Lakshmi Publications

2. Theory of Structures, R.S. Khurmi, S. Chand Publishers.

3. Structural analysis by R.C. Hibbeler, Pearson, New Delhi.

4. Structural Analysis-I, Hemanth Patel, Yogesh Patel, Synergy Knowledgeware, Mumbai

5. Structural Analysis I Analysis of Statically Determinate Structures, P. N. Chandramouli, Yesdee Publishing

Pool-2

CONCRETE TECHNOLOGY

Course Learning Objectives:

The student should able to understand the concepts of:

1. Concepts of Concrete production and its behaviour in various environments.
2. Learn the test procedures for the determination of properties of concrete.
3. Understand durability properties of concrete in various environments.
4. Modulus of elasticity, Dynamic modulus of elasticity , Poisson's ratio
5. Mix proportions and understand the concepts of Durability of concrete, Quality Control of concrete.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Understand the basic concepts of concrete.
2. Realize the importance of quality of concrete.
3. Familiarize the basic ingredients of concrete and their role in the production of concrete and its behaviour in the field.
4. Test the fresh concrete properties and the hardened concrete properties.
5. Evaluate the ingredients of concrete through lab test results. Design the concrete mix by bis method.

SYLLABUS:

UNIT I : Ingredients Of Concrete Cements & Admixtures: Portland cement – Chemical composition – Hydration, Setting of cement, Fineness of cement, Structure of hydrate cement – Test for physical properties – Different grades of cements – Admixtures – Mineral and chemical admixtures – accelerators, retarders, air entrainers, plasticizers, super plasticizers, fly ash and silica fume. Aggregates: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates –

UNIT – II Fresh Concrete: Steps in Manufacture of Concrete–proportion, mixing, placing, compaction, finishing, curing – including various types in each stage. Properties of fresh concrete-

Workability – Factors affecting workability – Measurement of workability by different tests, Setting times of concrete.

UNIT – III, Hardened Concrete: Water / Cement ratio – Abram's Law – Gel space ratio – Nature of strength of concrete –Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength – Curing, Testing of Hardened Concrete: Compression tests – Tension tests – Factors affecting strength – Flexure tests –Splitting tests – Non-destructive testing methods – codal provisions for NDT.

UNIT – IV, Elasticity, Creep & Shrinkage, Modulus of elasticity, Dynamic modulus of elasticity

, Poisson's ratio, Creep of concrete, Factors influencing creep, Relation between creep & time, Nature of creep, Effects of creep – Shrinkage –types of shrinkage.

UNIT – V, Mix Design: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Concepts Proportioning of concrete mixes by various methods – BIS method of mix design.

Text Books:

1. Concrete Technology, M. S. Shetty. – S. Chand & Company

2. Concrete Technology, A. R. Santha Kumar, Oxford University Press, New Delhi

References:

1. Properties of Concrete, A. M. Neville – PEARSON – 4th edition

2. Concrete Technology, M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi

Fundamentals in foundation engineering

Course Learning Objectives:

The student should able to understand the concepts of:

1. Depth and spacing of bore holes – Soil samples – Representative and undisturbed – Sampling methods
2. Factors affecting bearing capacity – Bearing capacity from in-situ tests (SPT, SCPT and plate load)
3. Contact pressure and settlement distribution – Proportioning of foundations for conventional rigid behaviour
4. Dynamic formulae (Engineering news and Hileys) – Capacity from insitu tests (SPT and SCPT)
5. Culmann's Graphical method – Pressure on the wall due to line load

Course Outcomes:

Upon the successful completion of this course, the students will be able to understand:

1. Thin wall sampler, Stationary piston sampler – Penetration tests (SPT and SCPT)
2. Location and depth of foundation – Codal provisions – Bearing capacity of shallow foundation on homogeneous deposits
3. Minimum thickness for rigid behaviour – Applications – Compensated foundation
4. Group capacity by different methods (Feld's rule, Converse – Labarra formula and block failure criterion)
5. Earth pressure on retaining walls of simple configurations – Culmann's Graphical method

UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION 9 CE8591 Syllabus FOUNDATION ENGINEERING

Scope and objectives – Methods of exploration – Auguring and boring – Wash boring and rotary drilling – Depth and spacing of bore holes – Soil samples – Representative and undisturbed – Sampling methods – Split spoon sampler, Thin wall sampler, Stationary piston sampler – Penetration tests (SPT and SCPT) – Data interpretation – Strength parameters – Bore log report and Selection of foundation.

UNIT II SHALLOW FOUNDATION 9 CE8591 Syllabus FOUNDATION ENGINEERING

Location and depth of foundation – Codal provisions – Bearing capacity of shallow foundation on homogeneous deposits – Terzaghi's formula and BIS formula – Factors affecting bearing capacity

– Bearing capacity from in-situ tests (SPT, SCPT and plate load) – Allowable bearing pressure – Seismic considerations in bearing capacity evaluation. Determination of Settlement of foundations on granular and clay deposits – Total and differential settlement – Allowable settlements – Codal provision – Methods of minimizing total and differential settlements.

UNIT III FOOTINGS AND RAFTS 9 CE8591 Syllabus FOUNDATION ENGINEERING

Types of Isolated footing, Combined footing, Mat foundation – Contact pressure and settlement distribution – Proportioning of foundations for conventional rigid behaviour – Minimum thickness for rigid behaviour – Applications – Compensated foundation – Codal provision

UNIT IV PILE FOUNDATION 9 CE8591 Syllabus FOUNDATION ENGINEERING

Types of piles and their functions – Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil – Static formula – Dynamic formulae (Engineering news and Hileys) – Capacity from insitu tests (SPT and SCPT) – Negative skin friction – Uplift capacity-Group capacity by different methods (Feld's rule, Converse – Labarra formula and block failure criterion) – Settlement of pile groups – Interpretation of pile load test (routine test only), Under reamed piles – Capacity under compression and uplift – Cohesive – expansive – non expansive – Cohesionless soils – Codal provisions.

UNIT V RETAINING WALLS 9 CE8591 Syllabus FOUNDATION ENGINEERING

Plastic equilibrium in soils – Active and passive states – Rankine's theory – Cohesionless and cohesive soil – Coulomb's wedge theory – Condition for critical failure plane – Earth pressure on retaining walls of simple configurations – Culmann's Graphical method – Pressure on the wall due to line load – Stability analysis of retaining walls – Codal provisions.

Text Books:

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

2. Soil Mechanics and Foundation Engineering, V. N. S. Murthy, CBS publishers

References:

1. Fundamentals of Soil Mechanics, D. W. Taylor, Wiley.

2. An introduction to Geotechnical Engineering, Holtz and Kovacs; Prentice Hall.

3. Fundamentals of Geotechnical Engineering, B M Das, Cengage Learning, New Delhi.

GROUND IMPROVEMENT TECHNIQUES

Course Learning Objectives:

The student should able to understand the concepts of:

1. Different ground improvement methods adopted for improving the properties of remoulded and in-situ soils by adopting different techniques such as in situ densification and dewatering methods.
2. The reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls.
3. Geotextiles and geosynthetics can be used to improve the engineering performance of soils.
4. Purpose and effects of grouting.

Course Outcomes:

Upon the successful completion of this course, the students will be able to understand:

1. Various methods of ground improvement and their suitability to different field situations.
2. The design a reinforced earth embankment and check its stability.
3. Various functions of geosynthetics and their applications in civil engineering practice.
4. The concepts and applications of grouting.

SYLLABUS:

UNIT- I In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

UNIT –II Dewatering – sumps and interceptor ditches – single and multi stage well points – vacuum well points – horizontal wells – criteria for choice of filler material around drains – electro osmosis

UNIT- III Stabilization of soils – methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag.

UNIT- IV Reinforce earth – principles – components of reinforced earth – design principles of reinforced earth walls – stability checks – soil nailing.

UNIT- V Geosynthetics – geotextiles – types – functions , properties and applications – geogrids

, geomembranes and gabions - properties and applications.

Text Books:

1. Ground Improvement Techniques, Purushotham Raj, Laxmi Publications, New Delhi.

2. Ground Improvement Techniques, Nihar Ranjan Patro, Vikas Publishing House (p) limited , New Delhi.

3. An introduction to Soil Reinforcement and Geosynthetics, G. L. Siva Kumar Babu, Universities Press.

Reference:

1. Ground Improvement, M.P. Moseley, Blackie Academic and Professional, USA.

2. Designing with Geosynethetics, R. M Koerner, Prentice Hall

Soil mechanics

Course Learning Objectives:

The student should able to understand the concepts of:

1. Index properties of the soil and classify it.
2. Seepage of water through soils and determine the seepage discharge.
3. Differentiate between compaction and consolidation of soils and to determine the magnitude and the rate of consolidation settlement.
4. Shear strength of soils, assessment of the shear parameters of sands and clays and the areas of their application.

Course Outcomes:

Upon the successful completion of this course, the students will be able to understand:

1. The definition of the various parameters related to soil mechanics and establishes their inter-relationships.
2. The methods of determination of the various index properties of the soils and classify the soils.
3. The importance of the different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.
4. The above concepts in day-to-day civil engineering practice.

SYLLABUS:

UNIT – I Introduction: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship –Relative density , Mechanism of compaction – factors affecting – effects of compaction on soil properties - compaction control.

UNIT – II Index Properties of Soils: Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – Various Types of soil Classifications – Unified soil classification and I.S. Soil classification.

UNIT –III Permeability: Soil water – capillary rise – One dimensioned flow of water through soils – Darcy's law- permeability – Factors affecting –laboratory determination of coefficient of permeability –Permeability of layered systems. Total, neutral and effective stresses –quick sand

condition – 2-D flow and Laplace's equation - Seepage through soils –Flow nets: Characteristics and Uses.

UNIT – IV Stress Distribution In Soils: Stresses induced by applied loads - Boussinesq's and Westergaard's theories for point loads and areas of different shapes– Newmark's influence chart
– 2:1 stress distribution method.

UNIT – V Consolidation: Compressibility of soils – e-p and e-log p curves – Stress history – Concept of consolidation - Spring Analogy - Terzaghi's theory of one-dimensional Consolidation
– Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (cv) - Over consolidated and normally consolidated clays.

Text Books:

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

2. Soil Mechanics and Foundation Engineering, V. N. S. Murthy, CBS publishers

References:

1. Fundamentals of Soil Mechanics, D. W. Taylor, Wiley.

2. An introduction to Geotechnical Engineering, Holtz and Kovacs; Prentice Hall.

3. Fundamentals of Geotechnical Engineering, B M Das, Cengage Learning, New Delhi

Pool-3

ENVIRONMENTAL IMPACT ASSESSMENT

Course Learning Objectives:

The student should able to understand the concepts of:

1. To impart knowledge on different concepts of Environmental Impact Assessment
2. To know procedures of risk assessment
3. To learn the EIA methodologies and the criterion for selection of EIA methods
4. To pre-requisites for ISO 14001 certification
5. To know the procedures for environmental clearances and audit

Course Outcomes:

Upon the successful completion of this course, the students will be able to understand:

1. Prepare EMP, EIS, and EIA report
2. Identify the risks and impacts of a project
3. Selection of an appropriate EIA methodology
4. Evaluation the EIA report
5. Estimate the cost benefit ratio of a project

SYLLABUS:

UNIT – I Basic concept of EIA: Elements of EIA-factors affecting EIA-Initial environmental Examination-life cycle analysis preparation of Environmental Base map-Classification of environmental parameters – role of stakeholders in the EIA preparation –stages in EIA

UNIT – II 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 - EIS and EMP

UNIT-III Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives- application of remote sensing and GIS for EIA.

UNIT-IV Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Generalized approach for assessment of Air pollution Impact.

UNIT – V Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation.

Text Books:

1. Environmental Impact Assessment, Canter Larry W., McGraw-Hill education Edi (1996)

2. Environmental Impact Assessment Methodologies, Y. Anjaneyulu, B. S. Publication, Sultan Bazar, Hyderabad.

References:

1. Environmental Science and Engineering, J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers

2. Environmental Science and Engineering, Suresh K. Dhaneja, S. K. , Katania & Sons Publication., New Delhi.

3. Environmental Pollution and Control, H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi

Basics in surveying

Course Learning Objectives:

The student should able to understand the concepts of:

1. Basic surveying skills
2. Various surveying instruments.
3. Different methods of surveying
4. Various data required for various methods of surveying.
5. Integrate the knowledge and produce topographical map.

Course Outcomes:

Upon the successful completion of this course, the students will be able to understand:

1. Definition-Uses of surveying- overview of plane surveying
2. EDM-Errors and corrections to linear measurements- Compass survey- Meridians, Azimuths and Bearings
3. Temporary and permanent adjustments-
4. method of leveling. Principles-uses and adjustments – temporary and permanent,

Syllabus:

UNIT – I, Introduction: definition-Uses of surveying- overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications – Errors in survey measurements

UNIT – II Distances And Direction: Electronic distance measurements (EDM)-principles of electro optical EDM-Errors and corrections to linear measurements-Compass survey- Meridians, Azimuths and Bearings, declination, computation of angle.

Traversing-Purpose-types of traverse-traverse computation-traverse adjustments-Introduction omitted measurements

UNIT – III Leveling And Contouring: Concept and Terminology, Levelling Instruments and their Temporary and permanent adjustments- method of levelling. Characteristics and Uses of contours- methods of conducting contour surveys.

UNIT – IV Theodolite: Description, principles-uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite – Introduction to Trigonometrical leveling,.

UNIT – V Curves: Types of curves, design and setting out – simple and compound curves- Introduction to geodetic surveying, Total Station and Global positioning system

Text Books:

1. Surveying, Vol No.1, 2 &3, B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications Ltd, New Delhi.

2. Advance Surveying, Satish Gopi, R. Sathi Kumar and N. Madhu, Pearson Publications.

3. Text book of Surveying, C. Venkataramaiah, University press, India Limited.

4. Surveying and levelling, R. Subramanian, Oxford University press.

References:

1. Text book of Surveying, S.K. Duggal (Vol No. 1&2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.

2. Text book of Surveying, Arora (Vol No. 1&2), Standard Book House, Delhi.

3. Higher Surveying, A.M. Chandra, New Age International Pvt ltd.

4. Fundamentals of surveying, S.K. Roy – PHI learning (P) ltd.

Solid waste management

Course Learning Objectives:

The student should able to understand the concepts of:

1. To impart the knowledge the methods of collection and optimization of collection routing of municipal solid waste
2. To acquire the principles of treatment of municipal solid waste
3. To know the impact of solid waste on the health of the living beings
4. To learn the criterion for selection of landfill and its design
5. To plan the methods of processing such as composting the municipal organic waste

Course Outcomes:

Upon the successful completion of this course, the students will be able to understand:

1. The collection systems of solid waste of a town
2. Treatment of municipal solid waste and landfill
3. The criteria for selection of landfill
4. C the solid waste and design a composting facility
5. The method of treatment and disposal of hazardous wastes.

SYLLABUS:

UNIT- I Introduction to Solid Waste Management: Goals and objectives of solid waste management, Classification of Solid Waste - Factors Influencing generation of solid waste - sampling and characterization –Future changes in waste composition, major legislation, monitoring responsibilities, Terms related to ISWM like WTE, ULB, TLV etc..Measurement of NPK and Calorific value.

UNIT- II Basic Elements in Solid Waste Management: Elements and their inter relationship – principles of solid waste management- onsite handling, storage and processing of solid waste

Collection of Solid Waste: Type and methods of waste collection systems, analysis of collection system - optimization of collection routes– alternative techniques for collection system.

UNIT- III Transfer, Transport and Transformation of Waste: Need for transfer operation, compaction of solid waste - transport means and methods, transfer station types and design requirements. Unit operations used for separation and transformation: shredding - materials separation and recovery, source reduction and waste minimization

UNIT- IV Processing and Treatment: Processing of solid waste - Waste transformation through combustion and composting. Market yard wastes and warming composting and vermin composting, anaerobic methods for materials recovery and treatment – Energy recovery – biogas generation and cleaning– Incinerators.

UNIT- V Disposal of Solid Waste: Methods of Disposal, Landfills: Site selection, design and operation, drainage and leachate collection systems –designated waste landfill remediation. Case studies

Text Books:

1. Integrated Solid Waste Management, George Techobanoglous, McGraw Hill Publication, 1993

References:

1. Solid Waste Engineering, Vesilind, P.A., Worrell, W., Reinhart, D., Cenage learning, New Delhi, 2004

2. Hazardous Waste Management, Charles A. Wentz, McGraw Hill Publication, 1995.

3. Solid and Hazardous Waste Management PM Cherry, CBS Publishers and Distributors. New Delhi, 2016.

4. Solid Waste Engineering, William A Worrell, P Aarue Vesilind, Cengage Learning, New Delhi 2016.

Water supply engineering

Course Learning Objectives:

The student should able to understand the concepts of:

1. Outline planning and the design of water supply systems for a community/town/city
2. Provide knowledge of water quality requirement for domestic usage
3. Impart understanding of importance of protection of water source quality and enlightens the efforts involved in converting raw water into clean potable water.
4. Selection of valves and fixture in water distribution systems
5. Impart knowledge on design of water distribution network

Course Outcomes:

Upon the successful completion of this course, the students will be able to understand:

1. Plan and design the water and distribution networks and sewerage systems
2. Identify the water source and select proper intake structure
3. Characterization of water
4. Select the appropriate appurtenances in the water supply
5. Selection of suitable treatment flow for raw water treatments

SYLLABUS:

UNIT–I Introduction: Importance and Necessity of Protected Water Supply systems, Water borne diseases, Flow chart of public water supply system, Role of Environmental Engineer, Agency activities Water Demand and Quantity Estimation: Estimation of water demand for a town or city, Per capita Demand and factors influencing it - Types of water demands and its variations- factors affecting water demand, Design Period, Factors affecting the Design period, Population Forecasting.

UNIT-II Sources of Water: Lakes, Rivers, Impounding Reservoirs, comparison of sources with reference to quality, quantity and other considerations- Capacity of storage reservoirs, Mass curve analysis. Groundwater sources of water: Types of water bearing formations, springs, Wells and Infiltration galleries, Yields from infiltration galleries.

Collection and Conveyance of Water: Factors governing the selection of the intake structure, Types of Intakes. Conveyance of Water: Gravity and Pressure conduits, Types of Pipes, Pipe Materials, Pipe joints, Design aspects of pipe lines, laying of pipe lines

UNIT-III Quality and Analysis of Water: Characteristics of water–Physical, Chemical and Biological-Analysis of Water – Physical, Chemical and Biological characteristics. Comparison of sources with reference to quality- I.S. Drinking water quality standards and WHO guidelines for drinking water

UNIT–IV Treatment of Water: Flowchart of water treatment plant, Treatment methods: Theory and Design of Sedimentation, Coagulation, Sedimentation with Coagulation, Filtration

UNIT-V Disinfection: Theory of disinfection-Chlorination and other Disinfection methods, Softening of Water, Removal of color and odours - Iron and manganese removal –Adsorption- fluoridation and deflouridation–aeration–Reverse Osmosis-Iron exchange–Ultra filtration

Text Books

1. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus

– Mc-Graw-Hill Book Company, New Delhi, 1985.

2. Elements of Environmental Engineering – K. N. Duggal, S. Chand & Company Ltd., New Delhi, 2012.

References

1.Water Supply Engineering – P. N.

Modi. 2.Water Supply Engineering – B.

C. Punmia

3. Water Supply and Sanitary Engineering – G. S. Birdie and J. S. Birdie

4.Environmental Engineering, D. Srinivasan, PHI Learning Private Limited,

New Delhi, 2011.

POOL-4

HIGHWAY ENGINEERING

Course Learning Objectives:

The student should able to understand the concepts of:

1. To impart different concepts in the field of Highway Engineering.
2. To acquire design principles of Highway Geometrics and Pavements
3. To learn various highway construction and maintenance procedures
4. Road Aggregates and Bituminous Materials
5. Flexible Pavement Design Methods

Course Outcomes:

Upon the successful completion of this course, the students will be able to understand:

1. Plan highway network for a given area.
2. Determine Highway alignment and design highway geometrics
3. Design Intersections and prepare traffic management plans
4. Judge suitability of pavement materials and design flexible and rigid pavements
5. Construct and maintain highways

SYLLABUS:

UNIT I

Highway Planning and Alignment: Highway development in India; Classification of Roads; Road Network Patterns; Necessity for Highway Planning; Different Road Development Plans – First, second, third road development plans, road development vision 2021, Rural Road Development Plan – Vision 2025; Planning Surveys; Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT – II Highway Geometric Design: Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and Intermediate Sight Distance- Design of Horizontal Alignment-

Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.

UNIT – III Traffic Engineering: Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies; Speed studies –spot speed and speed & delay studies; Parking Studies; Road Accidents-Causes and Preventive measures - Condition Diagram and Collision Diagrams; PCU Factors, Capacity of Highways – Factors Affecting; LOS Concepts; Road Traffic Signs; Road markings; Types of Intersections; At-Grade Intersections – Design of Plain, Flared, Rotary and Channelized Intersections; Design of Traffic Signals –Webster Method –IRC Method.

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

UNIT – V, Design Of Pavements: Types of pavements; Functions and requirements of different components of pavements; Design Factors Flexible Pavements: Design factors – Flexible Pavement Design Methods – CBR method – IRC method – Burmister method – Mechanistic method – IRC Method for Low volume Flexible pavements.

TEXT BOOKS:

1. Highway Engineering, Khanna S. K., Justo C. E. G and Veeraragavan A, Nem Chand Bros., Roorkee.

2. Traffic Engineering and Transportation Planning, Kadiyali L. R, Khanna Publishers, New Delhi.

REFERENCES:

1. Principles of Highway Engineering, Kadiyali L. R, Khanna Publishers, New Delhi

2. Principles of Transportation Engineering, Partha Chakroborthy and Animesh Das, PHI Learning Private Limited, Delhi

3. Highway Engineering, Paul H. Wright and Karen K Dixon, Wiley Student Edition, Wiley India (P) Ltd., New Delhi

4. Transportation Engineering - An Introduction, JotinKhisty C, Prentice Hall, Englewood Cliffs, New Jersey.

5. Traffic & Highway Engineering by Nicholas J. Garber, Lester A. Hoel, Fifth Edition, published in 2015, CENGAGE Learning, New Delhi.

6. Transportation Engineering and Planning, Papacostas C.S. and P.D. Prevedouros, Prentice Hall of India Pvt.Ltd; New Delhi.

7. Highway Engineering, Srinivasa Kumar R, Universities Press, Hyderabad

8. Practice and Design of Highway Engineering, Sharma S. K., Principles, S. Chand & Company Private Limited, New Delhi.

TRANSPORT SYSTEMS

Course Learning Objectives:

The student should able to understand the concepts of:

1. Development of transport, various road development plans and policies in India.
2. Railway mode of transport and its working
3. Planning, operation and maintenance of airport
4. Development of ports & their uses
5. Characteristics and operation of different urban transportation systems.

Course Outcomes:

Upon the successful completion of this course, the students will be able to understand:

1. Different transport plans and policies
2. The railway mode of transport
3. The design various component of airport
4. Characterize harbours & ports
5. Differentiate various urban transportation systems

SYLLABUS:

UNIT I:

Historical development of transport in India - Road Development Plans, National Transport Policy Recommendations, Vision 2021, NHDP, PMGSY - IRC, CRRI. Characteristics of different modes of transport and their integration and interactions - impact on environment.

UNIT II:

Planning of railway - Passenger and goods terminals - layout - passenger facilities – traffic control.

UNIT III:

Airport Planning, requirements and components. Design of runway and taxiway - Apron - parking configuration - terminal requirements - Airport marking and lighting - Air traffic control.

UNIT IV:

Planning of Harbours and ports – Harbour infrastructures - Port facilities - Containerization - Navigation aids - Inland waterways - Pipeline transportation.

UNIT V:

Urban transportation systems - Mass rapid transit system - Light rail transit - Personal rapid transit, guided way systems, cabin taxi, dual mode bus - Para transit systems – Demand responsive system
- Intermediate public transport.

Text Book:

1. Paquette, R.J., et al, Transportation Engineering Planning and Design, John Wiley & Sons, New York

2. Horenjeff Robert; the planning & Design of Airports, McGraw Hill Book Co., 2007

References:

1. Alan Black, Urban Mass Transportation Planning, McGraw-Hill

GREEN BUILDINGS

Course Learning Objectives:

The student should able to understand the concepts of:

1. Green buildings and sustainable development, typical features of green buildings
2. Soil erosion control, minimizing urban heat island effect
3. Methods to reduce operational energy: energy efficient building envelopes
4. Use of natural and renewable materials like bamboo, timber, rammed earth
5. Day lighting, air ventilation, exhaust systems, low voc paints, materials

Course Outcomes:

Upon the successful completion of this course, the students will be able to understand:

1. GRIHA, IGBC and LEED, overview of the criteria as per these rating systems.
2. Water efficient plumbing systems, water metering, waste water treatment, recycle and reuse systems.
3. Environmental impact of building constructions, Concepts of embodied energy, operational energy and life cycle energy
4. Waste Management: Handling of construction waste materials, separation of household waste, on-site and off-site organic waste management
5. Codes related to green buildings: NBC, ECBC, ASHRAE, UPC etc.

UNIT-I

Introduction to Green Buildings: Definition of green buildings and sustainable development, typical features of green buildings, benefits of green buildings towards sustainable development. Green building rating systems – GRIHA, IGBC and LEED, overview of the criteria as per these rating systems.

UNIT- II

Site selection and planning: Criteria for site selection, preservation of landscape, soil erosion control, minimizing urban heat island effect, maximize comfort by proper orientation of building

facades, day lighting, ventilation, etc. Water conservation and efficiency: Rainwater harvesting methods for roof & non-roof, reducing landscape water demand by proper irrigation systems, water efficient plumbing systems, water metering, waste water treatment, recycle and reuse systems.

UNIT-III

Energy Efficiency: Environmental impact of building constructions, Concepts of embodied energy, operational energy and life cycle energy. Methods to reduce operational energy: Energy efficient building envelopes, efficient lighting technologies, energy efficient appliances for heating and air-conditioning systems in buildings, zero ozone depleting potential (ODP) materials, wind and solar energy harvesting, energy metering and monitoring, concept of net zero buildings.

UNIT-IV

Building materials: Methods to reduce embodied energy in building materials: (a) Use of local building materials (b) Use of natural and renewable materials like bamboo, timber, rammed earth, stabilized mud blocks, (c) use of materials with recycled content such as blended cements, pozzolana cements, fly ash bricks, vitrified tiles, materials from agro and industrial waste. (d) reuse of waste and salvaged materials Waste Management: Handling of construction waste materials, separation of household waste, on-site and off-site organic waste management

UNIT-V

Indoor Environmental Quality for Occupant Comfort and Wellbeing: Daylighting, air ventilation, exhaust systems, low VOC paints, materials & adhesives, building acoustics. Codes related to green buildings: NBC, ECBC, ASHRAE, UPC etc.

Suggested Readings:

1. IGBC Green Homes Rating System, Version 2.0., Abridged reference guide, 2013, Indian GreenBuilding Council Publishers.

2. GRIHA version 2015, GRIHA rating system, Green Rating for Integrated Habitat Assessment.

3. Alternative building materials and technologies by K.S. Jagadish, B.V. Venkatarama Reddy and

K.S. Nanjunda Rao.

4. Non-Conventional Energy Resources by G. D. Rai, Khanna Publishers.

5. Sustainable Building Design Manual, Vol.1 and 2, TERI, New Delhi 2004.

6. Mike Montoya, Green Building Fundamentals, Pearson, USA, 2010.

7. Charles J. Kibert, Sustainable Construction – Green Building Design and Delivery,

John Wiley & Sons, New York, 2008.

8. Regina Leffers, Sustainable Construction and Design, Pearson / Prentice Hall, USA, 2009.

TRAFFIC ENGINEERING

Course Learning Objectives:

The student should able to understand the concepts of:

1. To understand basics principles of traffic engineering
2. To understand the causes of accident
3. To evaluate the traffic capacity
4. To design the optimal signal time
5. To propose desired measures to reduce traffic congestions

Course Outcomes:

Upon the successful completion of this course, the students will be able to understand:

1. The basics principles of Traffic Engineering
2. Analyzing parking data and model accidents
3. Determining capacity and LOS.
4. Evolution & design the optimal signal time
5. The engineering techniques to achieve Safe and efficient movement of people

SYLLABUS

UNIT - I

Traffic Studies: Basic principles of Traffic, Volume, Speed and Density; Definitions and their interrelationships; Traffic Volume studies - Objectives, Methods of Volume counts, Presentation of Volume Data; Speed studies- Types of Speeds, Objectives, Methods of speed studies, Statistical Methods for speed data Analysis, Presentation of speed data. Delay Studies; Head ways and Gap Studies - Headway and Gap acceptance.

UNIT - II

Traffic Studies: Origin and Destination Studies. Parking Studies: parameters of parking, definitions, Parking inventory study, Parking survey by Patrolling method; Analysis of Parking Survey data; Accident studies- Causative factors of Road accidents, Accident data collection: Accident analysis and modeling;, Road Safety Auditing, Measures to increase Road safety.

UNIT - III

Capacity and LOS Analysis: Introduction to Traffic capacity, Analysis concepts, Level of Service, Basic definitions, Factors affecting Capacity and LOS, Capacity of Urban/Rural Highway, with or without access control, Basic freeway segments - Service flow rate of LOS.

UNIT - IV

Signal Designing – Fixed Time signals, Determination of Optimum Cycle length and Signal setting for Fixed Time signals, Vehicle Actuated Signals, Signal Coordination.

UNIT - V

Transportation System Management - Measures for improving vehicular flow – one way Streets, Signal Improvement, Transit Stop Relocation, Parking Management, Reversible Lanes- Reducing Peak Period Traffic - Strategies for working hours, Congestion Pricing, Differential Toll Policies.

TEXT BOOK:

1. Traffic Engineering and Transportation Planning – L.R. Kadiyali, Khanna Publishers

2. Traffic Engineering – Khanna & Justo.

REFERENCES:

1. Traffic Engineering - Theory & Practice - Louis **J.** Pignataro,

Prentice Hall Publication.

2. Traffic Engineering by Roger P. Roess, William R. Mc. Shane, Elena S.

Prassas , Prentice Hall,