JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (Civil Engineering) 2017-18
COURSE STRUCTURE

I YEAR I Semester

Code	Subject	L	T	P	C
17A15501	**English**	3	-	-	3
17A15101	**Mathematics -I**	2	2	-	3
17A15301	**Engineering Chemistry**	3	-	-	3
17A10101	**Environmental Studies**	3	-	-	3
17A10102	**Engineering Mechanics**	2	2	-	3
17A10501	**Problem Solving and Computer Programming**	2	2	-	3
17A15303	**Engineering Chemistry Lab**	-	1	3	2
17A13501	**Engineering Workshop & IT Workshop**	-	1	3	2
17A15502	**English Language Communication Skills Lab.**	-	1	3	2
17A11301	**Comprehensive Objective type Examination**	-	-	-	1
	Total	**15**	**9**	**9**	**25**

I YEAR II Semester

Code	Subject	L	T	P	C
17A25501	**Technical Communication and Presentat Skills**	3	-	-	3
17A25101	**Mathematics -II**	2	2	-	3
17A25201	**Engineering Physics**	3	-	-	3
17A20303	**Engineering Drawing**	1	1	3	3
17A22301	Electrical & Mechanical Technology	2	2	-	3
17A20101	Strength of Materials- I	2	2	-	3
17A20504	**Computer Programming Lab**	-	1	3	2
17A25202	**Engineering Physics Lab**	-	1	3	2
17A20102	Strength of Materials Lab	-	1	3	2
17A29901	**Community Service (Audit)**	-	-	2	-
17A20102	**Comprehensive Objective type Examination**	-	-	-	1
	Total	**13**	**10**	**14**	**25**

II YEAR I SEMESTER

Code	Subject	L	T	P	C
17A35101	**Mathematical Methods**	2	2	-	3
17A30101	Strength of Materials- II	3	2	-	4
17A30102	Surveying – I	3	-	-	3
17A30103	Fluid Mechanics	3	2	-	4
17A30104	Building Materials and Construction	3	-	-	3
17A39901	**Human Values & Professional Ethics(Aud**	2	-	-	-
17A30105	Surveying lab – I	-	1	3	2
17A35104	**Exploratory Data Analysis Lab**	-	1	3	2
17A30110	**Comprehensive Objective type Examination**	-	-	-	1
	Total	**16**	**9**	**9**	**22**

II YEAR II SEMESTER

Code	Subject	L	T	P	C
17A45401	**Managerial Economics and Financial Analysis**	3	-	-	3
17A45101	**Probability and Statistics**	2	2	-	3
17A40101	Hydraulics & Hydraulic Machinery	2	2	-	3
17A40102	Structural Analysis - I	2	2	-	3
17A40103	Surveying – II	3	-	-	3
17A40104	Fluid Mechanics & Hydraulic Machinery La	-	1	3	2
17A40105	Surveying Lab – II	-	1	3	2
17A40106	**Comprehensive Objective type Examination**	-	-	-	1
	Total	**12**	**9**	**9**	**20**

III YEAR I SEMESTER

Code	Subject	L	T	P	C
17A50101	Design of Steel Structures	3	2	-	4
17A50102	Concrete Technology	3	-	-	3
17A50103	Water Resources Engineering-I	3	-	-	3
17A50104	Structural Analysis – II	2	2	-	3
17A50105	Engineering Geology	3	-	-	3
17A50106	Building Planning & Drawing	1	2	-	2
17A59901	**Foreign Language (Audit)**	2	-	-	-
17A50107	Engineering Geology Lab	-	1	3	2
17A50108	Concrete Technology Lab	-	1	3	2
17A50109	**Comprehensive Objective type Examination**	-	-	-	1
	Total	**16**	**7**	**9**	**23**

III YEAR II SEMESTER

Code	Subject	L	T	P	C
17A60101	Water Resources Engineering-II	3	-	-	3
17A60102	Design of Reinforced Concrete Structures	3	2	-	4
17A60103	Geo Technical Engineering – I	2	2	-	3
17A60104	Estimation, Costing & Valuation	2	2	-	3
17A60105	**Open Elective-I** 1.Environmental Engineering 2.Intellectual Property Rights 3. Industrial Waste and Waste Water Management	3	-	-	3
17A65501	**Advanced Communication Skills Lab**	-	1	3	2
17A60106	Environmental Engineering Lab	-	1	3	2
17A60107	Geo Technical Engineering Lab	-	1	3	2
17A60108	**Comprehensive Objective type Examination**	-	-	-	1
	Total	**13**	**9**	**9**	**23**

Note-

The students shall carry out a mini project for 2 credits related to any area specified under Neeru – Pragathi Program as per the orders of Government of Andhra Pradesh, between the gap of III-II and IV- I semesters. The project shall be evaluated in IV-I by Head of the Department and two senior professors.

IV YEAR I SEMESTER

Code	Subject	L	T	P	C
17A70101	Finite Element Analysis	2	2	-	3
17A70102	Geo – Technical Engineering – II	2	2	-	3
17A70103	Transportation Engineering - I	3	-	-	3
17A70104	**Open Elective*-II** 1.Experimental Stress Analysis 2.Environmental Impact Assessment 3.Disaster Mitigation & Management	3	-	-	3
17A70105	**Elective – I** 1.Bridge Engineering 2.Ground Improvement Techniques 3.Cost Effective Housing Techniques	3	-	-	3
17A79901	**MOOC-I (Audit)****	-	-	-	-
17A70106	Design Studio Lab	-	1	3	2
17A70107	Highway Materials Lab	-	1	3	2
17A70108	**Comprehensive Objective type Examination**	-	-	-	1
17A70109	**Neeru – Pragathi Mini Project**	-	-	-	2
	Total	**13**	**7**	**9**	**22**

Note: Project Work shall be initiated in IV-I Semester with a target of submission of Abstract and finalization of topic, and the evaluation of project work shall be done in IV-II Semester.

* The student should select the subject in the open elective which is not studied in previous semesters.

** The student can select the subject of any discipline for MOOC-I. The Students can register from NPTEL/GIAN/TEQIP. The registration can be done any time from second year onwards.

IV YEAR II SEMESTER

Code	Subject	L	T	P	C
17A80101	**Elective – II** 1. Advanced Structural Engineering 2.Building Construction Management 3.Water Harvesting and Conservation	3	-	-	3
17A80102	**Elective – III** 1.Design & Drawing of Irrigation Structures 2.Advanced Foundation Engineering 3.Architecture and Town planning	3	-	-	3
17A80103	**Elective – IV** 1.Rehabilitation & Retrofitting of structur 2. Transportation Engineering - II 3.Remote Sensing & GIS	3	-	-	3
17A80104	**Elective – V** 1.Air Pollution & Control 2.Prestressed Concrete 3.Earth Quake Resistant Structures	3	-	-	3
17A89901	**MOOC-II(Audit)*****	-	-	-	-
17A80105	**Seminar**	-	-	4	2
17A80106	**Project Work**	-	-	16	10
17A80107	**Comprehensive Objective type Examination**	-	-	-	1
	Total	11	02	20	25

*** The student should select the subject of discipline centric for MOOC-II. The Students can register from NPTEL/GIAN/TEQIP. The registration can be done any time from second year onwards.

Note: All End Examinations (Theory and Practical) are of three hours duration.

L – Lectures T- Tutorial   P – Practical/Drawing   C – Credits

Subject Code	Title of the Subject	L	T	P	C
17A15501	English	3	0	0	3

COURSE OBJECTIVES	
1	To enable the students to communicate in English for academic and social purpose
2	To enable the students to acquire structures and written expressions required for their profession.
3	To develop and practice critical and evaluative reading
4	To encourage investigating questions of the humanities through rhetorical study
5	To enhance the study skills of the students with emphasis on LSRW skills

COURSE OUTCOMES	
CO1	Develop facility in responding to a variety of situations and contexts calling for purposeful shifts in voice, tone, level of formality, design, medium, and/or structure
CO2	Become effective in the use of different modes of written communication in a professional environment
CO3	Develop capacity to apply different reading methods to evaluate a mass of data on the net and to glean the necessary information
CO4	Learn and use key rhetorical concepts through analyzing and composing a variety of texts
CO5	Well trained in LSRW skills and develop communicative competence

SYLLABUS

UNIT –I
Chapter entitled *Humour* from "Using English"
Chapter entitled "Jagadish Chandra Bose" from New Horizons

L- Listening -Techniques - Importance of phonetics
L- Meet & Greet and Leave taking, Introducing Oneself and Others (Formal and Informal situations)
R- -Reading Strategies -Skimming and Scanning
W- Writing strategies- sentence structures
 G-Parts of Speech –Noun-number, pronoun-personal pronoun, verb- analysis
V-Affixes-prefix and suffix, root words, derivatives

UNIT –II
Chapter entitled *Inspiration* from "Using English"
Chapter entitled "Dhyan Chand" from New Horizons

L- Listening to details
S- Apologizing, Interrupting, Requesting and Making polite conversations
R-note making strategies
W- Paragraph-types- topic sentences, unity, coherence, length , linking devices
G-Auxiliary verbs and question tags
V- synonyms-antonyms, homonyms , homophones, homographs, words often confused

UNIT –III

Chapter entitled *Sustainable Development* from "Using English"
Chapter entitled "After Twenty Years" from <u>New Horizons</u>

L- Listening to themes and note taking
S- Giving instructions and Directions, making suggestions, Accepting ideas, fixing a time and Advising
R- Reading for details -1
W- Resume and cover letter
G- Tenses – Present tense, Past tense and Future tense
V-Word formation and   One-Word Substitutes

UNIT –IV

Chapter entitled *Relationships* from "Using English"
Chapter entitled "The Tiger in the Tunnel" from <u>New Horizons</u>

L- Listening to news
S- Narrating stories, Expressing ideas and opinions and telephone skills
R- Reading for specific details and Information
W- Technical Report writing-strategies, formats-types-technical report writing
G- Voice and Subject – Verb Agreement
V- Idioms and prepositional Phrases

UNIT –V

Chapter entitled Science and Humanism from "Using English"
Chapter entitled a. "Daffodils" b. "Where the mind is Without Fear" from <u>New Horizons</u>
L- Listening to speeches
S- Making Presentations and Group Discussions
R- Reading for Information
W- E-mail drafting
G- Conditional clauses and conjunctions
V- Collocations and Technical Vocabulary and using words appropriately
Text Books:
1. **Using English (for detailed study)** published by Orient Black Swan, 2013
2. **New Horizons (for non detailes study) published by Pearson, 2013**

References:
1. **Raymond Murphy's English Grammar with CD,** Murphy, Cambridge University Press, 2012.
2. **Every Day Dialogues in English- Robert J.Dixson, Prentice Hall of India**
3. **Communication Skills, Sanjay Kumar & Pushpalatha** Oxford University Press,

2012.

4. **A Course in Communication Skills**- Kiranmai Dutt & co. Foundation Books, 2012.
5. **Current English grammar and usage-**S M Guptha, PHI, 2013.
6. **A Course in Listening and Speaking-Sasi Kumar.U, U.K.Cambridge**
7. **Powerful Vocabulary Builder**- Anjana Agarwal New Age International Publishers, 2011.
8. **Writing with a Purpose, Tickoo and Sasi Kumar, OUP, 2011**
9. **Oxford Advanced Learners Dictionary, 9ᵗʰ edition, Oxford, 2016**

Method of Evaluation:

The distribution shall be 40 marks for Internal Evaluation and 60 marks for the External Evaluation. Each Internal examination shall consist of an objective test for 10 marks and a subjective test for 20 marks with duration of 20 and 90 minutes respectively. In addition to that 10 marks will be awarded for assignment.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: ANANTHAPURAMU
**** DEPARTMENT OF CIVIL ENGINEERING****
I B.TECH – I SEMESTER
(Common to all Branches)

Subject Code	Title of the Subject	L	T	P	C
17A15101	MATHEMATICS – I	2	2	0	3

COURSE DESCRIPTION: First order differential equation, higher order linear differential equations; functions of several variables; applications of integration; multiple integrals, vector calculus.

COURSE OBJECTIVES:

CEO 1: To impart knowledge on the advanced concepts of linear differential equations, functions of several variables, applications of derivatives, multiple integrals and vectors calculus.

CEO 2: To develop skills in analyzing the problems, designing mathematical models, skills in differentiation, integration, and vectors calculus for the problems in engineering.

COURSE OUT COMES: After completion of the course a successful student is able to

CO 1: Acquire knowledge in
   (a) Higher order Differential equations
   (b) Maximum and minimum values for the functions of several variables
   (c) Double and triple integrals
   (d) Differentiation and integration of vector functions.
   (e) Line and surface volume
   (f) Transforming integrals from three dimensional surfaces and volumes
       on to plane surfaces

CO 2: Develop skills in analyzing the
   (a) methods for differential equation for obtaining appropriate solutions,
   (b) Properties of oscillatory electrical circuits and heat transfer in engineering systems
   (c) The variations in the properties of functions near their stationary values
   (d) Flow patterns of fluids, electrical and magnetic flux and related aspects

CO 3: Develop skills in designing mathematical models for
   (a) R-C and L-R-C oscillatory electrical circuits
   (b) Mechanical oscillations.
   (c) Deflection of Beams.
   (d) Heat transfer and Newton's laws of cooling
   (e) Engineering concepts involving lengths of curves and areas of planes Flux across
       surfaces

CO 4: Develop analytical skills in solving the problems involving
   (a) Newton's laws of cooling
   (b) non homogeneous linear differential equations
   (c) maximum and minimum values for the functions

(d) lengths of curves, areas of surfaces and volumes of solids in engineering

(e) transformations of integrals from three dimensional surfaces and volumes on to plane surfaces

CO 5: Use relevant mathematical techniques for evaluating

(a) various types of particular integrals in differential equations

(b) stationary values for multi variable functions

(c) multiple integrals in change of variables

(d) Integrations of vector functions.

UNIT-I:
FIRST ORDER DIFFERENTIAL EQUATIONS(6 periods)

Linear and Bernoulli type, exact equations and reducible to exact. Orthogonal trajectories (Both Cartesian and polar forms). Newton's law of cooling.

UNIT II:
HIGHER ORDER LINEAR DIFFERENTIALEQUATIONS(12 periods)

Method for solution of linear equations- Differential operator D, Solution of second order linear homogeneous equations with constant coefficients, Solution of Higher order homogeneous linear equations with constant coefficients, Solution of Non homogeneous linear equations-Operator methods for finding particular integrals- for cases – e^{ax}, sinax, cos ax, x^n, $e^{ax} V(x)$, $xV(x)$. Method of Variation of parameters. Applications of linear differential equations- Mechanical and Electrical oscillatory circuits and Deflection of Beams.

UNIT – III
Power Series Expansions &Multi-variable Calculus (8 Lectures)

Taylor series, Maclaurin series. Functions of several variables, Continuity, Partial derivatives, Total derivative, Increment theorem, Chain rule, Tangent plane and Normal line, Mixed derivative theorem, Necessary and sufficient conditions for Maxima, Minima and Saddle point, The method of Lagrange multipliers.

UNIT – IV
Multiple Integrals (6 Lectures)

Double integral, Fubini's theorem, Volumes and Areas, Change of variable in a double integral, special case: Polar coordinates, Triple integral, Applications, Change of variables in a triple integral, Surface area, Line integrals, Surface integrals.

UNIT – V
Vector Calculus (12 Lectures)

Vector functions, Continuity and Differentiability of vector functions, Arc length for space curves, Unit tangent vector, Unit normal and Curvature to plane and space curves, Gradient, Directional derivatives, Vector fields, Divergence and Curl of a vector field, vector integrations, Green's Theorem (without Proof), Stokes' Theorem(without Proof), The divergence theorem(without Proof), verifications and applications.

TEXT BOOKS:

1. Engineering Mathematics-I, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher

2. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.

REFERENCES:

1. Engineering Mathematics Volume-I, by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publication.

2. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
4. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.
5. Advanced Engineering Mathematics 3rd Edition, by R.K.Jain & S.R.K.Iyengar, Narosa publishers.

Subject Code	Title of the Subject	L	T	P	C
17A15301	Engineering Chemistry	3	-	-	3

COURSE OBJECTIVES	
1	The Engineering Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
2	The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
3	The lucid explanation of the topics will help students understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
4	The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example

COURSE OUTCOMES	
CO1	After the completion of the course, the student would understand about the concepts of chemistry in respect of Electrochemical cells, fuel cells, mechanism of corrosion and factors to influence, polymers with their applications, engineering materials and water chemistry.
CO2	Understand industrially based polymers, various engineering materials.
CO3	Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially. The Students select and apply suitable treatments domestically and industrially.

SYLLABUS

UNIT 1 :ELECTROCHEMISTRY
i) Review of electrochemical cells, Numerical calculations.
Batteries: Rechargeable batteries: Lead acid, Ni-Cd, Lithium Ion Batteries, Super capacitors
Fuels cells: Fuel cell working principle, classification of fuel cells-Hydrogen-Oxygen and Methanol-Oxygen.
ii) Electrochemical sensors: Potentiometric Sensors and voltammetric sensors. Examples:
    analysis of Glucose and urea
iii)Corrosion: definition, Types of Corrosion: Dry Corrosion (Direct Chemical attack), Wet
    Corrosion, Electrochemical Theory of corrosion, Factors affecting the corrosion. Prevention:
    Anodic and cathodic protection and electro and electroless plating. (10h)

UNIT 2 : POLYMERS
i) Introduction to polymers, Polymerisation process, mechanism:cationic, anionic, free radical

and coordination covalent.
  Elastomers Natural Rubber, process of natural rubber, vulcanization, Compounding of Rubber
  Synthetic Rubber: Preparation, properties and engineering applications of Buna-S, Buna-N, Polyurethene, Polysulfide (Thiokol) rubbers
  Plastomers: Thermosetting and Thermoplatics, Preparation, properties and Engineering applications , PVC, Bakelite, nylons. Polydispersive index
ii) Conducting polymers: Mechanism, synthesis and applications of polyacetyline, polyaniline.
iii) Liquid Crystals: Introduction, classification and applications
iii) Inorganic Polymers: Basic Introduction, Silicones, Polyphospazins (-(R)2-P=N-) applications. (12h)

UNIT 3 : FUEL TECHNOLOGY
 i) Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems.
  Solid Fuels–Coal, Coke : Manufacture of Metallurgical Coke by Beehive oven and Otto Hoffmann's by product oven processes.
ii) Liquid Fuels:
  Petroleum: Refining of Petroleum, Gasoline: Octane and cetane number, Synthetic Petrol: Bergius Processes and Fischer Troph's synthesis
  Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol
iii) Gaseous Fuels: Origin, Production and uses of Natural gas, Producer gas, Water gas, Coal gas and Biogas. Flue Gas analysis by Orsat's apparatus. Combustion: reaction of combustion and related problems.   (12h)

UNIT. 4 : CHEMISTRY OF ENGINEERING MATERIALS
i)   Ceramic: General properties, classification of ceramics
ii) Glass: Manufacture of glass, properties of glass, fracture of glasses, types of glasses.
iii) Cement: Composition, Setting and Hardening (Hydration and Hydrolysis)
iv) Refractories: Classification, properties of refractories and its failures. Applications of refractories.
v) Lubricants: Theory of lubrication, properties of lubricants and applications
vi) Rocket Propellants: Classification, Characteristics of good propellant. (9h)

UNIT.5 WATER TREATMENT
Impurities in water, Hardness of water and its Units, Disadvantages of hard water, Estimation of hardness by EDTA method, Numerical problems on hardness, Estimation of dissolved oxygen, Alkalinity, acidity and chlorides in water, Water treatment for domestic purpose (Chlorination, Bleaching powder, ionization)
Industrial Use of water for Steam generation, Boilers troubles. Scale & Sludge, Priming and Foaming, Caustic Embrittlement and Boiler Corrosion.
Treatment of Boiler Feed water:
Internal Treatment: Colloidal, Phosphate, Carbonate, Calgon and sodium aluminates treatment.
External Treatment: Ion-Exchange and Permutit processes.
Demineralization of brackish water: Reverse Osmosis and Electro dialysis (12h)

Text Books:
1. Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, Foruth Edition, New Delhi
2. A Text Book of Enigneering Chemistry, Jain and Jain, Dhanapathi Rai Publications, New Delhi

References:
1.A Text book of Engineering Chemistry by SS Dhara, S. Chand Publications, New Delhi

2. Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH Pubblications India Pvt Limited.
3. Concepts of Engineering Chemistry- Ashima Srivastavaf and N.N. Janhavi
4. Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.Agarwal and Andra Naidu
5. Chemistry of Engineering Materials, C.V.Agarwal, C.Parameswaramurthy and Andranaidu
6. Text Book of Engineering Chemistry, Shashichawla, Dhanapathirai Publications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANATAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
I Year B.Tech - I Semester

(Common to All Branches)

Subject Code	Title of the Subject	L	T	P	C
17A10101	**ENVIRONMENTAL STUDIES**	3	-	-	3

OBJECTIVE: *To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.*

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 modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT – II

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 following ecosystem:

    a.   Forest ecosystem.
    b.   Grassland ecosystem
    c.   Desert ecosystem
    d.   Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

BIODIVERSITY AND ITS CONSERVATION : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical 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 a mega-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: Definition, Cause, effects and control measures of :

    a.   Air Pollution.
    b.   Water pollution
    c.   Soil pollution
    d.   Marine pollution
    e.   Noise pollution
    f.   Thermal pollution
    g.   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 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 concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and 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: 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..

TEXT BOOKS :

   (1) Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
   (2) Environmental Studies by Palaniswamy – Pearson education
   (3) Environmental Studies by Dr.S.Azeem Unnisa, Academic Publishing Company

REFERENCES :

   (1) Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Pubilications.
   (2) Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
   (3) Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
   (4) Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.
   (5) A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Pubilishing House
   (6) Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.

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COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU

I Year B.Tech - I Semester

Subject Code	Title of the Subject	L	T	P	C
17A10102	**ENGINEERING MECHANICS**	2	2	0	3

OBJECTIVE: This course will serve as a basic course by introducing the concepts of basic mechanics which will help as a foundation to various courses.

UNIT – I
INTRODUCTION OF ENGINEERING MECHANICS – Basic concepts - System of Forces – Moment of Forces and its Application – Couples and Resultant of Force System – Equilibrium of System of Forces - Degrees of Freedom – Free body diagrams –Types of Supports – Support reactions for beams with different types of loading – concentrated, uniformly distributed and uniformly varying loading.

UNIT – II
FRICTION : Types of friction– laws of Friction – Limiting friction- Cone of limiting friction– static and Dynamic Frictions – Motion of bodies – Wedge, Screw jack and differential Screw jack.

UNIT – III
CENTROID AND CENTER OF GRAVITY: Centroids of simple figures – Centroids of Composite figures – Centre of Gravity of bodies – Area moment of Inertia - Parallel axis and perpendicular axis theorems - Moments of Inertia of Composite Figures.
MASS MOMENT OF INERTIA: Moment of Inertia of Simple solids – Moment of Inertia of composite masses.(Simple problems only)

UNIT – IV
KINEMATICS: Rectilinear and Curvilinear motion – Velocity and Acceleration – Motion of A Rigid Body – Types and their Analysis in Planar Motion.
KINETICS : Analysis as a particle and Analysis as a Rigid Body in Translation – Central Forces of motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies – Work Energy Method – Equation for Translation – Work Energy application to Particle Motion, Connection System – Fixed axis Rotation and Plane Motion.

UNIT – V
ANALYSIS OF PERFECT FRAMES: Types of frames – cantilever frames and simply supported frames – Analysis of frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.
MECHANICAL VIBRATIONS: Definitions, Concepts-Simple Harmonic motion-Free vibrations-Simple Compound and Torsional pendulum- Numerical problems

TEXT BOOKS:
(1) Engineering Mechanics by Dr.R.K.Bansal, Lakshmi Publications.
(2) Engineering Mechanics by Shames & Rao – Pearson Education.
(3) Engineering Mechanics by Bhavakatti, New age pubilishers

REFERENCES:
(1) Engineering Mechanics by Seshigiri Rao, Universities Press, Hyderabad.
(2) Engineering Mechanics – B. Bhattacharyya, Oxford University Publications.
(3) Engineering Mechanics by FedrinandL.Singer – Harper Collings Publishers.

(4) Engineering Mechanics (Statics and Dynamics) by Hibller and Gupta; Pearson Education

(5) Engineering Mechanics by S.Timoshenko, D.H.Young and J.V.Rao, Tata McGraw-Hill Company

(6) Engineering Mechanics by Chandramouli, PHI publications.

(7) Engineering Mechanics –Arthur P. Boresi and Richard J. Schmidt. – Brooks/Cole – Cengage Learning

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: ANANTHAPURAMU
**** DEPARTMENT OF CIVIL ENGINEERING ****
I B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A10501	**Problem Solving and Computer Programming**	2	2	-	3

COURSE OBJECTIVES	
1	To understand the various steps in Program development.
2	To understand the basic concepts in C Programming Language.
3	To learn how to write modular and readable C Programs
4	To understand the basic concepts such as Abstract Data Types, Linear and Non Linear Data structures.
5	To understand the notations used to analyze the Performance of algorithms.

COURSE OUTCOMES	
CO1	Develop flowcharts, algorithms for given complex problems.
CO2	Analyze basic programming constructs.
CO3	Write C programs for real world problems.
CO4	Implement C programming by using various control structures.
CO5	Appreciate coding standards and best practices for program development.

UNIT - I
Introduction: Programs and Programming, Programming Languages, Compiler, Interpreter, Loader and Linker, Program Execution, Classification of Programming, Structured Programming Concept, Algorithms, Flowcharts, System Developments.
Fundamentals Algorithms: Exchange the Values between two variables, Counting, Summation of set of numbers, Factorial Computation, Generation of the Fibonacci sequence, Reversing the digits of a integer.
Basics Of C: Introduction**,** Developing Programs in C, A Simple C program, Parts of C Program Revisited.

UNIT – II
Structure of C: Structure of a C Program, Concept of a Variable, Data Types in C, Program Statements, Declaration, Tokens, Operators and Expressions, Type conversion in C.
Input and Output: Introduction, Basic Screen and Keyboard I/O in C, Non-Formatted Input and Output, Formatted Input and Output Function.
Control Statements: Introduction, Specifying Test Condition for Selection and Iteration, Writing Test Expression, Conditional Execution and Selection, Iteration and Repetitive Execution. Nested Loops.

UNIT – III
Arrays And Strings: Introduction, One-Dimensional Array, Strings, Multidimensional Arrays, Arrays of Strings.

Function: Introduction, Concept of Functions, Using Functions, Call by Value Mechanism, Working with Functions, Passing Arrays to Functions, Scope and Extent, Inline Function, Recursion.

UNIT - IV
Factoring Methods: Finding Square root of a Number, The Smallest Deviser of an Interger, The GCD of Two Integers, Generating Prime Numbers.
Pointers – Introduction, Understanding Memory, Address Operator, Pointer, Void Pointer, Null Pointer, Use of pointer, Arrays and Pointers, Pointers and string, Pointers and string, Pointers to pointers, Array of pointers, Pointers to Function, Dynamic Memory Allocation. Introduction to Data Structures, Single Linked List.

UNIT – V

User-Defined Data Types and Variables: Introduction, User-defined Data Types, Structures, Union, Enumeration Types.
Files in C: Introduction, Using Files in C, Working with text Files, Working with Binary Fields, Direct File Input and Output, Files of Records, Random Access to Files of Records.

TEXT BOOKS:
1. Programming in C, PradipDey, Manas Ghosh, Second Edition, OXFORD,
2. How to Solve it by Computer by R.G. Dromey, Pearson.

REFERENCES:
1. Programming in C and Data Structures, Jeri R. Hanly, Elliot B. Koffman, Ashok Kamthane and A.Ananda Rao, Pearson Education.
2. Value Range analysis of C programs by simon, Axel by New Age International Publishers.
3. C Programming with problem solving, J.A. Jones & K. Harrow, dreamtech Press
4. Programming in C – Stephen G. Kochan, III Edition, PearsonEductaion.
5. C for Engineers and Scientists, H.Cheng, Mc.Graw-Hill International Edition Education / PHI
6. C Programming & Data Structures,E.Balagurusamy,TMH.
7. Complete Reference – C, Herbert Schildt,TMH.

Subject Code	Title of the Lab	L	T	P	C
17A15303	Engineering Chemistry lab	-	1	3	2

COURSE OBJECTIVES	
1	Will learn practical understanding of the redox reaction
2	Will able to understand the function of fuel cells, batteries and extend the knowledge to the processes of corrosion and its prevention
3	Will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineer these to suit diverse applications
4	Will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology

COURSE OUTCOMES	
CO1	Would be confident in handling energy storage systems and would be able combat chemical corrosion
CO2	Would have acquired the practical skill to handle the analytical methods with confidence.
CO3	Would feel comfortable to think of design materials with the requisite properties
CO4	Would be in a postion to technically address the water related problems.

LIST OF EXPERIMENTS

1. Determination of total hardness of water by EDTA method.
2. Determination of Copper by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler's method
4. Determination of Copper by Iodometry
5. Estimation of Iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).
6. Determination of Acidity and Alkalinity of Water
7. Determination of pH of various water samples.
8. Preparation of Phenol-Formaldehyde (Bakelite)
9. Determination of Viscosity of oils using Redwood Viscometer I
10. Determination of Viscosity of oils using Redwood Viscometer II
11. Conductometric titration of strong acid Vs strong base (Neutralization titration).
12. Conductometric titration of Barium Chloride vs Sodium Sulphate (Precipitation Titration)

13. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
14. Estimation of Chloride ion using potassium Chromite indicator (Mohrs method)

TEXT BOOKS:

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – J. Mendham et al, Pearson
   Education.
2. Chemistry Practical – Lab Manual by Chandra Sekhar, GV Subba Reddy and Jayaveera

JNTUA COLLEGE OF ENGINEERING (Autonomous)-ANANTAPURAMU
DEPARTMENT OF CIVIL ENGINEERING
I- Year B.Tech. I-Sem

Subject Code	Title of the Lab	L	T	P	C
17A13501	ENGINEERING WORKSHOP& IT WORKSHOP LAB	-	1	3	2

Part-A
ENGINEERING WORKSHOP
(Common to All Branches)

Course objectives:
- The objective of this subject is to provide the basic concepts about the engineering workshop trades like Carpentry, Fitting etc.
- Gain knowledge of the use of various workshop tools and make models in the respective trades.
- Exposure to power tools

Course Outcomes:
- CO1: Student will be aware of the safety aspects in using the tools
- CO2: Student will be able to use the tools for the preparation of models in respective trades of engineering workshop.
- CO3: Precautions in making the models will be known by the student.
- CO4: Student will be aware of the usage of the power tools for various purposes.
- CO5: Knowledge about the measuring instruments will be achieved.

1. TRADES FOR EXERCISES:
At least 2 Exercises in each of the following trades :
1. Carpentry
2. Fitting
3. House-wiring
4. Black Smithy
5. Tin smithy
6. Power Tools Demonstration

TEXT BOOK:
1. Work shop Manual / P.Kannaiah/ K.L.Narayana/ Scitech Publishers.

PART-B
IT workshop Lab

COURSE OBJECTIVES	
1	To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
2	To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
3	To learn about Networking of computers and use Internet facility for Browsing and Searching

COURSE OUTCOMES	
CO1	Disassemble and Assemble a Personal Computer and prepare the computer ready

		to use
CO2		Prepare the Documents using Word processors and Prepare spread sheets for calculations using excel
CO3		Prepare Slide presentations using the presentation tool
CO4		Interconnect two or more computers for information sharing
CO5		Access the Internet and Browse it to obtain the required information

Preparing your Computer

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: **Operating system features**: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet

Task 5: Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc should be done by the student. The entire process has to be documented.

Task 6: Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc.

If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating e-mail account.

Task 7: Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools

Task 8: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page

setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 9: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement.Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 10: Presentations: creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

References:

1. Introduction to Computers, Peter Norton, McGraw Hill
2. MOS study guide for word, Excel, Powerpoint& Outlook Exams", Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, Maintaining & Repairing PCs", Bigelows, TMH

Subject Code	Title of the Lab	L	T	P	C
17A15502	English Language Communication Skills Lab	-	1	3	2

COURSE OBJECTIVES	
1	To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
2	To sensitise the students to the nuances of English speech sounds, word accent, intonation and rhythm
3	To provide opportunities for practice in using English in day to day situations
4	To improve the fluency in spoken English and neutralize mother tongue influence
5	To train students to use language appropriately for debate, group discussion and public speaking

COURSE OUTCOMES	
CO1	Better Understanding of nuances of language through audio- visual experience and be independent learners
CO2	The significance of paralinguistic features will be understood by the students and they will try to be intelligible.
CO3	Become good at Inter-personal skills
CO4	Achieve neutral accent and be free from mother tongue influence
CO5	Being an active participant in debates and group discussion, showing ability to express agreement, argument to summarize ideas to elicit the views of others and present own ideas;

UNIT- I
Phonetics – Introduction to Sounds of Speech – Vowels – Consonants – Phonetic Transcription & Orthographic Transcription
UNIT – II
Syllabification – Word Stress – Rules of word stress – Intonation – Falling tone and Rising tone
UNIT – III
Situational Dialogues – Role-play – Expressions in various situations – Self Introduction – Introducing others – Greetings – Apologies – Requests – Giving directions -Social and Professional etiquettes – Telephone Etiquettes
UNIT – IV
JAM – Describing Pictures, Photographs, Products, and Process – Talking about Wishes-Information Transfer.
UNIT – V
Debates - Group Discussions-1

MINIMUM REQUIREMENT FOR ELCS LAB:
The English Language Lab shall have two parts:
1. Computer Assisted Language Learning (CALL) Lab:
   The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

2. The Communication Skills Lab with movable chairs and audio-visual aids with a P.A. system, Projector, a digital stereo-audio & video system and camcorder etc.

System Requirement (Hardware component):
Computer network with LAN with minimum 60 multimedia systems with the following specifications:
   i) P – IV Processor
      a) Speed – 2.8 GHZ
      b) RAM – 512 MB Minimum
      c) Hard Disk – 80 GB
   ii) Headphones of High quality

SUGGESTED SOFTWARE:
1. Walden Infotech English Language Communication Skills.
2. Clarity Pronunciation Power – Part I (Sky Pronunciation)
3. Clarity Pronunciation Power – part II
4. LES by British council
5. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
6. *DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.*
7. Lingua TOEFL CBT Insider, by Dreamtech
8. English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
9. Cambridge Advanced Learners' English Dictionary with CD.

REFERENCE BOOKS:
1. **A Textbook of English Phonetics for Indian Students** 2nd Ed T. Balasubramanian. (Macmillian), 2012.
2. **A Course in Phonetics and Spoken English**, Dhamija Sethi, Prentice-Hall of India Pvt.Ltd
3. **Speaking English Effectively**, 2nd Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).
4. **A Hand book for English Laboratories**, E.Suresh kumar, P.Sreehari, Foundation Books,2011
5. **English Pronunciation in Use. Intermediate & Advanced**, Hancock, M. 2009. CUP
6. **Basics of Communication in English**, Soundararaj, Francis. 2012.. *New Delhi: Macmillan*
7. **Spoken English** (CIEFL) in 3 volumes with 6 cassettes, OUP.
8. **English Pronouncing Dictionary**, Daniel Jones Current Edition with CD.Cambridge, 17th edition, 2011.

Method of Evaluation:
English Language Laboratory Practical Examination:
1. The Practical Examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core Engineering practical sessions.

2. For the Language lab sessions, there shall be a continuous evaluation during the year for 40 sessional marks and 60 year-end Examination marks. Of the 40 marks, 20 marks shall be awarded for day-to-day work and 20 marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

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I B.TECH – II SEMESTER(R-17)

Subject Code	Title of the Subject	L	T	P	C
17A25501	**Technical Communication and Presentation Skills**	3	0	0	3

COURSE OBJECTIVES	
1	To develop awareness in students of the relevance and importance of technical communication and presentation skills.
2	To prepare the students for placements
3	To sensitize the students to the appropriate use of non-verbal communication
4	To train students to use language appropriately for presentations and interviews
5	To enhance the documentation skills of the students with emphasis on formal and informal writing

COURSE OUTCOMES	
CO1	Become effective technical communicators
CO2	Be job-ready and able to face interviews confidently
CO3	Sensitive use of non-verbal language suitable to different situations in professional life
CO4	Learn and use keys words, phrases and sentence structures making a mark in interviews and presentation skills
CO5	Effective writing skills with the ability to use different styles for different situations

SYLLABUS

UNIT 1:
Basics of Technical Communication – Introduction – Objectives & Characteristics of Technical Communication – Importance and need for Technical communication - LSRW Skills –
Barriers to effective communication
UNIT II
Informal and Formal Conversation - Verbal and Non-verbal communication –Kinesics, Proxemics, Chronemics, Haptics, Paralanguage
UNIT III
Written communication – Differences between spoken and written communication – Features of effective writing –Advantages and disadvantages of spoken and written communication- Art of condensation- summarizing and paraphrasing

UNIT IV

Presentation Skills – Nature and importance of oral presentation – Defining the purpose –
Analyzing the audience - Planning and preparing the presentation, organizing and rehearsing
the presentation –Individual and group presentations - Handling stage fright
UNIT V
Interview Skills – The Interview process –Characteristics of the job interview – Pre-interview
preparation techniques – Projecting the positive image – Answering Strategies
Text Books:

1. **Effective Technical Communication,** Ashrif Rizvi, TataMcGrahill, 2011
2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma,3rd Edition, O U
   Press 2015

References:
1.Communication Skills by Pushpalatha & Sanjay Kumar, Oxford Univsesity Press
2.Books on **TOEFL/GRE/GMAT/CAT/ IELTS** by Barron's/DELTA/Cambridge University
Press.2012.
3. **Soft Skills for Everyone,** Butterfield Jeff, Cengage Publications, 2011.
4. **Management Shapers Series** by Universities Press (India) Pvt Ltd., Himayatnagar,
Hyderabad 2008.
5. **Successful Presentations** by John Hughes & Andrew Mallett, Oxford.
6. **Winning at Interviews** by Edgar Thorpe and Showick Thorpe, Pearson
7. Winning Resumes and Successful Interviews by Munish Bhargava, Mc Graw Hill

Method of Evaluation:

The distribution shall be 40 marks for Internal Evaluation and 60 marks for the External
Evaluation. Each Internal examination shall consist of an objective test for 10 marks and a
subjective test for 20 marks with duration of 20 and 90 minutes respectively. In addition to that
10 marks will be awarded for assignment.

Subject Code	Title of the Subject	L	T	P	C
17A25101	**MATHEMATICS – II**	**2**	**2**	**0**	**3**

COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z – transforms;partial differential equations.

COURSE OBJECTIVES:

CEO 1: To impart basic knowledge on Fourier series, Fourier transforms, Laplace Transforms, z-transforms and partial differential equations.

CEO 2: To develop skills in analyzing the problems, designing mathematical models,
Fourier series, Fourier transforms, Laplace transforms, z-transforms and partial differential equations for the problems in engineering.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO 1: Acquire basic knowledge in
      (a) Fourier series and Fourier transforms
      (b) Fourier integrals
      (c) Laplace transforms and their applications
      (d) z- transforms and their applications
      (e) Solving partial differential equations
      (f) Heat transfer and wave motion

CO 2: Develop skills in Analyzing the
      (a) Properties of Fourier series for a given function
      (b) Partial differential equations through different evaluation methods
      (c) Difference equations through z – transforms
      (d) Engineering systems and processes involving wave forms and heat transfer

CO 3: Develop skills in designing mathematical models for
      (a) Problems involving heat transfer and wave forms
      (b) Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms,
          z-transforms and difference equations
CO 4: Develop analytical skills in solving the problems involving
      (a) Fourier series and Fourier transforms
      (b) Laplace transforms
      (c) Z-transforms and difference equations
      (d) Heat transfer and wave motion

CO 5: Use relevant transformation techniques for
      (a) Obtaining Fourier transforms for different types of functions
      (b)   Laplace transforms
      (c) Z- transforms
      (d) Partial differential equations

UNIT- I :

FOURIER SERIES   (7 periods)

Fourier series: Determination of Fourier coefficients (Euler's formulae),Fourier series of even and odd functions, convergence of Fourier series (Dirichlet conditions), Half-range Fourier sine and cosine expansions, Parseval's formula, Complex form of Fourier series.

UNIT- II:

FOURIER INTEGRALS AND FOURIER TRANSFORMS(8 periods)

Fourier integral theorem (statement only), Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms –properties, Inverse transform and finite Fourier transforms.

UNIT-III:

LAPLACE TRANSFORMS (12 periods)

Laplace transforms of standard functions. Properties of Laplace transform. First and second shifting Theorems. Laplace transforms of derivatives and integrals. Inverse transforms. Convolution theorem, inverse Laplace transforms by convolution theorem. Laplace transform of periodic functions, Step and Impulse functions, Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

UNIT-IV :

Z- TRANSFORMS (9 periods)

Z – transforms, inverse Z– transforms, damping rule, shifting rule, initial and final value theorems. Convolution theorem, Solution of difference equations by Z– transforms.

UNIT – V :

PARTIAL DIFFERENTIAL EQUATIONS (9 periods)

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions ,Method of separation of variables , Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace's equation under initial and boundary conditions.

TEXT BOOKS:
1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.

REFERENCES:
1. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.
2. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
4. Advanced Engineering Mathematics 3rd Edition, by R.K.Jain & S.R.K.Iyengar, Narosa publishers

Subject Code	Title of the Subject	L	T	P	C
17A25201	**ENGINEERING PHYSICS**	3	-	-	3

COURSE OBJECTIVES	
1	To make a bridge between the physics in school and engineering courses.
2	To evoke interest on applications of superposition effects like interference and diffraction, the mechanisms of emission of light, achieving amplification of electromagnetic radiation through stimulated emission, study of propagation of light through transparent dielectric waveguides along with engineering applications.
3	To open new avenues of knowledge in dielectric and magnetic materials which find potential in the emerging micro device applications.
4	To understand and employ the concepts of waves & oscillations and acoustics to engineering applications.
5	To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications. Considering the significance of micro miniaturization of electronic devices and significance of low dimensional materials, the basic concepts of nano and smart materials, their properties and applications in modern emerging technologies are elicited.
6.	To enlighten the characterization of materials by different techniques, the periodic arrangement of atoms in crystals, Bragg's law and X-Ray diffraction technique.

COURSE OUTCOMES	
CO1	The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fiber optics.
CO2	The concepts of types of waves and oscillations ,acoustics are highlighted
CO3	The dielectric and magnetic response of materials are focussed.
CO4	The importance of superconducting materials, nano and smart materials along with their engineering applications are well elucidated.
CO5	Characterization of materials by advanced techniques, the important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction technique are focused.

SYLLABUS

UNIT 1: PHYSICAL OPTICS, LASERS AND FIBRE OPTICS
Physical Optics: Introduction to interference – Colours in thin films – Newton's Rings – Michelson interferometer - Fraunhoffer diffraction due to single slit, double slit – Diffraction grating (Qualitative).
Lasers: Introduction – Characteristics of laser – Spontaneous and stimulated emission of radiation – Einstein's coefficients — Population inversion – Pumping mechanisms - Nd:YAG laser – He-Ne laser – Applications of lasers.
Fiber optics: Introduction – working principle of optical fiber – Numerical aperture and acceptance angle – V- Number - Types of optical fibers –Optical fiber communication system – Attenuation and losses in optical fibers – Applications of optical fibers.

UNIT 2: WAVES & OSCILLATIONS AND ACOUSTICS
Waves & Oscillations: Categories of waves: Mechanical, electromagnetic, matter and gravitational – Reflection and transmission of waves at a boundary – Free oscillations – Damped Oscillations – Forced oscillations – Resonance – Coupled oscillations.
Acoustics – Absorption coefficient and its measurement – Reverberation time – Sabine's formula – Acoustic Quieting – Methods of Quieting.

UNIT 3: DIELECTRICS AND MAGNETIC MATERIALS
Dielectrics: Introduction – Dielectric Polarization – Types of Polarization – Lorentz field – Clausius-Mosotti equation – Piezoelectricity – Ferroelectricity – Dielectric strength, loss and breakdown.
Magnetic materials: Introduction – Basic definitions – Origin of magnetic moment – Classification of magnetic materials – Hysteresis – Soft and hard magnetic materials – Applications of magnetic materials.

UNIT 4: ADVANCED MATERIALS
Superconductors: Introduction – Properties of superconductors – Meissner effect– Type I and Type II superconductors – ac and dc Josephson effects – BCS theory (qualitative treatment) – High T_c superconductors – Applications of superconductors.
Nanomaterials: Introduction – Surface area and quantum confinement – Physical properties: optical, thermal, mechanical and magnetic – Carbon Nanotubes – Applications of nanomaterials.
Smart Materials: Shape Memory Alloys: Definition – Two phases – One way and two way memory effect – Pseudo elasticity – Applications of shape memory alloys.

UNIT 5: CRYSTALLOGRAPHY AND MATERIAL CHARACTERIZATION
Crystallography: Introduction – Space lattice –Unit cell – Lattice parameters –Bravias lattice – Crystal systems – Packing fractions of SC, BCC and FCC - Miller indices – Interplanar spacing in cubic crystals – X-ray diffraction – Bragg's law.
Material Characterization: Electron microscopy: SEM, TEM, AFM – Non-destructive testing: objectives – Methods: Pulse-echo method.

Prescribed 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.

Reference Books:
1. Introduction to modern optics – Grant R Fowles
2. A text book on Optics – Brijlal & Subramanyam
3. Laser Fundamentals – William T. Silfvast, Cambridge University Press

4. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons
5. Introduction to Nanotechnology – C P Poole and F J Owens, Wiley
6. Shape Memory Alloys-Modeling and Engg. Applications – C Lagoudas, Springer
7. Hand Book of Non-destructive evaluation, C.J.Hellier, McGraw-Hill
8. Engineering Physics – V. Rajendran, K.Thyagarajan Tata MacGraw Hill Publishers
9. Engineering Physics – M.R.Srinivasan, New Age Publications
10. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning
11. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
12. Engineering Physics – M. Arumugam, Anuradha Publications

Subject Code	Title of the Subject	L	T	P	C
17A20303	Engineering Drawing	1	1	3	3

COURSE OBJECTIVES	
1	To draw and understand the practical importance of geometrical constructions.
2	To understand the representation of the regular planes and solids in first angle of projections

COURSE OUTCOMES	
CO1	Student will be familiar with the BIS conventions and dimensions
CO2	Student will be familiar with the positions of points and straight lines under different cases
CO3	Student will be able to represent regular planes and solids on the drawing sheet for various cases
CO4	Student can draw the development for regular solids
CO5	Student will familiarize with the 2D and 3D projections of various figure

SYLLABUS
(Common to Civil and Chemical Engg.).

Unit-I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance Drawing Instruments and their Use – BIS Conventions in drawing and Lettering.
Curves used in practice:
  a) Conic sections including the Rectangular Hyperbola
  b)   Cycloid, Epicycloid and Hypocycloid –Normals and Tangents
  c) Involute of a circle –Normals and Tangents
Principles of orthographic projection, I and III angle projections –Conventions –Projections of points.

Unit –II

Projection of lines inclined to both planes –traces, Projection of plane figures inclined to both planes.

Unit –III

Projection of simple solids inclined to both planes.

Unit –IV

Sections and Developments: Sections and Sectional views of Regular solids –Prism, Cylinder, Pyramid, Cone – True shapes.

Unit –V

Isometric projections: Principles of pictorial representations-Isometric projection- Isometric scale-Isometric views- conventions- Isometric views of plane figures, solids-Isometric projection of objects with non isometric lines-Isometric projection of spherical parts.

TEXT BOOKS:
  1. Engineering Drawing, N.D. Bhat, Charotar Publishers
  2. Engineering Drawing, K.L. Narayana& P. Kannaih, Scitech Publishers, Chennai.

REFERENCES:
1. Engineering Drawing, Johle, Tata McGraw-Hill Publishers.
2. Engineering Drawing, Shah and Rana,2/e, Pearson Education
3. Engineering Drawing and Graphics, Venugopal/New age Publishers
4. Engineering Graphics, John&john.

Method of Evaluation:
The distribution shall be 40 marks for Internal Evaluation and 60 marks for the External Evaluation.
 Internal mid examination for 30 marks and internal assessment for 10 marks shall be awarded for internal evaluation.

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I B. Tech –II-SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A22301	**ELECTRICAL & MECHANICAL TECHNOLOGY**	2	2	-	3

PART – A
ELECTRICAL TECHNOLOGY

Course Objectives:
           To make the students learn about:

1	The basics of AC & DC Circuits, DC generators & motors.
2	The construction and operation of Transformers, Induction motors and their performance aspects will be studied.

Course Outcomes:

After completing the course, the student should be able to :

CO1	Analyze the basics of AC & DC Circuits and know the performance characteristics of DC generators & motors.
CO2	Gets a thorough knowledge on Transformers, Induction motors & Alternators with which he/she can able to apply the above conceptual things to real-world problems and applications.

UNIT – I   Introduction to DC & AC Circuits
Ohm's Law, Basic Circuit Components, Kirchhoff's Laws, Types of Sources, Resistive Networks, Series Parallel Circuits, Star Delta and Delta Star Transformation. Principle of AC Voltages, Waveforms and Basic Definitions, Root Mean Square and Average Values of Alternating Currents and Voltage, Form Factor and Peak Factor, Phasor Representation of Alternating Quantities, The J Operator and Phasor Algebra, Analysis of Ac Circuits With Single Basic Network Element, Single Phase Series.

UNIT-II   DC Machines
D.C Generators: Principle of Operation of Dc Machines, Types of D.C Generators, E.M.F Equation in D.C Generator, O.C.C. of a D.C. Shunt Generator
D.C Motors: Principle of Operation of Dc Motors, Types of D.C Motors, Torque Equation, Losses and Efficiency Calculation in D.C Motor- Swinburne's Test

UNIT-III   AC Machines
Transformers: Principles of Operation, Constructional Details, Losses and Efficiency, Regulation of Transformer, Testing: OC & SC Tests.
Three Phase Induction Motors: Principle of Operation, Slip and Rotor Frequency, Torque (Simple Problems).
Alternators: Principle of Operation-Constructional Details-EMF Equation-Voltage Regulation by Synchronous Impedance Method.

TEXT BOOKS:
1. Basic Electrical Engineering - By M.S.Naidu and S. Kamakshiah – TMH.

2. Basic Electrical Engineering –By T.K.Nagasarkar and M.S. Sukhija Oxford University Press.
3. Electrical and Electronic Technology-By Hughes – Pearson Education.
REFERENCES:
1. Theory and Problems of Basic Electrical Engineering by D.P.Kothari & I.J. Nagrath PHI.
2. Principles of Electrical Engineering by V.K Mehta, S.Chand Publications.
3. Fundamentals of Electrical Electronics Engineering by T.Thyagarajan, SCITECH Publications 5th Edition-2007

PART – B
MECHANICAL TECHNOLOGY
UNIT – I
WELDING PROCESSES: Introduction to welding classification of welding processes, Oxyacetylene welding – equipment, welding fluxes and filler rods, Gas cutting, Introduction to are welding – Manual metal are welding. Submerged are welding, TIG and MIG processes, soldering and brazing Importance, comparison and applications.
UNIT - II
Description and working of steam engines and steam turbines (Prime movers) – impulse and Reaction turbines. Description and working of I.C. Engines – 4 stroke and 2 stroke engines – comparison – Gas Turbines – Closed and open type gas turbines.
Reciprocating Air compressors – description and working of single stage and multistage reciprocating air compressors – inter cooling. Transmission of power; Belt, Rope, Chain and gear drive-simple problems.
UNIT - III
Block diagram of a vapour compression refrigeration system. Names of common refrigerates. Basic principles of air-conditioning. Room and General air conditioning systems Ducting – Different types of ventilation system. Earth moving machinery and Mechanical handling equipment – bull dozers – power showels – Excavators – concrete mixer – Belt and bucket conveyers.

TEXT BOOKS :
1.   Mechanical Technology by Khurmi.
2.   Mechanical Technology by Kodandaraman C.P.

Subject Code	Title of the Subject	L	T	P	C
17A20101	**STRENGTH OF MATERIALS – I**	2	2	--	3

OBJECTIVE: *The subject provide the knowledge of simple stress strains flexural stresses in members, shear stresses and deflection in beams so that the concepts can be applied to the Engineering problems.*

UNIT – I

SIMPLE STRESSES AND STRAINS : – Deformable bodies **-** 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.

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, uniformly distributed load uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

FLEXURAL STRESSES : Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/y = E/R$ – Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I,T,Angle and Channel sections – Design of simple beam sections.

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

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-deflections of propped cantilevers for simple loading cases.

UNIT – V

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

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

TEXT BOOKS :

(1) Mechanics of Materials – Dr.B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications.
(2) Strength of Materials by R.K Rajput, S.Chand & Company Ltd.
(3) Strength of Materials by B.S.Basavarajaiah, Universities Press, Hyderabad.
(4) Strength of materials by Timoshenko , PHI Publications

REFERENCES:
1. Strength of Materials by Ghosh & Datta, New Age Pubilishers
2. Strength of Materials by Dr.R.K.Bansal, Lakshmi Publications.
3. Strength of Materials by S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.

Outcome :
(1) The students would be able to understand the behavior of materials under different stress and strain conditions.
(2) The students would be able to draw bending moment, shear force diagram, bending stress and shear stress distribution for beams under the different conditions of loading.
(3) The student would be able to apply knowledge to analyse concept of deflection, bending moment and shear force diagram in beams, and columns under various loading conditions using different analysis methods.

Subject Code	Title of the Lab	L	T	P	C
17A20504	**Computer Programming Lab**	-	1	3	2

COURSE OBJECTIVES	
1	To work with the compound data types
2	To explore dynamic memory allocation concepts
3	Able to design the flowchart and algorithm for real world problems
4	Able to write C programs for real world problems using simple and compound data types
5	Employee good programming style, standards and practices during program development

COURSE OUTCOMES	
CO1	Translate algorithms in to programs
CO2	Code and debug programs in C program language using various constructs.
CO3	Formulate problems and implement algorithms in C.
CO4	Able to use different data types in a computer program

LIST OF EXPERIMENTS

Week-1
1) Write a C program to make the following exchange between the variables a-> b -> c->d - > a
2) Write a C program to carry out the arithmetic operations addition, subtraction, multiplication, and division between two variables
3) Write a C program for printing prime numbers between 1 and n.

Week-2
1) Write a C program to construct a multiplication table for a given number.
2) Write a program to reverse the digit of a given integer.
3) Write a C program to find the sum of individual digits of a positive integer.
4) Write a C program to calculate the factorial of a given number

Week-3
1) Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

2) Write a program to calculate tax, given the following conditions:

   a) If income is less than 1,50,000 then no tax.
   b) If taxable income is in the range 1,50,001 – 300,000 then charge 10% tax
   c) If taxable income is in the range 3,00,001 – 500,000 then charge 20% tax
   d) If taxable income is above 5,00,001 then charge 30% tax

Week-4   1)   Write a program to print the calendar for a month given the first Week- day of the month.
Input the first day of the month (Sun=0,Mon=1,Tue=2,Wed=3,.....) :: 3

Total number of days in the month : 31

Expected output

Sun	Mon	Tue	Wed	Thu	Fri	Sat
-	-	-	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
25	26	27	28	29	30	31

2) Write a C program to find the roots of a quadratic equation

Week-5   1)   Write a program to print the Pascal triangle for a given number
2)   Write a C program to find the GCD (greatest common divisor) of two given integers
3)   Write a C program to construct a pyramid of numbers.
4)   Write C code to define a function cash_dispense, which takes an amount as its input, and returns the number of 1000, 500, 100, 50, 20, 10, 5, 2, 1 rupee denomination that make up the given amount

Week-6   1)   Write C code to reverse the contents of the array. For example, [1,2,3,4,5] should become [5,4,3,2,1]
2)   Write a C program that uses functions to perform the following:
i) Addition of Two Matrices

ii) Multiplication of Two Matrices

3)   Write a program that will search and find out the position where the given key element exist in a user chosen array and print it as output.

Week-7   1)   Write C code to compute the frequency table of survey responses given by 20 users. The survey responses range from 1 to 5 and are stored in an array. For example, 10 responses are stored in the array [1,1,5,2,3,3,5,5,2,2]. The frequency table will be as shown below:
a. $1 = 2$
b. $2 = 3$
c. $3 = 2$
d. $4 = 0$
e. $5 = 3$

2)   Write a program to define a function to sort an array of integers in ascending order by using exchange sort.

Week-8   1)   Write a C program to check whether a given string is a palindrome or not, without using any built-in functions.

2) Write a C program to determine if the given string is a palindrome or not by using string functions.
3) Write a function that accepts a string and delete the first character.
4) Write a function that accepts a string and delete all the leading spaces.

Week-9 Write a program to accept a string from user and display number of vowels, consonants, digits and special characters present in each of the words of the given string.

Week-10
1) Write a C program to define a union and structure both having exactly the same numbers using the sizeof operators print the sizeof structure variables as well as union variable
2) Declare a structure *time* that has three fields *hr, min, secs.* Create two variables,*start_time*and*end_time.* Input there values from the user. Then while *start_time* is not equal to *end_time* display GOOD DAY on screen.

Week-11
1) Write a program to read in an array of names and to sort them in alphabetical order. Use sort function that receives pointers to the functions strcmp, and swap, sort in turn should call these functions via the pointers.
2) Write a program to read and display values of an integer array. Allocate space dynamically for the array using the *malloc().*
3) Write a program to calculate area of a triangle using function that has the input parameters as pointers as sides of the triangle.

Week-12
1) Two text files are given with the names text1 and text2. These files have several lines of text. Write a program to merge (first line of text1 followed by first line of text2 and so on until both the files reach the end of the file) the lines of text1 and text2 and write the merged text to a new file text3.
2) Write a program to split a given text file into n parts. Name each part as the name of the original file followed by .part<**n**> where n is the sequence number of the part file.

Reference Books:

1. Computer Science, A Structured Programming Approach Using C by Behrouz A. Forouzan& Richard F. Gilberg, Third Edition, Cengage Learning
2. C Programming A Problem-Solving Approach, Behrouz A. Forouzan& E.V. Prasad, F. Gilberg, Third Edition, Cengage Learning
3. Programming with C RemaTheraja, Oxford
4. "C Test Your Skills", Kamthane, Pearson Education
5. Programming in C: A Practical Approach, Ajay Mittal, Pearson
6. Problem solving with C, M.T.Somasekhara, PHI
7. C Programming with problem solving, J.A. Jones & K. Harrow,Dreamtech Press
8. Programming withc, Byron S Gottfried, Jitender Kumar Chhabra, TMH, 2011

Subject Code	Title of the Lab	L	T	P	C
17A25202	ENGINEERING PHYSICS LABORATORY	--	1	3	2

COURSE OBJECTIVES	
1	The Objective of this course is to make the students gain practical knowledge to correlate with the theoretical studies.
2	To develop practical applications of engineering materials and use of principle in the right way to implement the modern technology.
3	To train engineering students on basis of measurements and the instruments
4	To equip the students with practical knowledge in electronic, optics, and heat experiments

COURSE OUTCOMES	
CO1	On Completion of this course, students are able to – Develop skills to impart practical knowledge in real time solution.
CO2	Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.
CO3	Understand measurement technology, usage of new instruments and real time applications in engineering studies.
CO4	The student will be able to analyze the physical principle involved in the various instruments, also relate the principle to new application.
CO5	The various experiments in the areas of optics, mechanics and thermal physics will nurture the students in all branches of Engineering.

LIST OF EXPERIMENTS

Any TEN of the following experiments has to be performed during the SEMESTER
1. Determination of wavelengths of various colours of mercury spectrum using diffraction grating in normal incidence method
2. Determination of dispersive power of prism
3. Determination of thickness of thin object by wedge method
4. Determination of radius of curvature of lens by Newton's rings
5. Laser : Diffraction due to single slit
6. Laser : Diffraction due to double slit
7. Laser: Determination of wavelength using diffraction grating
8. Determination of Numerical aperture of an optical fiber
9. Meldes experiment: Determination of the frequency of tuning fork
10. Sonometer: Verification of the three laws of stretched strings
11. Energy gap of a material using p-n junction diode
12. Electrical conductivity by four probe method
13. Hall effect: Determination of mobility of charge carriers in semiconductor

14. B-H curve

15. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method

16. Determination of dielectric constant and Curie temperature of a ferroelectric material

Note: Out of 10 experiments, two experiments will be performed using virtual laboratory

Data Books Required: Nil

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I Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Lab	L	T	P	C
17A20102	**STRENGTH OF MATERIALS LAB**	--	1	3	2

OBJECTIVE: *The object of the course to make the student to understand the behavior of materials under different types of loading for different types structures.*

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

II Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A35101	**MATHEMATICAL METHODS**	2	2	--	3

COURSE DESCRIPTION:

Fundamentals of matrix theory;numerical solutions of equations curve fitting; interpolation; numerical differentiation and integration;numerical solutions of ordinary differential equations.

COURSE OBJECTIVES:

CEO 1:To impart basic knowledge on ranks of matrices, systems of linear equations,numerical methods to solve algebraic and transcendental equations,differential equations, numerical differentiation and integration.

CEO 2:To develop skills in analyzing various numerical techniques, designing mathematical models, numerical techniques for engineering problems and fitting of curves toexperimentaldata.

COURSE OUTCOMES: Aftercompletion of the course a successful student is able to

CO 1 :Acquire basic knowledge in
  (a) Finding the rank of matrices and analyzing them.
  (b) Solving algebraic and transcendental equations by various numerical methods.
  (c) Fitting of various types of curves to the experimental data.
  (d) Estimating the missing data through interpolation methods.
  (e) Identification of errors in the experimental data
  (f) Finding the values of derivatives and integrals through various numerical methods.
  (g) Solving differential equations numerically when analytical methods fail to hold.
CO 2 :Develop skills in analyzing the
  (a) Methods of interpolating a given data
  (b) Properties of interpolating polynomials and derive conclusions
  (c) Properties of curves of best fit to the given data
  (d) Algebraic and transcendental equations through their solutions
  (e) Properties of functions through numerical differentiation and integration
  (f) Properties of numerical solutions of differential equations

CO 3 :Develop skills in designing mathematical models for
  (a) Fitting geometrical curves to the given data
  (b) Solving differential equations
  (c) Constructing polynomials to the given data and drawing inferences.

CO 4 :Develop numerical skills in solving the problems involving
- (a) Systems of linear equations
- (b) Fitting of polynomials and different types of equations to the experimental data
- (c) Derivatives and integrals
- (d) Ordinary differential equations

CO 5 : Use relevant numerical techniques for
- (a) Diagonalising the matrices of quadratic forms
- (b) Interpolation of data and fitting interpolation polynomials
- (c) Fitting of different types of curves to experimental data
- (d) Obtaining derivatives of required order for given experimental data

UNIT–I :

MATRIX THEORY (11 periods)
Rank of a matrix, echelon form, normal form, inverse of a matrix by elementary row operations. Solutions of linear system of equations. Eigen values, Eigen vectors and properties,Diagonalization.Quadratic form, reductions to canonical form using orthogonal transformation method and nature of Quadratic forms.

UNIT-II

NUMERICAL SOLUTIONS OF EQUATIONS AND CURVE FITTING (9 periods)
Solutions of Algebraic and Transcendental equations by Regula falsi method, Newton – Raphson's method. Solution of linear simultaneous equation: Crout's triangularisation method, Gauss - Seidal iteration method.Curve fitting by the principle of least squares, fitting of a straight line, parabola and exponential curves.

UNIT- III
INTERPOLATION (7 periods)
Interpolation, difference operators and their relationships, Newton's forward and backward interpolation formulae, Lagrange's interpolation formula. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

UNIT-IV
NUMERICAL DIFFERENTIATION AND INTEGRATION(7 periods)
Numerical differentiation using Newton's forward and backward formulae. Numerical integration using Trapezoidal rule, Simpsons $1/3^{rd}$ rule and $3/8^{th}$ rule.

UNIT- V
NUMERICAL SOLUTIONS OF DIFFERENTIAL EQUATIONS(11 periods)
Numerical solutions of first order Initial value problems using Taylor series method, Euler's, modified Euler's, Runge – Kutta method (4thorder only) and Milne's predictor – corrector method. Numerical solutions of Laplace equation using finite difference approximation.

TEXT BOOKS:
1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Introductory Methods of Numerical Analysis, S.S. Sastry, PHI publisher.

REFERENCES:

1. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.
2. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S. Chand publication.
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
4. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
5. Advanced Engineering Mathematics 3rd Edition, by R.K.Jain & S.R.K.Iyengar, Narosa publishers

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II Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A30101	**STRENGTH OF MATERIALS – II**	3	2	--	4

OBJECTIVE: *Study of the subject provides the understanding of principal stress, strains, springs, columns and structures.*

UNIT – I
PRINCIPAL STRESSES AND STRAINS: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.
THEORIES OF FAILURES: Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.
UNIT – II
THIN CYLINDERS & THICK CYLINDERS : Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – Changes in dia, and volume of thin cylinders – Thin spherical shells.
Introduction Lame's theory for thick cylinders – Derivation of lame's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells.
UNIT – III
TORSION OF CIRCULAR SHAFTS – Theory of pure torsion – Derivation of Torsion equations: – Assumptions made in the theory Theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.
SPRINGS:
Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple –springs in series and parallel – Carriage or leaf springs.
UNIT – IV
COLUMNS AND STRUTS : Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns – assumptions – derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Long columns subjected to eccentric loading – Secant formula – Empirical formulae – Straight line formula – Prof. Perry's formula.
UNIT – V
UNSYMETRICAL BENDING : Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid - Location of neutral axis – Deflection of beams under unsymmetrical bending.

BEAMS CURVED IN PLAN : Introduction – circular beams loaded uniformly and supported on symmetrically placed Columns – Semicircular beam simply-supported on three equally spaced supports.

TEXT BOOKS:

1. A Text book of Strength of materials by R.K.Bansal – Laxmi Publications (P) Ltd., New Delhi.
2. Strength of Materials by S.S. Bhavikatti – Vikas publishers
3. Strength of Materials by R.Subramanian, Oxford University Press.
4. Strength of Materials by D.S. Prakasa rao, University press.

REFERENCES :
1. Mechanics of Structures, by Ghosh& Datta, New Age Pubilishers
2. Strength of Materials by B.C.Punmia.- Laxmi publications
3. Strength of Materials by Schaum's out line series – Mc.Graw hill International Editions.
4. Strength of Materials by S.Ramkrishna and R.Narayan – Dhanpat Rai Publications.
5. Strength of Materials by L.S.Srinath et al., Macmillan India Ltd., Dew Delhi.
Fundamentals of Solid Mechancis by M.L.Gambhir, PHI Learning Pvt. Ltd

Subject Code	Title of the Subject	L	T	P	C
17A30102	**SURVEYING-I**	3	-	--	3

OBJECTIVE: To ensure that the student develops knowledge of the basic and conventional surveying instruments, principles behind them, working of the instruments, plotting of the area from the field measurements, determination of the area and the theory behind curves.

UNIT – I

BASIC CONCEPTS: Surveying – History; Definition; primary divisions, Classification, Principles of surveying Plan and map; Basic Measurements; Instruments and Basic methods; units of measurement, Scales used for Maps and plans, Duties of a surveyor. Errors: Accuracy and Precision Sources and types of errors, theory of Probability, Rounding of numbers.

CHAIN SURVEYING: Instruments for chaining, Ranging out, chaining a line on a flat ground; Chaining on an uneven or a sloping ground; Chain & Tape corrections; Degree of accuracy. Principles of chain surveying; Basic definitions; Well-Conditioned Triangle, Field book, Field work; Offsets, Cross Staff survey; obstacles in chain survey-problems, Conventional signs.

UNIT-II

COMPASS SURVEY: Introduction, Bearings and angles, Designation of bearings, Conversion of bearings from one system to the other, fore bearing and back bearing, , Calculation of bearing from angles, Theory of Magnetic compass (i.e. Prismatic compass), Temporary adjustments of compass-Magnetic Declination, Local attraction-Related Problems-Errors in compass survey.

PLANE TABLE SURVEYING: Introduction, Accessories, Working operations, Methods of plane tabling, Three point problem-Mechanical method -Graphical method, Two point problem, Errors in plane tabling.

UNIT-III

LEVELLING: Introduction, basic definitions, methods of leveling, leveling instruments: dumpy level, levelling staff, Temporary adjustments of dumpy level, theory of simple and differential leveling, Level field book, Classification of direct leveling methods, Reciprocal leveling, Profile leveling and Cross sectioning, Curvature and Refraction, Difficulties in leveling, errors in leveling, Degree of Precision.

CONTOURING: Introduction, contour interval, Characteristics of contours Methods of locating contours - Direct and indirect methods; Interpolation and sketching of contours, Contour gradient-Uses of contour maps.

UNIT-IV

THEODOLITE: Vernier Theodolite: Basic definitions; Fundamental lines and desired relations; Temporary adjustments; Measurement of a horizontal angle; Repetition and Reiteration methods of horizontal angle measurement. Measurement of vertical angle; Sources of errors in Theodolite survey.

TRAVERSE SURVEYING: Introduction, Selection and marking of traverse stations,methods of traversing, traversing by free needle and fast needle method, traversing by direct observation of angles, checks in closed traverse, closing error, methods of balancing the traverse, Gale's traverse table, Omitted measurements.

UNIT-V

COMPUTATION OF AREAS AND VOLUMES: methods of determining areas, areas by sub-division into triangles, areas from offsets to a base line: regular and irregular intervals, area

by double meridian distances, area by co-ordinates. embankments and cutting for a level section, two level sections, three level section and multi level section, volume of earth work from contour plan, capacity of a reservoir , volume of barrow pits.

MINOR INSTRUMENTS: uses and working of the minor instruments: hand level, line ranger, optical square, abney level, clinometers, pantagraph, sextant and planimeter.

TEXT BOOKS:
(1) Surveying (Vol – 1,2 &3), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) Ltd., New Delhi
(2) Text book of surveying by C.Venkataramaiah, Universities Press.
(3) Advanced Surveying by SatheeshGopi, R.Shanta Kumar and N.Madhu, Pearson education.

REFERENCES:
(1) Chandra AM, "Plane Surveying", New age International PVt.Ltd., Publishers, New Delhi, 2002
(2) Duggal S.K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co.Ltd. New Delhi, 2004.
(3) Arora K R "Surveying (Vol-1 & 2), Standard Book House, Delhi, 2004
(4) Surveying and Levelling by Kanetkar T.P., and Kulkarni, Vols. I and II, United Book Corporation, Pune, 1994
(5) Surveying and leveling by R.Subramaniah, Oxford university press, New Delhi.
(6) Surveying by Mimi Das Saikia, PHIPubilications.

II Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A30103	**FLUID MECHANICS**	3	2	--	4

OBJECTIVE: This subject introduces the basic concepts of fluids, their behavioural properties, analyzing the fluid flows using primary equations. This subject further deals with various flow measuring devices and concepts of boundary layer flows.

UNIT – I
INTRODUCTION: Dimensions and units – physical properties of fluids, specific gravity, viscosity, surface tension and capillarity, vapor pressure and their influences on fluid motion. Newtonian and non Newtonian fluids.Fluid Pressure at a Point; Pascal's law, Hydrostatic law, Atmospheric, Absolute and gauge pressure; Hydrostatic paradox, Pressure measurement manometers; Simple, differential and Micro Manometers
HYDROSTATIC FORCES ON SURFACES: Total Pressure and Centre of Pressure: on Horizontal Plane Surface; Vertical Plane Surface; Inclined Plane Surface and Curved Surfaces.
UNIT-II
BUOYANCY: Buoyancy; Buoyant Force and Centre of Buoyancy, Stability of submerged bodies and floating bodies; Metacentre and metacentric height, analytical method for metacentric height.
KINEMATICS OF FLUID MOTION: Methods of describing fluid motion; Classification of flow; Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; Three, two and one dimensional flows; Irrotational and rotational flows; Streamline; Pathline; Streakline; Equation for acceleration; Convective acceleration; Local acceleration; Continuity equation; Velocity potential and stream function; Flownet; Vortex flow – free vortex and forced vertex flow.
UNIT-III
DYNAMICS OF FLUID FLOW: Forces acting on a Fluid in Motion; Euler's equation of motion; .Bernoulli's equation ; Energy correction factor; Momentum principle; Force exerted on a pipe bend.
FLOW MEASUREMENTS IN PIPES: Discharge through Venturi Meter; Discharge through Orifice Meter; Discharge through flow nozzle; Measurement of velocity by Pitot tube,pitot-static tube.

UNIT-IV
FLOWTHROUGH ORIFICES AND MOUTHPIECES: Flow through Orifices: Classification of Orifices; Determination of coefficients for an Orifice Flow through large rectangular Orifice; Flow through submerged Orifice – fully sub-merged and Partially sub-merged. Classification of Mouthpieces; Flow through external and internal cylindrical Mouthpiece
FLOW OVER NOTCHES & WEIRS: Classification of Notches and Weirs; Flow through rectangular, triangular and trapezoidal notches and weirs; End contractions; Velocity of approach; Cipolletti weir, Broad crested weir.
UNIT-V
ANALYSIS OF PIPE FLOW: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length;

Hydraulic power transmission through a pipe; Siphon; Pipes in series, parallel & branched pipes.

LAMINAR & TURBULENT FLOW IN PIPES: Reynolds's experiment; Characteristics of laminar flow; Steady laminar flow through a circular pipe(Hazen poiseuille equation). Characteristics of turbulent flow, Prandtl's mixing length theory, Hydro dynamically smooth and rough boundaries, Velocity distribution, Friction factor for pipe flow.

TEXT BOOKS:
(1) Fluid Mechanics by Modi and Seth, Standard book house.
(2) A text of Fluid mechanics and hydraulic machines by Dr.R.k.Bansal – Laxmi Publications (P) Ltd., New Delhi.
(3) Fluid Mechanics and Machinery by D.RamaDurgaiah, New Age International.

REFERENCES:
(1) Fluid Mechanics and Machinery, CSP Ojha, Oxford Higher Education
(2) Fluid mechanics and machinery by Garde, New Age Pubilishers.
(3) Theory and applications of fluid mechanics by K.Subramanyam, TMH Pubilications, New Delhi.
(4) Principles of Fluid Mechanics and Fluid Machines by M.Narayana Pillai, Universities Press.
(5) Introduction to Fluid Machines by S.K.Som&G.Biswas .Tata Mc.Grawhill publishers PVt.Ltd.
(6) Fluid Mechanics by A.K.Mohanty, Prentice Hall of India PVt.Ltd., New Delhi.

II Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A30104	**BUILDING MATERIALS AND CONSTRUCTION**	3	-	--	3

OBJECTIVES: To give the students a basic idea about the traditional and modern construction materials a brief knowledge on building components and its construction methodologies.

UNIT – I
INTRODUCTION TO BUILDING MATERIALS
Traditional & Organic Building Materials – Stone – Dressing of Stones – Modern Building Materials – Bricks – Manufacturing process – Ceramic Products – Manufacturing Process – Building Materials for Low Cost Housing – Utilisation of Wastes for Alternative Building Materials –Sustainable Materials in Construction –National Standards.

UNIT – II
GLASS:
Introduction – Functions of Glass in Buildings – Constituents and Classification of Glass – Manufacturing Process –Properties of Glass – Common Types of Glass – Special Glass – Advantages and Disadvantages of Glass – National Standards.

PLASTIC:
Introduction – Polymerisation – Classification of Plastics – Commonly Used Plastics – Moulding and Fabricating for Plastic Products – Applications – Advantages – Disadvantages – Intelligent Use of Plastics in Buildings – National Standards.

UNIT – III
INSULATING MATERILAS
Thermal Insulating Materials: Introduction – Thermal Insulation – Heat Transfer Fundamentals – Thermal Properties of Insulating Materials – Selection of Insulating Materials – Classification of Insulation materials – Reflective Insulation Systems – Commonly Used Building Insulation Materials – Insulation that Should not be Used – National Standards.
Sound Insulating Materials: Introduction – Basics of Acoustics – Sound Absorption or Insulation – Green Insulation – National Standards.

UNIT – IV
STRUCTURAL COMPONENTS:–
Foundations – classification of Foundations – consideration in selection of foundation types – Masonry – Brick and block walls – Cavity walls – Damp–proof courses and membranes – Mortars – Arches and openings – Windows – Glass and glazing –Doors – Stairs – Types and Applications – Cladding to external walls – Flat roofs – Dormer windows – Formwork & Scaffolding – Precast concrete frames – Portal frames – Types – components – Framed structures – Components – Construction Procedure – Panel walls – National Standards.

UNIT – V
INTERNAL CONSTRUCTION AND FINISHES
Internal elements – Internal walls – Construction joints – Internal walls, fire protection – separating walls – Partitions – Plasters and plastering – Domestic floors and finishes – Sound insulation – Timber, concrete and metal stairs–Internal doors – Door sets – Fire resisting doors – Plasterboard ceilings – Suspended ceilings –Paints and painting – Components of Paints – Types of Paint – Considerations in Selecting Paints – Cement Paints – Oil Paints –Emulsion

Paints – Whitewash and Colourwash – Application of Paints –Distempers – Varnishes – Safety –Joinery production – Composite boarding – National Standards.

TEXT BOOKS:
1. Building Material by S K Duggal – New Age International Publishers; Second Edition
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi
3. A Textbook on Building Construction by S.K.Sharma, S.Chand Pubilishers.
4. Building Materials by M.L.Gambhir, TMH Pubilishers.

REFERENCES:
1. Building construction by W.B.Mckay, Vol.I, II, III & IV Pearson Publications, 2013 edition.
2. R.Chudly "Construction Technology "– Volumes I and II" 2nd Edition, Longman, UK, 1987.
3. Building materials by S.C.Rangawala, Charotar Pubilishing House, Anand- INDIA.
4. Building Construction by S.C.Rangawala, Charotar Pubilishing House, Anand- INDIA
5. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.
6. Building materials by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi

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II Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A39901	**HUMAN VALUES & PROFESSIONAL ETHICS (AUDIT)**	2	-	--	-

OBJECTIVE
• To create an awareness on Engineering Ethics and Human Values.
• To instill Moral and Social Values and Loyalty
• To appreciate the rights of Others

Students will be able to:
- identify and analyze an ethical issue in the subject matter under investigation or in a relevant field
- identify the multiple ethical interests at stake in a real-world situation or practice
- articulate what makes a particular course of action ethically defensible
- assess their own ethical values and the social context of problems
- identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects
- demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work
- integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research

Unit I: HUMAN VALUES
Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty - Courage- Co Operation – Commitment – Empathy –Self Confidence Character – Spirituality.

Unit II: ENGINEERING ETHICS
Senses of 'Engineering Ethics- Variety of moral issued – Types of inquiry – Moral dilemmas – Moral autonomy –Kohlberg's theory- Gilligan's theory- Consensus and controversy – Models of professional roles- Theories about right action- Self interest - Customs and religion –Uses of Ethical theories – Valuing time –Co operation – Commitment.

Unit III :ENGINEERING AS SOCIAL EXPERIMENTATION
Engineering As Social Experimentation – Framing the problem – Determining the facts – Codes of Ethics – Clarifying Concepts – Application issues – Common Ground - General Principles – Utilitarian thinking respect for persons.

UNIT IV: ENGINEERS RESPONSIBILITY FOR SAFETY AND RISK
Safety and risk – Assessment of safety and risk – Risk benefit analysis and reducing risk- Safety and the Engineer- Designing for the safety- Intellectual Property rights(IPR).

UINIT V: GLOBAL ISSUES
Globalization – Cross culture issues- Environmental Ethics – Computer Ethics – Computers as the instrument of Unethical behavior – Computers as the object of Unethical acts – Autonomous Computers- Computer codes of Ethics – Weapons Development - Ethics and Research – Analyzing Ethical Problems in research – Intellectual property Rights(IPR).

Text Books

1. "Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
2. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.
3. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill– 2003.
4. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications.
5. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi   Publications.
6. "Professional Ethics and Human Values" by Prof.D.R.Kiran
7. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication

II Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A30105	**SURVEYING LAB - I**	-	1	3	2

OBJECTIVE: *To impart the practical knowledge in the field, it is essential to introduce in curriculum. Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.*

LIST OF EXERCISES:

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

II Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A35104	**EXPLORATORY DATA ANALYSIS LAB**	-	1	3	2

COURSE DESCRIPTION: Statistical and Numerical Techniques – Measures of central tendency/dispersion, Curve fitting by method of least squares, linear regression and correlation, ANOVA; Data analysis using R, Numerical Solution of algebraic, transcendental and ordinary differential equations, Inverse and Eigen values of a matrix – Numerical method.

CEO 1: To impart knowledge on the application of Statistical and Numerical techniques – analysis of data, solution of algebraic, transcendental and differential equations, Matrices, transformation from time domain to frequency domain.

CEO 2: To develop skills in analyzing the data using appropriate statistical tools, solving algebraic and differential equations, matrices using appropriate numerical methods, obtaining amplitude and frequency of a time signal

COURSE OUTCOMES: After completion of the course, a successful student is able to

CO 1 : Develop skills in designing appropriate statistical method for
     (a) Determining the measures of central tendency/dispersion.
     (b) Box plot representation using Origin Software.
     (c) Finding a best fit curve to a given set of data.
     (d) Determining the coefficient of correlation and linear regression.

CO 2 : Develop skills in using suitable statistical technique for
     (a) Analyzing variance (ANOVA) for one variable.
     (b) Determination of R function for a given set of data and appropriate interpretation.
     (c) Representing three dimensional data in contour plot using MATLAB.

CO 3 : Transform a time signal/pulse to a frequency domain using concepts of Fourier series

CO 4 : Develop skills using suitable numerical technique for
     (a) Solving algebraic, transcendental and differential equations.
     (b) Determining Eigen Values and dominant Eigen value of a matrix.
     (c) Differentiation, integration and solution of differential equations.

LIST OF EXPERIMENTS

Required softwares: ORIGIN, MATLAB, R-LAB.

I. Statistical and Fourier series Techniques:

    To a given set of data:

1. Determine measures of central tendency/dispersion - Mean, Median, Mode, Range and Variance;
   Box plot representation using Origin Software.
2. Fit a straight line, parabola, exponential curve.
3. Determine the coefficient of correlation and regression.
4. Analysis of variance (ANOVA) for one variable.
5. Determine R function and give interpretation.

6. Transforming signal in time domain into frequency domain.
7. Represent in contour plot using matlab.

II. Numerical Techniques:
8. Solving algebraic and transcendental equations using Regula - Falsi and Newton - Raphson methods.
9. Determine the inverse of a matrix; solving system of algebraic equations using Gauss-Siedal method.
10. Determine the Eigen values of a matrix and dominant Eigen value by power method.
11. Numerical differentiation and integration.
12. Numerical solution of Ordinary differential equations - Modified Euler method & R-K fourth order
    method.

II Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A45401	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**	3	-	-	3

Course Objectives: The objective of this course is to equip the student with the basic inputs of Managerial Economics and Economic Environment of business and to impart analytical skills in helping them take sound financial decisions for achieving higher organizational productivity.

Unit I: INTRODUCTION TO MANAGERIAL ECONOMICS

Managerial Economics – Definition- Nature- Scope - Contemporary importance of Managerial Economics - Demand Analysis: Concept of Demand-Demand Function -   Law of Demand - Elasticity of Demand- Significance - Types of Elasticity - Measurement of elasticity of demand - Demand Forecasting- factors governing demand forecasting- methods of demand forecasting -Relationship of Managerial Economics with Financial Accounting and Management.

UNIT II: THEORY OF PRODUCTION AND COST ANALYSIS

Production Function- Least cost combination- Short-run and Long- run production function- Isoquants and Isocosts, MRTS - Cobb-Douglas production function - Laws of returns - Internal and External economies of scale - **Cost Analysis**: Cost concepts and cost behavior- Break-Even Analysis (BEA) -Determination of Break Even Point (Simple Problems)-Managerial significance and limitations of Break- Even Point.

UNIT   III: INTRODUCTION   TO   MARKETS   AND   NEW   ECONOMIC ENVIRONMENT

Market structures: Types of Markets - Perfect and Imperfect Competition - Features of Perfect   Competition-   Monopoly-Monopolistic   Competition-Oligopoly-Price-Output Determination - Pricing Methods and Strategies-Forms of Business Organizations- Sole Proprietorship- Partnership – Joint Stock Companies - Public Sector Enterprises – New Economic Environment- Economic Liberalization – Privatization - Globalization.

UNIT IV: CAPITAL AND CAPITAL BUDGETING

Concept of Capital - Over and Undercapitalization – Remedial Measures - Sources of Shot term and Long term Capital - Estimating Working Capital Requirements – Capital Budgeting – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting

Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

UNIT V: INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Financial Accounting – Concept - Emerging need and Importance - Double-Entry Book Keeping- Journal - Ledger – Trial Balance - Financial Statements - Trading Account – Profit & Loss Account – Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

The students are required to submit any one of the following- two assignments/ a mini project/submission of any two case studies in the subject.

Learning Outcome: After completion of this course, the student will able to understand various aspects of Managerial Economics and analysis of financial statements and inputs therein will help them to make sound and effective decisions under different economic environment and market situations.

TEXT BOOKS:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2013.
2. Ahuja H.L Managerial economics. S.Chand, 3/e, 2013
3.

REFERENCES

1. Aryasri: Managerial Economics and Financial Analysis, 4/e, TMH, 2013

2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International,. 2013.

3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.

4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage,

 2013.

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II Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A45101	PROBABILITY AND STATISTICS	2	2	0	3

COURSE DESCRIPTION: Random variables; mathematical expectations; probability distributions; correlation and regressions; statistical quality control; sampling distributions; tests for small and large samples and their significances.

COURSE OBJECTIVES:

CEO 1: To impart knowledge on random variables, probability distributions, sampling theory,statistical quality control and Queing models.

CEO 2: To develop skills in analyzing the data designing of statistical models, skills' in mathematical expectations, probability distributions, testing of hypothesis, significance, statistical quality control for problems in engineering.

COURSE OUTCOMES: After completion of the course, a successful student is able to:

CO 1: Acquire basic knowledge in
- (a) Probability distributions, correlation and regressions
- (b) Statistical quality control and testing of hypotheses
- (c) Simple linear regression
- (d) Tests of significance for small and large samples

CO 2: Develop skills for analyzing the data with
- (a) Mathematical expectations for realistic results
- (b) Probability distributions for practical situations.
- (c) Control charts of statistical quality control
- (d) Correlation and regression concepts
- (e) Suitable tests of significance for practical situations.

CO3: Develop skills in designing
- (a) Probability distributions
- (b) Limitations of statistical quality control
- (c) control charts,
- (d) X, R, np, and c charts

CO 4: Develop analytical skills forsolvingproblems involving
- (a) Probability distributions, means,variances and standard deviations
- (b) Statistical techniques employed for quality
- (c) Sampling techniques for decision making
- (d) Tests of significances for small and large samples

CO 5 : Use relevant probability and statistical techniques for
- (a) Mathematical expectations of desired results

(b) Fitting probability distributions for experimental data.
(c) Quality control and testing of hypothesis.
(d) Formation of queues and their properties.

UNIT - I:
Random variable and Distributions(9 periods)
Random Variables: Discrete and Continuous random variables, Distribution function of random variable, Properties, Probability mass function, Probability density function, Mathematical Expectation-Mean and Variance. Distribution functions. Binomial and poison distributions Normal distribution – correlation and linear regressions- Related properties.

UNIT – II

Testing of Hypothesis and Large Samples(9 periods)

Test of Hypothesis: Population and Sample - Statistical hypothesis - Null and Alternative Hypothesis, Type I and II errors, Level of Significance, Critical region, Degrees of freedom.Test of significance - Test of Significance for Single Proportion, Difference of Proportions, Single Mean, Difference of Means.

UNIT – III

Small Sample Tests(9 periods)

Small samples - t- test for one sample and two sample problem and paired t-test, F-test and Chi-square test for testing of goodness of fit. Contingency table, Chi-Square Test for Independence of Attributes.

UNIT – IV

Statistical quality control (9 periods)

Statistical Quality Control: Concept of quality of a manufactured product -Defects and Defectives - Causes of variations - Random and assignable - The principle of Shewhart Control Chart-Charts for attribute and variable quality characteristics- Constructions and operation of $\overline{X}$ - Chart, R-Chart,

p - Chart and C-Chart.

UNIT – V

Queuing Theory (9 periods)

Queuing Theory: Pure Birth and Death process, M/M/1 & M/M/S & their related simple problems.

TEXT BOOKS:
1. Probability & Statistics by E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.
2. Probability & Statistics for engineers by Dr. J. Ravichandran WILEY-INDIA publishers.

REFERENCES:
1. Probability & Statistics by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publications.
2. Statistical methods by S.P. Gupta, S.Chand publications.
3. Probability & Statistics for Science and Engineering by G.Shanker Rao, Universities Press.
4. Probability and Statistics for Engineering and Sciences by Jay L.Devore, CENGAGE.
5. Probability and Statistics by R.A. Jhonson and Gupta C.B.
6. Fundamentals of Statistics. 7th Revived Edition by S.C Gupta, Himalaya Publishing House.

II Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A40101	**HYDRAULICS AND HYRAULIC MACHINERY**	2	2	-	3

OBJECTIVE: The main objective of this course is to deal with the concepts of flow through open channels and their applications and the principles of hydraulic machines and hydraulic models.

UNIT – 1

OPEN CHANNEL FLOW-UNIFORM FLOW: Introduction, Classification of flows, Types of channels; Flow analysis: The Chezy equation, Empirical formulae for the Chezy constant, Hydraulically efficient channel sections: Rectangular, Trapezoidal, Triangular and Circular channels; Velocity distribution; Energy and momentum correction factors. Application of Bernoulli's equation to open channel flow.

OPEN CHANNEL FLOW- NON – UNIFORM FLOW: Concept of specific energy; Specific energy curves; Critical flow; Critical flow in a rectangular channel; Critical slope; discharge curve, Different slope conditions; Channel transitions- Reduction in width of a rectangular channel, Raised bottom in a rectangular channel, venture flume, Momentum principle applied to open channel flow; Specific force; Specific force curve.

UNIT – II

OPEN CHANNEL FLOW- GRADUALLY VARIED FLOW: Introduction, Dynamic equation; Dynamic equation for GVF in wide Rectangular channel, classification of channel bottom slopes, Surface Profiles; Characteristics of surface profiles, Back water Curves and Draw down curves; Examples of various types of water surface profiles; Control section, Computation of surface profiles by single step method.

OPEN CHANNEL FLOW- RAPIDLY VARIED FLOW: Hydraulic jump; Elements and characteristics of hydraulic jump; Hydraulic jump in rectangular channels, height and length of the jump, Energy loss in a hydraulic jump, Types of hydraulic jump; applications of hydraulic jump; Location of hydraulic jump,.

UNIT – III

IMPACT OF JETS: 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, Torque and head transferred in roto dynamic machines.

HYDRAULIC TURBINES-I: Introduction, head and efficiencies of hydraulic turbines, Classification of turbines; pelton wheel: parts, Velocity triangles, work done and efficiency,

working proportions, design of pelton wheel. Radial flow reaction turbines: velocity triangles and work done for inward radial flow turbine, degree of reaction, discharge, speed ratio, flow ratio.

UNIT – IV

HYDRAULIC TURBINES-II: Francis turbine: main components and working, work done and efficiencies, design proportions; design of Francis turbine runner. Kaplan turbine: main components and working, working proportions. Draft tube: theory and efficiency; specific speed, unit quantities, characteristic curves of hydraulic turbines. Cavitation: causes, effects.

CENTRIFUGAL PUMPS: Introduction, component parts and working of a centrifugal pump, work done by the impeller; heads, losses and efficiencies; minimum starting speed; Priming ;specific speed; limitation of suction lift, net positive suction head(NPSH);Performance and characteristic curves; Cavitation effects ;Multistage centrifugal pumps; troubles and remedies.

UNIT – V

DIMENSIONAL ANALYSIS AND SIMILITUDE: Introduction, dimensions; Dimensional homogeneity; Methods of dimensional analysis- Rayleigh's method; Buckingham – Pi theorem; model analysis; similitude-types of similarities; Dimensionless numbers; Model laws ;Partially submerged objects; types of models; Scale effect.

BOUNDARY LAYER THEORY& DRAG AND LIFT: Boundary layer – concepts, Prandtl's contribution, Characteristics of boundary layer along a thin flat plate, laminar and turbulent Boundary layers, separation of BL. expression for drag and lift; Lift and Drag Coefficients; pressure drag and friction drag; Streamlined and bluff bodies.

TEXT BOOKS :

(1) Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, Standard book house.
(2) A text of Fluid mechanics and hydraulic machines by Dr.R.K.Bansal – Laxmi Publications (P) Ltd., New Delhi.

REFERENCES :

(1) Fluid Mechanics & Fluid Machines by Narayana Pillai, universities press.
(2) Open channel flow by srinivasan, Oxford University Press
(3) Fluid Mechanics And Machenary-Kothandaraman, New Age Pubilishers
(4) Open Channel flow by K.Subramanya.Tata Mc.Grawhill Publishers.
(5) Elements of Open channel flow by Ranga Raju, Tata MC.Graw Hill, Publications.
(6) Fluid mechanics and fluid machines by Rajput, S.Chand & Co.
(7) Open Channel flow by V.T.Chow, Mc.Graw Hill book company
(8) Hydraulic Machines by Banga & Sharma Khanna Publishers.
(9) Fluid Mechanics & Fluid Power Engineering by D.S. Kumar Kataria & Sons.

II Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A40102	**STRUCTURAL ANALYSIS – I**	2	2	-	3

OBJECTIVE: To make the students to understand the principles of analysis of structures of static and moving loads by various methods.

UNIT – I

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.

UNIT – II

ANALYSIS OF INDETERMINATE STRUCTURES : Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with upto two degrees of internal and external indeterminacies – Castigliano's theorem..

UNIT – III

FIXED BEAMS & CONTINUOUS BEAMS : Introduction to statically indeterminate beams with uniformly distributed 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 effect of sinking of support, effect of rotation of a support.

UNIT – IV

SLOPE-DEFLECTION: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports- Analysis of single bay, single storey, portal frame including side sway .

UNIT – V

MOMENT DISTRIBUTION METHOD Introduction to moment distribution method-application to continuous beams with and without settlement of supports. Analysis of single storey portal frames – including Sway

TEXT BOOKS :

   (1) Analysis of Structures – Vol-I&II by V.N.Vazirani & M.M.Ratwani, Khanna Publications, New Delhi.
   (2) Structural Analysis by S S Bhavikatti – Vikas Publishing House.

(3) Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi.

REFERENCES :

(1) Structural analysis – Hibbler – Pearson education
(2) Introduction to structural analysis by B.D.Nautiyal, New Age international publishers, New Delhi.
(3) Structural Analysis – D.S.Prakasa rao - Univeristy press.
(4) Introduction To Structural Analysis-Nautial- New Age Pubilishers
(5) Strength of Materials and Mechanics of Structures by B.C.Punmia, Khanna Publications, NewDelhi.
(6) Structual analysis Vol.I and II by Dr. R.Vaidyanathan and Dr.P Perumal – Laxmi publications.
(7) Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.

Subject Code	Title of the Subject	L	T	P	C
17A40103	**SURVEYING – II**	3	-	-	3

OBJECTIVE: To ensure that the student develops knowledge in the working of advanced instruments, setting out of curves from the field measurements and basic knowledge on remote sensing

UNIT-I

TRIGONOMETRIC LEVELLING : Introduction; Determination of the level of the top of an object, When its base is accessible and When its base is not accessible; Determination of the height of the object when the two instrument stations are not in the same vertical plane; Axis signal correction; Difference in elevation by single observation and reciprocal observations.

UNIT-II

TACHEOMETRIC SURVEYING: Definition, Advantages of Tacheometric surveying-Basic systems of tacheometric measurement , Principle of stadia measurements, Determination of constants K and C, Inclined sight with staff vertical; Inclined sight with staff normal to the line of sight, Movable hair method, Tangential method, Subtanse bar, Errors in Tacheometry.

UNIT-III

TRIANGULATION: Principles of triangulation, Uses of triangulation survey; Classification of triangulation; operations of triangulation survey; Signals and towers, Satellite station; Base line & Extension of the base line.

SETTING OUT WORKS: Introduction, Control stations; Horizontal control; Reference grid; Vertical control; Positioning of a structure; offset pegs, Setting out a foundation: reference pillars, batter boards, Setting out with a theodolite; Graded stakes; setting out a sewer; Setting out a culvert.

UNIT-IV

CURVES: Simple curves–Definitions and Notations, designation of a curve, Elements of simple curves, location of tangent points, selection of peg interval, Methods of setting simple curves(based on equipment) – Rankines method,Two theodolite method. Compound curves – Elements of compound curve, setting out compound curve. Reverse curves – Elements of reverse curve, relationship between various elements.

UNIT-V

ELECTRONIC DISTANCE MEASUREMENTS: Introduction, Basic concepts-electromagnetic waves, basic definitions, phase of the wave ,units, types of waves; distance from measurement of transit time, Computing the distance from the phase differences, , EDM

instruments, electronic theodolites, total station-models, fundamental measurements, recording, traversing, data retrieval.

REMOTE SENSING: Introduction, Principle of Remote sensing, EM Radiation and the atmosphere, interaction of EM radiation with earth's surface, remote sensing observation platforms, sensors, applications of remote sensing. Geographical Information System: Introduction and principle of Geographical Information System,components of GIS, applications.

TEXT BOOKS:

1. Surveying Vol. 1 & II by Dr. K. R. Arora; Standard Book House;

2. Surveying Vol-I&II by B.C. Punmia ,Laxmi Publications

3. Higher Surveying by Chandra, New age Pubilishers

REFERENCE BOOKS:

1. Surveying Vol. 1and 2 – By S.K. Duggal. Tata Mc. Graw Hill Publishing Co.

2. Surveying and Levelling by Kanetkar T.P., and Kulkarni , Vols. I and II, United Book Corporation, Pune, 1994.

3.Principles of GIS for land resource assessment by P.A. Burrough –Clerendon Press, Oxford.

4. Advanced Surveying by Mahajan, Santhos K. Dhanpat Rai & Sons, Nai Sarak, Delhi, 1987.

5. Remote sensing and Image Interpretation by Lillesand,T.M.,and Kiefer R.W., John Wiley

and Sons, Inc, New York,1997

6. Advanced Surveying: Total Station, GIS and remote Sensing by R. Sathikumar, Satheesh Gopi and N. Madhu, Pearson Education, India

II Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A40104	**FLUID MECHANICS AND HYDRAULIC MACHINERY LAB**	-	1	3	2

OBJECTIVE: *The object of the course to make the students understand the fluid flow concepts and get familiarity with flow measuring devices.*

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

II Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A40105	**SURVEYING LAB – II**	-	1	3	2

OBJECTIVE: *To impart the practical knowledge in the field, it is essential to introduce in curriculum. Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.*

LIST OF EXERCISES:

1.   Study of theodolite in detail – practice for measurement of horizontal and vertical angles.
2.   Measurement of horizontal angles by method of repetition and reiteration.
3.   Trigonometric Leveling – Heights and distance problem (Two Exercises).
4.   Heights and distance using Principles of tachometric surveying (Two Exercises)
5.   Curve setting – different methods. (Two Exercises)
6.   Setting out works for buildings & pipe lines.
7.   Determination of area using total station.
8.   Traversing using total station.
9.   Contouring using total station.
10.   Determination of remote height using total station.
11.   Distance, gradient, Diff. height between tow inaccessible points using total stations.

III Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A50101	**DESIGN OF STEEL STRUCTURES**	3	2	-	4

OBJECTIVE: *To understand design specifications, loading and design procedures of different steel structures as per BIS specifications.*

UNIT – I
Materials – Making of iron and steel – types of structural steel – mechanical properties of steel – Concepts of plasticity – yield strength. Loads–and combinations loading wind loads on roof trusses, behavior of steel, local buckling. Concept of limit State Design – Different Limit States as per IS 800 -2007 – Design Strengths- deflection limits – serviceability - Bolted connections – Welded connections – Design Strength – Efficiency of joint – Prying action Types of Welded joints - Design of Tension members – Design Strength of members.

UNIT – II
Design of compression members – Buckling class – slenderness ratio / strength design – laced – battened columns –column splice – column base – slab base.

UNIT – III
Design of Beams – Plastic moment – Bending and shear strength laterally / supported beams design – Built up sections – large plates Web buckling Crippling and Deflection of beams, Design of Purlin.

UNIT – IV
Design of eccentric connections with brackets, Beam end connections – Web angle – Un-stiffened and stiffened seated connections (bolted and Welded types) Design of truss joints

UNIT – V
Plate Girder: Design consideration – I S Code recommendations Design of plate girder-Welded – Curtailment of flange plates stiffeners – splicings and connections.
Gantry Girder : Gantry girder impact factors – longitudinal forces, Design of Gantry girders.

Note: The students should prepare the following plates.
Plate 1 Detailing of simple beams
Plate 2 Detailing of Compound beams including curtailment of flange plates.
Plate 3 Detailing of Column including lacing and battens.
Plate 4 Detailing of Column bases – slab base and gusseted base
Plate 5 Detailing of steel roof trusses including particulars at joints.
Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.
FINAL EXAMINATION PATTERN:
The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.
TEXT BOOKS

1. limit state design of Steel Structures by Subramanyam.N, Oxford University press, New Delhi
2. Limit State Design of steel structures by S.K. Duggal, Tata Mcgraw Hill, New Delhi.

REFERENCES
1. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad.
2. Structural design in steel by Sarwar Alam Raz, New Age International Publishers, New Delhi
3. Design of Steel Structures by Edwin Gaylord,Charles Gaylord,James Stallmeyer, Tata Mc.Graw-Hill, New Delhi.

Codes/Tables:
IS Codes:
1) IS -800 – 2007
2) IS – 875 – Part III
3) Steel Tables.
4) Railway Design Standards Code.
and **steel tables** to be permitted into the examination hall.

Outcomes :
On completion of course -
1. Apply the IS code of practice for the design of steel structural elements
2. Design compression and tension members using simple and built-up sections
3. Students will be able to explain the behaviour and modes of failure of tension members and different connections.
4. Students will be able to analyze and design tension members, bolted connections, welded connections, compression members and beams.
5. Design welded connections for both axial and eccentric forces

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III Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A50102	**CONCRETE TECHNOLOGY**	3	-	-	3

OBJECTIVE: Lot of advances is taking place in the concrete technology as par with development taking place in the engineering. The present day industry needs the knowledge of concrete technology thoroughly. The subject is designed to give the basic knowledge as well as latest developments in concrete technology.

UNIT I

CEMENTS & ADMIXTURES: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrated cement – Test`s on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures.

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

UNIT – II

FRESH & HARDENED CONCRETE: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.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 compressive & tensile strength - Curing.Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests –

UNIT – III

SPECIAL CONCRETES: Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C – Applications – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete – Applications – High performance concrete – Self consolidating concrete – SIFCON – Bacterial concrete(self healing concrete)

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. Introduction to Non-destructive testing methods – Rebound Hammer – Ultra Pulse Velocity method – Pullout - Codal provisions for NDT.

UNIT – V

MIX DESIGN: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – ACI method & IS 10262 method

TEXT BOOKS:

1. Properties of Concrete by A.M.Neville – Pearson publication – 4th edition
2. Concrete Technology by M.S.Shetty. – S.Chand & Co. ; 2004

REFERENCES:

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
2. Concrete: Micro structure, Properties and Materials – P.K.Mehta and J.M.Monteiro, Mc-Graw Hill Publishers
3. Design of Concrete Mix by Krishna Raju, CBS pubilishers.

Outcomes:

After completing the course, the student should be able to do the following:

1. The students should be able to check and recommend different constituent of concrete.
2. The students should be able to test strength and quality of plastic and set concrete.
3. The students should have understanding of application admixture and its effect on properties of concrete.
4. The students should be able to design mix of concrete according to availability of ingredients and design needs.
5. The students should be able to test various strength of concrete by destructive and non-destructive testing methods.

III Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A50103	**WATER RESOURCES ENGINEERING-I**	3	-	-	3

OBJECTIVE:

To study the concepts of
  i.   *Engineering Hydrology and its applications like Runoff estimation, estimation of design discharge and flood routing.*
  ii. *Irrigation Engineering – Water utilization for Crop growth, canals and their designs.*

UNIT – I
INTRODUCTION TO HYDROLOGY: Engineering hydrology and its applications; Hydrologic cycle; precipitation- types and forms, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, presentation and interpretation of rainfall data.
DESCRIPTIVE HYDROLOGY: Evaporation- factors affecting evaporation, measurement of evaporation; Infiltration- factors affecting infiltration, measurement of infiltration, infiltration indices; Run off- Factors affecting run- off, Computation of run-off; Design Flood; Estimation of maximum rate of run-off; separation of base flow.

UNIT – II
HYDROGRAPH ANALYSIS: Hydrograph; Unit Hydrograph- construction and limitations of Unit hydrograph, Application of the unit hydrograph to the construction of a flood hydrograph resulting from rainfall of unit duration; S-hydrograph.
GROUND WATER: Introduction; Aquifer; Aquiclude; Aquifuge; aquifer parameters- porosity, Specific yield, Specific retention; Divisions of sub–surface water; Water table; Types of aquifers; storage coefficient-coefficient of permeability and transmissibility; well hydraulics- Darcy's law; Steady radial flow to a well –Dupuit's theory for confined and unconfined aquifers; Tube well; Open well; Yield of an open well–Constant level pumping test, Recuperation test.

UNIT – III
IRRIGATION: Introduction; Necessity and Importance of Irrigation; advantages and ill effects of Irrigation; types of Irrigation; methods of application of Irrigation water; quality for Irrigation water. Duty and delta; duty at various places; relation between duty and delta; factors affecting duty; methods of improving duty.
WATER REQUIREMENT OF CROPS: Types of soils, Indian agricultural soils, preparation of land for Irrigation; soil fertility; Soil-water-plant relationship; vertical distribution of soil moisture; soil moisture tension; soil moisture stress; various soil moisture constants; Limiting soil moisture conditions; Depth and frequency of irrigation; Gross command area; Culturable command area; Culturable cultivated and uncultivated area; Kor depth and Kor period; crop seasons and crop rotation; Irrigation efficiencies; Determination of irrigation requirements of crops; Assessment of Irrigation water. Consumptive use of water-factors affecting consumptive use, direct measurement and determination by use of equations (theory only)

UNIT – IV

CHANNELS – SILT THEORIES: Classification; Canal alignment; Inundation canals; Cross–section of an irrigation channel; Balancing depth; Borrow pit; Spoil bank; Land width; Silt theories–Kennedy's theory, Kennedy's method of channel design; Drawbacks in Kennedy's theory; Lacey's regime theory- Lacey's theory applied to channel design; Defects in Lacey's theory; Comparison of Kennedy's and Lacey's theory.

WATER LOGGING AND CANAL LINING: Water logging; Effects of water logging; Causes of water logging; Remedial measures; Saline and alkaline soils and their reclamation; Losses in canal; Lining of irrigation channels – necessity, advantages and disadvantages; Types of lining; Design of lined canal.

UNIT – V

DIVERSION HEAD WORKS: Types of diversion head works; Diversion and Storage head works; weirs and barrages; Layouts of diversion head works; components; Causes and failure of hydraulic structures on pereable foundations; Blighs creep theory; Khoslastheory; Determination of uplift pressure, impervious floors using Blighs and Khoslas theory; Exit gradient.

CANALOUTLETS: Introduction; types of outlet; flexibility, proportionality, setting ,hyper proportional outlet, sub-proportional outlet, sensitivity, efficiency of an outlet, drowning ratio, modular limit; pipe outlet; kennedy's gauge outlet; gibb's module; canal escape.

TEXT BOOKS:
1. Irrigation and water power engineering by Punmia & Lal, Laxmi publications pvt. Ltd., New Delhi
2. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi.

REFERENCES:

1. Engineering Hydrology by K.Subramanya, The Tata Mcgraw Hill Company, Delhi
2. Engineering Hydrology by Jayarami Reddy, Laxmi publications pvt. Ltd., New Delhi
3. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House.

Outcomes :
On completion of the course, the students will be able to:
1. To understand the basic types of irrigation, irrigation standards and crop water assessment
2. To study the different aspects of design of hydraulic structures
   To provide knowledge on various hydraulic structures such as energy dissipaters, head and cross regulators, canal falls and structures involved in cross drainage works

III Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A50104	**STRUCTURAL ANALYSIS – II**	2	2	-	3

OBJECTIVE: Indeterminate structures are subjected to different loading with different supported conditions; hence it is necessary to study the behaviour of the structures.

UNIT I
ARCHES : Three hinged arches, Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature- 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
SLOPE-DEFLECTION & MOMENT DISTRIBUTION METHOD:-Analysis of single bay, single storey, portal frame including side sway– Stiffness and carry over factors – Distribution factors – Analysis of single storey portal frames – including Sway - Substitute frame analysis by two cycle method.

UNIT – III
KANI`S METHOD:-
Analysis of continuous beams – including settlement of supports and single bay, single storey portal frames with side sway by Kani's method.

UNI T – IV
FLEXIBILITY & STIFFNESS METHODS:-
Flexibility methods, Introduction, application to continuous beams including support settlements-Introduction to stiffness method and its application application to continuous beams including support settlements.

UNIT – V
PLASTIC ANALYSIS:
Introduction – Idealized stress – Strain diagram – shape factors for various sections – Moment curvature relationship – ultimate moment – Plastic hinge – lower and upper bound theorems – ultimate strength of fixed and continuous beams.

TEXT BOOKS:
1. Analysis of structures by Vazrani & Ratwani – Khanna Publications.
2. Theory of structures by Ramamuratam, jain book depot , New Delhi.

REFERENCES :
1. Structural Analysis (Matrix Approach) by Pundit and Gupta – Tata Mc.Graw Hill publishers.
2. Structural analysis by R.S.Khurmi, S.Chand Publications, New Delhi.
3. Basic Structural Analysis by K.U.Muthu *et al.,* I.K.International Publishing House Pvt.Ltd

Outcomes:

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

1. Apply the methods of indeterminate truss analysis
2. Demonstrate the behaviour of arches and their methods of analysis
3. Use various classical methods for analysis of indeterminate structures
4. Determine the effect of support settlements for indeterminate structures
5. Able to analyze the beam and frames for vertical and horizontal loads and draw SFD and BMD.
6. Able to calculate forces in members of truss due to load by stiffness method.

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III Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A50105	**ENGINEERING GEOLOGY**	3	-	-	3

OBJECTIVES: *The objectives of this is to give the basic knowledge of Geology that is required for construction of various Civil Engineering Structures. The syllabus includes the basics of Geology. Geological hazard's and gives a suitable picture on the Geological aspects that are to be considered for the planning and construction of major Civil Engineering projects.*

UNIT – I
INTRODUCTION:
Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.
WEATHERING OF ROCKS : Its effect over the properties of rocks importance of weathering with REFERENCE to dams, reservoirs and tunnels weathering of common rock like "Granite"
MINERALOGY :
Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties.Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar , Quartiz , Flint , Jasper, Olivine , Augite , Hornblende , Muscovite , Biotite , Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite , Magnetite, Chrorite , Galena , Pyrolusite , Graphite, Magnesite, and Bauxite.

UNIT – II
PETROLOGY :
Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of Igneous. Sedimentary and Metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.
STRUCTURAL GEOLOGY :

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

UNIT – III
GROUND WATER ,EARTH QUAKE &LAND SLIDES:-
Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Land slides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and land slides.

UNIT –IV
GEOPHYSICAL STUDIES:-
Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc.

UNIT – V
GEOLOGY OF DAMS ,RESERVOIRS AND TUNNELS :
Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factor's Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs. Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (ie. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

TEXT BOOKS:
1) Engineering Geology by N.Chennkesavulu, Mc-Millan, India Ltd. 2005
2) Engineerring Geology by Vasudev Kanthi, Universities press, Hyderabad.

REFERENCES:
1. Engineerring geology by Prabin singh, Katson Pubilcations
2. Engineering geology by Duggal, TMH Publishers.
3. Engineering Geology by Subinoy Gangopadhyay, Oxford University press.
4. Principals of Engineering Geology by K.V.G.K. Gokhale – B.S publications

Outcomes
1. The students would have the knowledge of principles of engineering geology.
2. The students would have the knowledge of properties of soil, various rocks and minerals
3. The students would be able to judge the suitability of sites for various civil engineering structures.
4. The students would exhibit the ability to use the knowledge of geological strata in the analysis and design the civil engineering structures.
5. The students would have the knowledge for deciding the suitability of water and soil conservation projects.

III Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A50106	**BUILDING PLANNING AND DRAWING**	1	2	-	2

OBJECTIVE: This subject provides the knowledge of building by laws, registration, planning of various types of buildings different sign convention of various Civil Engineering Materials, Doors, windows, tiles of roof, drawing of building plans etc.

PART-A

UNIT -I

PLANING OF BUILDINGS: Types of buildings, types of residential buildings, site selection for residential building, orientation of buildings; aspect; prospect; privacy; furniture requirement;grouping;circulation;sanitation;lighting;ventilation;cleanliness;flexibility;elegancy ;Economy; practical considerations.

BUILDING BYELAWS AND REGULATIONS: Introduction- Terminology ;Objectives of building byelaws; Minimum plot sizes; Open space requirements ;Plinth area, floor area, carpet area; Floor area ratio (FAR), Floor space Index (FSI) ;areas for different units; Principles underlying building byelaws ; built up area limitations – Height of Buildings ,Wall thickness, lighting and ventilation requirement, safety from fire, drainage and sanitation; applicability of the bye-laws.

UNIT –II

PLANNING OF RESIDENTIAL BUILDINGS: Minimum standards for various parts of buildings – requirements of different rooms and their grouping – characteristics of various types of residential buildings

PLANNING OF PUBLIC BUILDING: Planning of Educational institutions, Hospitals, Office buildings, Banks, Industrial buildings, Hotels and Motels, Hostels, Bus Station.

UNIT -III

BUILDINGS: SAFETY AND COMFORT: aspects of safety-structural, health, fire and constructional safety. Components of building automation system - HVAC, electrical lighting, Security, fire-fighting, communication etc. design for thermal comfort, ventilation comfort, air conditioning comfort, lighting comfort, noise and acoustic comfort.

PART-B

UNIT -IV

SIGN CONVENTIONS AND BONDS: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminum alloys etc., Lead, Zinc, tin, and white lead etc.,

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

DOORS WINDOWS, VENTILATORS AND ROOFS: Paneled Door – paneled and glazed door; glazed windows – paneled windows; Swing ventilator – Fixed ventilator; Couple roof – Collar roof; Kind Post truss – Queen post truss.

UNIT –V

Given line diagram with specification to draw plan, section and elevation of:

1. Residential Building
2. Hospital
3. Schools
4. Post office
5. Corporate Office Building
6. Hotels
7. Bank buildings
8. Bus stations
9. Industrial buildings

FINAL EXAMINATION PATTERN: The end examination paper should consist of Part- A and Part-B. Part- A consists of three questions with either or choice from three units in planning portion .Each question carries 10 marks. Total marks for Part-A is 30 marks. Part- B consists of two questions with either or choice from drawing portion. Question from unit-IV carries 10 marks and question from unit-V carries 30 marks. Total marks for Part-B is 40 marks.

TEXT BOOKS:

1. Planning and Designing and Scheduling – Gurucharan Singh and Jagadish Singh- Standard publishers.

2. Building Planning and Design – N.Kumara Swamy and A.Kameswara Rao. Charotar publications.

REFERENCE:

1. Building by laws by state and Central Governments and Municipal corporations. National Building Code

2. Building drawing with an integrated approach to building environment-M.G.Saha, G.M.Kale, S.Y.patki-Tata Mc Graw Hill

III Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A50107	**ENGINEERING GEOLOGY LAB**	-	1	3	2

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

LAB EXAMINATION PATTERN:
1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Inter pretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.

Text Books:-
1. **Elementary Exercises in Geology by CVRK Prasad, Universities press.**

III Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A50108	**CONCRETE TECHONOLOGY LAB**	-	1	3	2

1. Normal Consistency of fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity and soundness of cement.
4. Compressive strength of cement.
5. Workability test on concrete by compaction factor, slump and Vee-bee.
6. Young's modulus and compressive strength of concrete.
7. Specific Gravity and Water Absorption of Coarse aggregate.
8. Bulking of Fine aggregate.
9. Non-Destructive testing on concrete (for demonstration)

LIST OF EQUIPMENT:
1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers.
4. Los angles Abrasion test machine
5. Vicat's apparatus
6. Specific gravity bottle.
7. Lechatlier's apparatus.
8. Slump and compaction factor setups
9. Longitudinal compressor meter and 1
10. Rebound hammer, Pulse velocity machine.
11. Relevant IS Codes

Reference books:-
1. Concrete Manual by M.L.Gambhir, Dhanpat Rai&co., Fourth edition.
2. Building construction and materials(Lab Manual) by Gambhir , TMH publishers.

III Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A60101	**WATER RESOURCES ENGINEERING-II**	3	-	-	3

OBJECTIVE: To study various head works canal structures and their design principles the subject also covers the river structures, their classifications, designs, etc.

UNIT – 1

CANAL REGULATION WORKS: Canal falls: Necessity and location of falls; Types of falls; classification of falls; cistern design; roughening devices; design of sarada type fall. Canal regulators: off-take alignment; head regulators and cross-regulators; design of cross-regulator and distributary head regulator.

CROSS DRAINAGE WORKS: Introduction; types of cross drainage works; selection of suitable type of cross drainage work; classification of aqueducts and siphon aqueducts.

UNIT-II

STREAM GAUGING: Necessity; Selection of gauging sites; methods of DischargeMeasurementArea-Velocity method; Slope-Area method; Tracer method, Electromagnetic induction method,Ultrasonic method; Measurement of depth –Sounding rod, Echo-sounder; Measurement ofvelocity: Floats – Surface floats, Sub–surface float or Double float, Velocity rod; Pitot tube;Current meter- rating of current meter, measurement of velocity; chemical method; Measurementof stage-Staff gauge, wire gauge, water stage recorder, bubble gauge recorder; stage-dischargecurve.

RIVER ENGINEERING: Classification of rivers; Meandering; Causes of meandering; Basic factors controlling process of meandering; Aggrading type of river; Degrading type of River; River training: objectives, Classification of river training works; Types of River training works : Guide banks, Marginal embankments ,Groynes or spur, levees, bank protection, pitched islands.

UNIT-III

RESERVOIR PLANNING: Introduction; Investigations for reservoir planning; Selection ofsitefor a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curveand demand curve; Calculation of reservoir capacity for a specified yield from the mass inflowcurve; Determination of safe yield from a reservoir of a given capacity; Sediment flow instreams:Reservoir sedimentation; Life of reservoir; Reservoir sediment control; Flood routing;Methodsof flood routing-Graphical Method (Inflow – storage discharge curves method).

DAMS :GENERAL: Introduction; Classification according to use; classification according to material- Gravity dams, Arch dams, Buttress dams, Steel dams, Timber dams, Earth dams and rock fill dams-advantages and disadvantages; Physical factors governing selection of type of dam ; selection of site for a dam.

UNIT-IV

GRAVITY DAMS: Introduction; Forces acting on a gravity dam; Combination of loading for design; Modes of failure: stability requirements; principal and shear stresses; Stability analysis; Elementary profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam- High and low gravity dams; Design of gravity dams–single step method; Galleries; Stability analysis of non–overflow section of Gravity dam.

EARTH DAMS: Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams; Section of an earth dam; Design to suit available materials; Seepage control measures; Slope protection. Seepage through earth dam – graphical method

UNIT-V

SPILLWAYS: Introduction; Types of spillways; Profile of ogee spillway; Energy dissipation below spillways for relative positions of jump height curve and tail water curve; Stilling basins; Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal aprons; Spillway crest gates-Types and description only.

WATER POWER ENGINEERING: Development of hydro power in India; Classification of hydel plants: runoff river plants, storage plants and pumped storage plants; low, medium and high head schemes ; Investigation and planning; components of hydel schemes – fore bay, intake structure, surge tanks, penstocks ,power house, turbines-selection of suitable type of turbine, Scroll casing .draft tube and tail race; assessment of available power; definition of gross head ,operating head ,effective head; Flow duration curve; Power duration curve; Load duration curve; Load curve ; primary power and secondary power; installed capacity, dependable capacity; firm power, secondary power; power factor ;load factor, capacity factor ,utilization factor and Diversity factor.

TEXT BOOKS:
3. Irrigation and Water Power Engineering by Dr. B.C.Punmia & Dr. Pande B.B. Lal; Laxmi Publications pvt. Ltd., New Delhi.
4. Irrigation Engineering and Hydraulic Structure by S. K. Garg; Khanna Publishers, Delhi.

REFERENCES:
1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers
2. Irrigation, Waterpower and Water Resources Engineering by K R Arora; Standard Publication,New Delhi.
3. Water resources engineering by Satyanarayana Murthy. Challa, New Age International Publishers

outcomes:
 On completion of the course, the students will be able to:
1. Design various channel systems
2. Design head and cross regulator structures
3. Identify various types of reservoir and their design aspects
4. By the Establishes the understanding of cross drainage works and its design
5. Design different types of dams
6. Design gravity dam and earthen dam
7. Design the canal systems

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
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III Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A60102	**DESIGN OF REINFORCED CONCRETE STRUCTURES**	3	2	-	4

**OBJECTIVE:** Structural elements are subjected to different loading to with stand the structures, for external loading we need to design the structures for its safety and serviceability.

UNIT –I
Concepts of RC. Design –Introduction to Working stress method - Limit State method – Material Stress- Strain Curves – Safety factors – Characteristic values. Stress Block parameters – IS: 456 – 2000.
Beams **:** Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.

UNIT – II
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 for deflection, cracking and codal provision.

UNIT - III
Design of Two-way slabs, one way slab, continuous slab Using I S Coefficients, Cantilever slab /Canopy slab.

UNIT –IV
Short and Long columns –axial loads, uni axial and biaxial bending I S Code provisions.

UNIT – V
Design of Footings - isolated (square, rectangular) and Combined footings.
Design of Stair case – Dog legged and Open well.

NOTE : All the designs to be taught in Limit State Method
Following plates should be prepared by the students.
1. Reinforcement particulars of T-beams and L-beams.
2. Reinforcement detailing of continuous beams.
3. Reinforcement particulars of columns and footings.
4. Detailing of One way, Two way and continuous slabs

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

TEXT BOOKS:
1. Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
2. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishres, New Delhi

REFERENCES :

4. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad
5. Analysis of skeletal structures by seetharamulu kaveti, TMH pubilications.
6. Limit state designed of reinforced concrete – P.C.Varghese, Printice Hall of India, New Delhi

Codes/Tables: IS 456-2000 and IS-800 code books to be permitted into the examinations Hall.
Outcome:
After completing the course, the student should be able to do the following:
1. Will be able to understand the basic concepts of reinforced concrete analysis and design.
2. Will be able to understand the behavior and various modes of failure of reinforced concrete members.
3. Will be able to analyze and design various reinforced concrete members.
4. Will be able to understand and analyze the effect of various support conditions on design of structures.
5. Will be able to implement the knowledge in using analysis and design softwares.

III Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A60103	**GEOTECHNICAL ENGINEERING – I**	2	2	-	3

OBJECTIVE: The object of this course is to make the student to understand the behaviour of soil under different loads and different conditions. This is necessary because the safety of any structure depends on soil on which it is going to be constructed.

UNIT – I
INTRODUCTION: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship – Relative density.
INDEX PROPERTIES OF SOILS: Moisture Content, Specific Gravity, Insitu density, Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – I.S. Classification of soils

UNIT –II
PERMEABILITY: Soil water – capillary rise – flow of water through soils – Darcy's law-permeability – Factors affecting – laboratory determination of coefficient of permeability – Permeability of layered systems.
SEEPAGE THROUGH SOILS: Total, neutral and effective stresses –quick sand condition – Seepage through soils – Flownets: Characteristics and Uses.

UNIT – III
STRESS DISTRIBUTION IN SOILS: Boussinesq's and Wester gaard's theories for point loads and areas of different shapes – Newmark's influence chart .
COMPACTION: Mechanism of compaction – factors affecting – effects of compaction on soil properties. – Field compaction Equipment – compaction control.

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

UNIT – V
SHEAR STRENGTH OF SOILS : Importance of shear strength **–** Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelops – Shear strength of sands - dilatancy – critical void ratio – Liquefaction- shear strength of clays.

TEXT BOOKS:

1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
2. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).

REFERENCES:
1. Soil Mechanics and Foundation by by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
2. Geotechnical Engineering by Iqbal H.Khan, PHI pubilishers.
3. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt . Ltd, New Delhi.

OUTCOMES:
On completion of the course, the students will be able to:
1. carry out soil classification
2. solve any practical problems related to soil stresses estimation, permeability and seepage including flow net diagram
3. estimate the stresses under any system of foundation loads
4. solve practical problems related to consolidation settlement and time rate of settlement

III Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A60104	**ESTIMATION, COSTING AND VALUATION**	2	2	-	3

OBJECTIVE: The objective of the course is to make the student to understand about estimation and valuations of different types of structures and their valuation as per standard schedule of rates.

UNIT – I
INTRODUCTION : General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating.
STANDARDS SPECIFICATIONS : Standard specifications for different items of building construction

UNIT – II
ESTIMATION OF BUILDINGS : Detailed Estimates of Buildings

UNIT – III
EARTHWORK ESTIMATION : Earthwork for roads and canals.
REINFORCEMENT ESTIMATION : Reinforcement bar bending and bar requirement schedules.

UNIT – IV
CONTRACTS AND TENDERS : Contracts – Types of contracts – Contract Documents – Conditions of contract – Types of Tenders – Requirement of Tendering.

UNIT – V
RATE ANALYSIS : Working out data for various items of work over head and contigent charges.
VALUATION : Valuation of buildings.

TEXT BOOKS
1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Contracts and estimations by B.S.Patil, Universities.Press, Hyderabad.

REFERENCES :
1. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.
2. Engineering construction cost by Peurifoy , TMH Publishers.
3. Standard Schedule of rates and standard data book by public works department.
4. I. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)

Note : Standards scheduled of rates is permitted in the examination hall.

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

1. apply different types of estimates in different situations
2. carry out analysis of rates and bill preparation at different locations
3. demonstrate the concepts of specification writing
4. carry out valuation of assets

III Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A60105	**ENVIRONMENTAL ENGINEERING (OPEN ELECTIVE -I)**	3	-	-	3

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

UNIT – I
INTRODUCTION: Importance and Necessity of Protected Water Supply systems, Objectives of Protected water supply system, Flow chart of public water supply system, Role of Environmental Engineer.
WATER DEMAND AND QUANTITY STUDIES : Estimation of water demand for a town or city, Types of water demands, Per capita Demand, Factors affecting the Per Capita Demand, Variations in the Demand, Design Period, Factors affecting the Design period, Population Studies, Population Forecasting Studies.
QUALITY AND ANALYSIS OF WATER: Characteristics of water – Physical, Chemical and Biological. Analysis of Water – Physical, Chemical and Biological. Impurities in water, Water borne diseases. Drinking water quality standards.
UNIT - II
WATER TREATMENT: Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation-flocculation clarifier design – coagulants – feeding arrangements. Filtration and Chlorination**:** Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation comparison of filters – disinfection – theory of chlorination, chlorine demand, other disinfection practices- Miscellaneous treatment methods
WATER DISTRIBUTION : Distribution systems – Requirements, Layout of Water distribution systems - Design procedures- Hardy Cross and equivalent pipe methods service reservoirs – joints, valves such as sluice valves, air valves, scour valves and check valves water meters – laying and testing of pipe lines – pump house, waste detection and prevention.
UNIT – III
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 – materials for sewers- appurtenances in sewerage – cleaning and ventilation of sewers .
WASTE WATER COLLECTION AND CHARACTERSTICS : Conservancy and water carriage systems – sewage and storm water estimation – time of concentration – storm water overflows combined flow – characteristics of sewage – cycles of decay – decomposition of sewage, examination of sewage – B.O.D. – C.O.D. equations.
UNIT IV
WASTE WATER TREATMENT: Layout and general out line of various units in a waste water treatment plant – primary treatment: design of screens – grit chambers – skimming tanks

– sedimentation tanks – principles of design – biological treatment – trickling filters – standard and high rate – Construction and design of Oxidation ponds.

SLUDGE TREATMENT: Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks and Imhoff Tanks, working principles and design – soak pits.

UNIT – V

SOLID WATE MANAGEMENT: Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment and disposal).

AIR POLLUTION: Types of pollutants, their sources and impacts, air pollution meteorology, air pollution control, air quality standards and limits.

NOISE POLLUTION: Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution.

TEXT BOOKS:

1. Water supply and sanitary Engineering by G.S. Birdi, Dhanpat Rai & Sons Publishers.
2. Water Supply Engineering, Vol. 1, waste water Engineering, Vol. II, B.C.Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi
3. Environmental Engineering by Peavy, TMH Publishers.

REFERENCS :

1. Environmental Science and Engineering by J.G.Henry and G.W.Heinke – Person Education..
2. Waste water treatment- concepts and design approach by G.L. Karia and R.A. Christian, Prentice Hall of India
3. Elements of environmental engineering by K.N. Duggal, S. Chand Publishers.

OUTCOMES:

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

1. Identify the source of water and water demand
2. Apply the water treatment concept and methods
3. Apply water distribution processes and operation and maintenance of water supply
4. Prepare basic process designs of water and wastewater treatment plants collect, reduce, analyze, and evaluate basic water quality data
5. Determine the sewage characteristics and design various sewage treatment plants
6. Carry out municipal water and wastewater treatment system design and operation
7. Apply environmental treatment technologies and design processes

III Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A60105	**INTELLECTUAL PROPERTY RIGHTS** (**OPEN ELECTIVE - I**)	3	-	-	3

UNIT – I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II

Trade Marks : Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copy rights : Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents : Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets : Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition : Misappropriation right of publicity, False advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law ; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah. E. Bouchoux, cengage learing.
2. Intellectual property right – nleashmy the knowledge economy, prabuddha ganguli,
Tate Mc Graw Hill Publishing company ltd.,

III Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A60105	**INDUSTRIAL WASTE AND WASTE WATER MANAGEMENT** (**OPEN ELECTIVE**)	3	-	-	3

Objectives:
- To familiarize student with the knowledge of theory and design of Industrial waste water treatment.
- To produce civil engineering graduates who have strong fundamental knowledge about the treatment of effluents from food and chemical industries.

UNIT – I:
Quality requirements of boiler and cooling waters - Quality requirements of process water for Textile - Food processing and Brewery Industries - Special Treatment processes.

UNIT – II:
Basic Theories of Industrial Waste water Management - Volume reduction - Strength reduction - Neutralization - Equalization and proportioning. Joint treatment of industrial wastes and domestic sewage - consequent problems.

UNIT –III:
Industrial wastewater discharges into streams. Lakes and oceans and problems.

UNIT – IV:
Recirculation of Industrial Wastes - Use of Municipal Waste Water in Industries.   .

UNIT – V:
Industrial Wastes - Special characteristics & Treatment of Liquid Wastes from the following industries: Textile, Tannery, Paper and Pulp, Distilleries, Dairy, Fertilizer Plant, Sugar Mill, Steel plants, oil Refineries -Pharmaceutical plants - thermal power plants.

TEXT BOOKS:
1. Waste Water Treatment by Rao and Dutta. IBH Publishers
2. Metcalf and Eddy. "Waste water Engineering – Collection, Treatment, Disposal and Reuse", Mc Graw Hill Pub. Co., 1995.
3. Water and Waste Water technology by Mark J. Hammer and Mark J. Hammer (Jr)

Course Outcomes:
- Student will be able to identify and analyse the waste from various sources.
- Student will be able to understand about Industrial processes –Origin of waste water – various treatment methods, code of practices – management.

III Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A65501	**ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS LAB**	-	1	3	2

1. **Introduction:**

      In the past engineering education has focused only on imparting "hard" or technical skills. With the entry of multinational companies in India there is a revolutionary change in the employment opportunities and recruitment process as well. Globalization demands universities to produce engineers who are equipped with effective interpersonal skills to meet global demands.

      In this scenario the **Advanced English Language Communication skills lab** introduced at the 3rd B. Tech. level plays a key role to learn the foreign language in a happy atmosphere and in a successful way. Breaking through the traditional method of teaching, this course motivates student's learning attitude by providing an interactive learning environment.

      This course is developed on the methodology of LSRW skills along with soft skills. This course focuses on the practical aspects of listening, speaking, reading and writing that enable the students to expose to various activities like group discussions, Oral Presentations, Mock interview sessions etc., Personality development, etiquettes and to provide corporate knowledge to help the students in facing interviews in a formal organizational set up.

2. Objectives:

This lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

- To expose the students to a variety of self instructional, learner-friendly modes of language learning.

- To enable the students to learn better pronunciation and accent through listening and reading exercises.

- To train students to use language appropriately for interviews, group discussion and public speaking.

- To initiate them to greater use of the computer in resume preparation, format-making etc.

- To help the students to cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer based competitive exams such as GRE, TOFEL, and GMAT etc.

- To enable the students to acquire good communication skills as well as soft skills to meet global demands.

3 **Syllabus:**

The following course content is prescribed for the Advanced Communication Skills Lab:

Unit I:

Reading &Listening Comprehension: Skimming –scanning- Extensive and Intensive reading. Reading for making   inferences. Active VS passive listening. Listening and Note taking, - Listening for making inferences.

. **Unit II:**

Writing Skills: Formal and informal writing- Resume Writing-E-Correspondence.

. **Unit III:**

Technical Presentations (Oral) : Planning-Preparation-Presentation . Art of Persuasion- Audience analysis- Handling questions.

Unit IV:

Interview Skills: Types of Interviews - pre-interview planning- answering strategies. Analysis of One to one –interviews – group interviews - Mock interviews.

Unit V:

Soft Skills: Inter Personal Skills- Goal setting – Etiquettes and good manners   – Team Working – Work Ethics--Time management – Problem Solving.

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Minimum Requirements

The English Language Lab shall have two parts:

The Computer Aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners. The Communication Skills Lab with movable chairs and audio-visual aids with a PA System, a TV, a digital stereo-audio and video system, a Camcorder, etc

System Requirement (Hardware Component):

Computer network with LAN with a minimum of 60 multimedia systems with the following specifications:

P-IV Processor
Speed-2.8 GHZ
RAM_512 MB minimum
Hard Disk-80 GB
Headphones

Prescribed Software:
10. K-Van Advanced Communication Skills
11. Walden Infotech Advanced Communication Skills.

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. **Technical Writing and Professional Communication, Huckin and Olsen** Tata Mc Graw-Hil 2009.

2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.

3. **Cambridge English for Job-Hunting** by Colm Downes, Cambridge University Press, 2008

4. **Resume's and Interviews** by M.Ashraf Rizvi, Tata Mc Graw-Hill, 2008

5.. **English Language Communication : A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.

6. **Managing Soft Skills** by K R Lakshminarayan and T.Muruguvel, Sci-Tech Publications, 2010

7. **The ACE of Soft Skills** by Gopal Ramesh and Mahadevan Ramesh, Pearson Education, 2010

8. **Soft Skills** by Dr. K. Alex, S.Chand

9. **Study Skills for Professional Students in Higher Education** by Dr. M. Adithan, S.Chand.

10. **Personality Development and Soft Skills by Barun** K. Mitra, Oxford Higher Education.

III Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A60106	**ENVIRONMENTAL ENGINEERING LAB**	-	1	3	2

OBJECTIVE: The laboratory provides knowledge of estimating various parameters like PH, Chlorides, Sulphates, Nitrates in water. For effective water treatment, the determination of optimum dosage of coagulant and chloride demand are also included. The estimation status of Industrial effluents will also be taught in the laboratory by estimating BOD and COD of effluent.

LIST OF EXPERIMENTS
1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids.
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination and Estimation of total solids, organic solids and inorganic solids.
6. Determination of iron.
7. Determination of Dissolved Oxygen.
8. Determination of Nitrogen.
9. Determination of total Phosphorous.
10. Determination of B.O.D
11. Determination of C.O.D
12. Determination of Optimum coagulant dose.
13. Determination of Chlorine demand.
14. Presumptive coliform test.
NOTE: At least 8 of the above experiments are to be conducted.

LIST OF EQUIPMENT
1) pH meter,
2) Turbidity meter,
3) Conductivity meter,
4) Hot air oven,
5) Muffle furnace,
6) Dissolved Oxygen meter,
7) U – V visible spectrophotometer,
8) Reflux Apparatus,
9) Jar Test Apparatus,
10) BOD incubator.
11) COD Extraction apparatus
TEXT BOOKS:
1. Chemistry for Environmental Engineering by Sawyer and Mc. Carty
2. Standard Methods for Analysis of water and Waste Water – APHA
3. Environmental Engineering Lab Manual by Dr.G.Kotaiah and Dr.N.Kumara Swamy, Charotar Publishers, Anand.
REFERENCE
1. Relevant IS Codes.

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III Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A60107	**GEOTECHNICAL ENGINEERING LAB**	-	1	3	2

OBJECTIVE: To obtain the properties of soils by conducting experiments, it is necessary for students to understand the behavior of soil under various loads and conditions.

LIST OF EXPERIMENTS
1. Atterberg's Limits.
2. Field density-core cutter and sand replacement method
3. Grain size analysis
4. Permeability of soil, constant and variable head test
5. Compaction test
6. CBR Test
7. Consolidation test
8. Unconfined compression test
9. Tri-axial Compression test
10. Direct shear test.
11. Vane shear test

Any eight experiments may be completed.

LIST OF EQUIPMENT:
1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and Shrinkage limits
3. Field Density apparatus for
   a) Core cutter method
   b) Sand Replacement method

4. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 5.15mm, and 0.075mm.
6. Hydrometer
7. Permeability Apparatus for
   a) Constant Head test
   b) Variable Head test
8. Universal Auto compactor for I.S light and heavy compaction tests.
9. Apparatus for CBR test
10. Sampling tubes and sample extractors.
11. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
12. One dimensional consolation test apparatus with all accessories.
13. Tri-axial cell with provision for accommodating 38 mm dia specimens.
14. Box shear test apparatus
15. Laboratory vane shear apparatus.
16. Hot Air ovens (Range of Temperature 50-150^{0}C
17. Moisture cans – 2 dozens.

18. Electronic balances pf 500 g capacity with 0.01g least count and 5 kg capacity with least count of 1gm
19. Measuring Jars   - 1000CC- 6
                              - 100CC- 4
20. Mercury   - 500 g
21. Rammers   - 2
     Crow bars   - 2

TEXT BOOKS:

1.Soil Testing Lab Manual by K.V.S. Appa Rao & V.C.C.Rao,University Science Press , Laxmi Publication.
2.Soil Testing for Engineers by S.Mittal and J.P.Shukla, Kahna Publishers, New Delhi.
3. Relevant IS Codes.

IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70101	**FINITE ELEMENT ANALYSIS**	2	2	-	3

OBJECTIVE: *To familiarize the student with the latest developments in analysis for Civil Engineering problems.*

UNIT –I
INTRODUCTION: Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation.
PRINCIPLES OF ELASTICITY: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT –II
ONE DIMENSIONAL & TWO DIMENSIONAL ELEMENTS: Stiffness matrix for bar element – shape functions for one dimensional elements – one dimensional problems .Two Dimensional Elements - Different types of elements for plane stress and plane strain analysis – Displacement models – generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates

UNIT –III
GENERATION OF ELEMENT : Generation of element stiffness and nodal load matrices for 3-node triangular element and four noded rectangular elements.

UNIT –IV
ISOPARAMETRIC FORMULATION :
Concepts of, isoparametric elements for 2D analysis –formulation of CST element, 4 –Noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements.
AXI-SYMMETRIC ANALYSIS: Basic principles-Formulation of 4-noded iso-parametric axi-symmetric element

UNIT-V
SOLUTION TECHNIQUES: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

TEXT BOOK:
1.   Finite Element Analysis for Engineering and Technology, Tirupathi R Chandraputla, Universities Press Pvt Ltd, Hyderabad. 2003.
2.   Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers

REFERENCES:

1. Finite element analysis and procedures in engineering by H.V.Lakshminaryana, 3rd edition, universities press, Hyderabad.
2. 3.. Finite element analysis in Engineering Design by S.Rajasekharan, S.Chand Publications, New Delhi.
3. Finite element analysis by S.S. Bhavakatti-New age international publishers

<u>OUTCOMES</u>**:**

On completion of the course, the students will be able to:
1. demonstrate the differential equilibrium equations and their relationship
2. apply numerical methods to FEM
3. demonstrate the displacement models and load vectors
4. compute the stiffness matrix for isoperimetric elements
5. analyze plane stress and plane strain problems

IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70102	**GEOTECHNICAL ENGINEERING – II**	2	2	-	3

Objective: To use the principles of Soil mechanics to design the foundations, Earth retaining structures and slope stability safely and economically knowledge of the subject is essential.

UNIT – I
SOIL EXPLORATION: Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Plate load test – Pressure meter – planning of Programme and preparation of soil investigation report.

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

UNIT – III
EARTH PRESSURE THEORIES: Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory – Rebhann's and Culmann's graphical method
RETAINING WALLS: Types of retaining walls – stability of retaining walls.

UNIT – IV
SHALLOW FOUNDATIONS: Types – choice of foundation – Location of depth – Safe Bearing Capacity – Terzaghi`s, Meyerhoff's and Skempton`s Methods
ALLOWABLE BEARING PRESSURE : Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – allowable settlements of structures – Settlement Analysis

UNIT –V
PILE FOUNDATION: 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 – Settlement of pile groups.
WELL FOUNDATIONS: Types – Different shapes of wells – Components of wells – functions and Design Criteria – Sinking of wells – Tilts and shifts.

TEXT BOOKS:
1. Geotechnical Engineering by C.Venkataramaiah, New Age Pubilications.
2. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors, Delhi
3. Soil Mechanics and Foundations by – by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

REFERENCES:
1. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Pubilications
2. Das, B.M., - (1999) Principles of Foundation Engineering –6th edition (Indian edition) Thomson Engineering
3. Foundation Engineering by Varghese,P.C., Prentice Hall of India., New Delhi.
4. Foundation Engineering by V.N.S.Murthy, CRC Press, New Delhi.
5. Bowles, J.E., (1988) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishing company, Newyork.

6. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.

Subject Code	Title of the Subject	L	T	P	C
17A70103	**TRANSPORTATION ENGINEERING – I**	3	-	-	3

OBJECTIVE: It deal with different components of Transportation Engineering like highway, Railway & Airport Engineering. Emphasis is a Geometric Design of different elements in Transportation Engineering.

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 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 – Definitions and their inter relation – Highway capacity and level of service concept – factors affecting capacity and level of service - 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.

TRAFFIC REGULATION AND MANAGEMENT:
Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Specifications - Design of Traffic Signals –Webster Method – Saturation flow – phasing and timing diagrams – Numerical problems.

UNIT – IV
INTERSECTION DESIGN:
Conflicts at Intersections- Channelisation: Objectives –Traffic Islands and Design criteria-Types of At-Grade Intersections – Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

UNIT – V
PAVEMENT DESIGN :
Types of pavements – Difference between flexible and rigid pavements – Pavement Components – Sub grade, Sub base, base and wearing course – Functions of pavement components – Design Factors – Flexible pavement Design methods – G.I method, CBR

Method, (as per IRC 37-2002) –Design of Rigid pavements – Critical load positions - Westergaard's stress equations – computing Radius of Relative stiffness and equivalent radius of resisting section – stresses in rigid pavements – Design of Expansion and contraction joints in CC pavements. Design of Dowel bars and Tie bars.

TEXT BOOKS:
1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th edition (2000).
2. Traffic Engineering and Transportation planning by L.R.Kadiyali and Lal- Khanna Publications.

REFERENCES:
1. Principles and Practice of Highway Engineering Design – L.R.Kadiyali and Lal- Khanna Publications.
2. Text book of Highway Engineering by R.Srinivasa Kumar, Universities Press, Hyderabad.
3. Highway Engineering – Dr.S.K.Sharma, S.Chand Publishers

Outcomes :
On completion of the course, the students will be able to:
1. carry out surveys involved in planning and highway alignment
2. design cross section elements, sight distance, horizontal and vertical alignment
3. implement traffic studies, traffic regulations and control, and intersection design
4. determine the characteristics of pavement materials
5. design flexible and rigid pavements as per IRC

IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70104	**EXPERIMENTAL STRESS ANALYSIS** (**OPEN ELECTIVE - II**)	3	-	-	3

Objective:-
To bring awareness on experimental method of finding the response of the structure to different types of load.

1. **PRINCIPLES OF EXPERIMENTAL APPROACH :-**
   Merits of Experimental Analysis Introduction, uses of experimental stress analysis advantages of experimental stress analysis, Different methods –Simplification of problems.
2. **STRAIN MEASUREMENT USING STRAIN GAUGES :-**
   Definition of strain and its relation of experimental Determinations Properties of Strain-Gauge Systems-Types of Strain Gauges –Mechanical, Acoustic and Optical Strain Gauges. Introduction to Electrical strain gauges - Inductance strain gauges – LVDT – Resistance strain gauges – various types –Gauge factor – Materials of adhesion base..

3. **STRAIN ROSSETTES AND NON – DESTRUCTIVE TESTING OF CONCRETE:-**
   Introduction – the three elements Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge.
   Ultrasonic Pulse Velocity method –Application to Concrete. Hammer Test – Application to Concrete.
4. **THEORY OF PHOTOELASTICITY** :-
   Introduction –Temporary Double refraction – The stress Optic Law –Effects of stressed model in a polariscope for various arrangements – Fringe Sharpening. Brewster's Stress Optic law.
5. **TWO DIMENSIONAL PHOTOELASTICITY :-**
   Introduction – Isochramic Fringe patterns- Isoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope Isoclinic Fringe patterns – Compensation techniques – Calibration methods – Separation methods – Scaling Model to prototype Stresses – Materials for photo – Elasticity Properties of Photoelastic Materials.

   Reference Books :-
   1.Experimental stress analysis by J.W.Dally and W.F.Riley, College House Enterprises
   2. Experimental stress analysis by Dr.Sadhu Singh.khanna Publishers
   3.Experimental Stress analysis by U.C.Jindal, Pearson Pubilications.
   4. Experimental Stress Analysis by L.S.Srinath, MC.Graw Hill Company Publishers.

OUTCOMES:
After completion of the course
1. **The student** will be able to understand different methods of experimental stress analysis

2. **The student** will be able to understand the use of strain gauges for measurement of strain
3. **The student** will be exposed to different Non destructive methods of concrete
4. **The student** will be able to understand the theory of photo elasticity and its applications in analysis of structures

IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70104	**ENVIRONMENTAL IMPACT ASSESTMENT & MANAGEMENT (OPEN ELECTIVE – II)**	3	-	-	3

Objective:-
This course is aimed at exposing the student to the concept of environmental impact assessment and methodologies used for the same. The student will also be imparted the knowledge about the various laws related to EIA and also methods of EIA audit.

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

UNIT – II
EIA METHODOLOGIES:-
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 and cost/benefit Analysis.

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. Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

UNIT – IV
ASSEMENT OF IMPACT ON VEGETATION AND WILDLIFE :
Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.
ENVIRONEMNTAL AUDIT :
Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocel, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.
UNIT-V
ENVIRONEMENTAL ACTS (PROTECTION AND PREVENTION)

Post Audit activities, The Environmental protection Act, The water preventation Act, The Air (Prevention & Control of pollution Act.), Wild life Act.Case studies and preparation of Environmental Impact assessment statement for various Industries.

TEXT BOOKS:
1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers

REFERENCES:
1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katari & Sons Publication., New Delhi.
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi

Outcomes :-
 After completion of this course the student will be able to
1. Understand the concept of Environmental impact
2. Understand the methodologies related to EIA
3. Appreciate various laws related to environmental protection
4. Prepare the environmental impact assessment statement and to evaluate it.

IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70104	**DISASTER MANAGEMENT AND MITIGATION** **(OPEN ELECTIVE – II)**	3	-	-	3

Objective:-The objectives of this is to give the basic knowledge of Environmental Hazards and disasters. The syllabus includes the basics of Endogenous and Exogenous hazard's and gives a suitable picture on the different types of hazardas.

Unit-I

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

Unit –II

Types of Environmental hazards & Disasters: Natural hazards and Disasters - Man induced hazards & Disasters - Natural Hazards- Planetary Hazards/ Disasters - Extra Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards - Exogenous Hazards –

Unit–III

Endogenous Hazards - Volcanic Eruption – Earthquakes – Landslides - Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - - Human adjustment, perception & mitigation of earthquake.

Unit –IV

Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters

Infrequent events: Cyclones – Lightning – Hailstorms Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes ,   distribution human adjustment, perception & mitigation)Cumulative atmospheric hazards/ disasters : - Floods- Droughts- Cold waves- Heat waves.Floods:- Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation).Droughts:- Impacts of

droughts- Drought hazards in India- Drought control measures- Extra Palnetary Hazards/ Disasters- Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion

Soil Erosion:-- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion-Conservation measures of Soil Erosion.Chemical hazards/ disasters:-- Release of toxic chemicals, nuclear explosion- Sedimentation processes.Sedimentation processes:- Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation.Biological hazards/ disasters:-Population Explosion.

Unit –V

Emerging approaches in Disaster Management- Three Stages
1. Pre- disaster stage (preparedness)
2. Emergency Stage
3. Post Disaster stage-Rehabilitation

Text books:

1. Disaster Management by Rajib Shah, Universities Press, India, 2003
2. Disaster Mitigation: Experiences And Reflections by Pardeep Sahni
3. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning

References

1.Kates,B.I & White, G.F The Environment as Hazards, oxford, New York, 1978

2.R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000

3.H.K. Gupta (Ed) Disaster Management, Universiters Press, India, 2003

4.R.B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo,1994

5.Dr. Satender , Disaster Management t in Hills, Concept Publishing Co., New Delhi,   2003

IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70105	**BRIDGE ENGINEERING** **(Elective – I)**	3	-	-	3

OBJECTIVE: It deal with different types of Bridges like deck slab bridge, T – Beam Bridge e.t.c and gives a god knowledge on different components of bridges.

UNIT - I
INTRODUCTION:
Importance of site investigation in Bridge design. Highway Bridge loading standards. Impact factor. Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges.
BOX CULVERT :   General aspects. Design loads, Design of Box culvert subjected to RC class AA tracked vehicle only.
BRIDGE BEARINGS :
General features – Types of Bearings – Design principles of steel Rocker & Roller Bearings – Design of a steel Rocker Bearing – Design of Elastometric pad Bearing.

UNIT - II
DECK SLAB BRIDGE :
Introduction – Effective width method of Analysis Design of deck slab bridge (Simply supported) subjected to class AA Tracked Vehicle only.

UNIT - III
BEAM & SLAB BRIDGE (T-BEAM BRIDGE)
General features – Design of interior panel of slab – Pigeauds method – Design of a T-beam bridge subjected to class AA tracked vehicle only.

UNIT – IV
PLATE GIRDER BRIDGE :
Introduction – elements of a plate girder and their design. Design of a Deck type welded plate girder – Bridge of single line B.G.
COMPOSITE BRIDGES :
Introduction – Advantages – Design of Composite Bridges consisting of RCC slabs over steel girders' including shear connectors

UNIT V
PIERS & ABUTMENTS:
General features – Bed Block – Materials piers & Abutments Types of piers – Forces acting on piers – Stability analysis of piers – General features of Abutments – forces acting on abutments – Stability analysis of abutments – Types of wing walls – Approaches – Types of Bridge foundations (excluding Design).

TEXT BOOKS :
1. Bridge Engineering by Ponnu Swamy, TATA Mcgraw Hill Company, New Delhi.
2. Design of Bridges by N.Krishnam Raju, Oxford & IBH, Publishing Company Pvt.ltd., Delhi.

3. Relevant – IRC & Railway bridge Codes.

REFERENCE :-
1. Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
2. Design of Bridges Structure by D.J.Victor
3. Design of Steel structures by Ramachandra.
4. Design of R.C.C. structures B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
5. Design of Bridges Structure by T.R.Jagadish & M.A.Jayaram Prentice Hall of India Pvt., Delhi.

IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70105	**GROUND IMPROVEMENT TECHNIQUES** (Elective – I)	3	-	-	3

Objective :- The knowledge on the problems posed by the problematic soils and the remedies to build the various structures in problematic soils.

UNIT – I

DEWATERING: Methods of de-watering- sumps and interceptor ditches- single, multi stage well points - vacuum well points- Horizontal wells-foundation drains-blanket drains- criteria for selection of fill material around drains –Electro-osmosis .

GROUTING: Objectives of grouting- grouts and their properties- grouting methods- ascending, descending and stage grouting- hydraulic fracturing in soils and rocks- post grout test.

UNIT – II

DENSIFICATION METHODS IN GRANULAR SOILS:-

In – situ densification methods in granular Soils:– Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth.

DENSIFICATION METHODS IN COHESIVE SOILS:–

In – situ densification methods in Cohesive soils:– preloading or dewatering, Vertical drains – Sand Drains, Sand wick geodrains – Stone and lime columns – thermal methods.

UNIT – III

STABILISATION: Methods of stabilization-mechanical-cement- lime-bituminous-chemical stabilization with calcium chloride,sodium silicate and gypsum

UNIT – IV

REINFORCED EARTH: Principles – Components of reinforced earth – factors governing design of reinforced earth walls – design principles of reinforced earth walls.

GEOSYNTHETICS : Geotextiles- Types, Functions and applications – geogrids and geomembranes – functions and applications.

UNIT - V

EXPANSIVE SOILS: Problems of expansive soils – tests for identification – methods of determination of swell pressure. Improvement of expansive soils – Foundation techniques in expansive soils – under reamed piles.

TEXT BOOKS:

1. Haussmann M.R. (1990), Engineering Principles of Ground Modification, McGraw-Hill International Edition.
2. Dr.P.Purushotham Raj. Ground Improvement Techniques, Laxmi Publications, New Delhi / University science press, New Delhi
3. Nihar Ranajan Patra. Ground Improvement Techniques, Vikas Publications, New Delhi

REFERENCES:

1. Moseley M.P. (1993) Ground Improvement, Blackie Academic and Professional, Boca Taton, Florida, USA.
2. Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994) Ground Control and Improvement, John Wiley and Sons,
New York, USA.

3. Robert M. Koerner, Designing with Geosynthetics, Prentice Hall New Jercy, USA

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IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70105	**Cost Effective Housing Techniques (Elective – I)**	3	-	-	3

UNIT-I: a) **Housing Scenario**

Introducing - Status of urban housing - Status of Rural Housing

b) Housing Finance:

Introducing - Existing finance system in India - Government role as facilitator - Status at Rural Housing Finance - Impedimently in housing finance and related issues

a) **Land use and physical planning for housing**

introduction - Planning of urban land - Urban land ceiling and regulation act - Efficiency of building bye lass - Residential Densities

b) **Housing the urban poor**

Introduction - Living conditions in slums - Approaches and strategies for housing urban poor

UNIT-II: Development and adoption of low cost housing technology

Introduction - Adoption of innovative cost effective construction techniques - Adoption of precast elements in partial prefatroices - Adopting of total prefactcation of mass housing in India- General remarks on pre cast rooting/flooring systems -Economical wall system - Single Brick thick loading bearing wall - 19cm thick load bearing masonery walls - Half brick thick load bearing wall - Flyash grypsym thick for masonry - Stone Block masonry - Adoption of precast R.C. plank and join system for roof/floor in the building

UNIT-III: Alternative building materials for low cost housing

Introduction - Substitute for scarce materials – Ferrocement - Gypsum boards - Timber substitutions - Industrial wastes - Agricultural wastes - Fitire starateru; for ,p,topm of alternative building maintenance

Low cost Infrastructure services:

Introduce - Present status - Technological options - Low cost sanitation - Domestic wall - Water supply, energy

UNIT-IV: Rural Housing:

Introduction traditional practice of rural housing continuous - Mud Housing technology Mud roofs - Characteristics of mud - Fire treatment for thatch roof - Soil stabilization - Rural Housing programs

UNIT-V: Housing in Disaster prone areas:

Introduction – Earthquake - Damages to houses - Traditional prone areas - Type of Damages and Railways of non-engineered buildings - Repair and restore action of earthquake Damaged non-engineered buildings recommendations for future constructions. Requirement's of structural safety of thin precost roofing units against Earthquake forcesStatus of R& D in earthquake strengthening measures - Floods, cyclone, future safety

TEXT BOOKS

1. Building materials for low –income houses – International council for building research studies and documentation.
2. Hand book of low cost housing by A.K.Lal – Newage international publishers.
3. Properties of concrete – Neville A.m. Pitman Publishing Limited, London.
4. Light weight concrete, Academic Kiado, Rudhai.G – Publishing home of Hungarian Academy of Sciences 1963.
5. Low cost Housing – G.C. Mathur.
6. Modern trends in housing in developing countries – A.G. Madhava Rao, D.S. Ramachandra Murthy & G.Annamalai.

IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70106	DESIGN STUDIO LAB	-	1	3	2

CAD:
SOFTWARE:
1. STAAD PRO or Equivalent

EXCERCISIES:
1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple tower Analysis and Design
6. One Way Slab Analysis & Design
7. Two Way Slab Analysis & Design
8. Column Analysis & Design

TEXT BOOK:
1.Computer Aided Design Lab Manual by Dr.M.N.Sesha Prakash And Dr.C.S.Suresh

IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70107	**HIGHWAY MATERIALS LAB**	-	1	3	2

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.

LIST OF EQUIPMENT:
1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers.
4. Los angles Abrasion test machine
5. Deval'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. Penskey – Morten's apparatus
11. Relevant IS Codes

TEXT BOOKS:-
1.   Lab manual in High way Engineering by Ajay.K.Duggal & Vijay .P.Puri, New Age pubilications,New Delhi

IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80101	**ADVANCED STRUCTURAL ENGINEERING (ELECTIVE-II)**	3	-	-	3

OBJECTIVE: To make the student more conversant with the design principals of multistoried buildings, roof system, foundation and other important structures.

1. Design of a flat slab(Interior panel only)
2. Design of concrete bunkers of circular shape – (excluding staging) – Introduction to silos
3. Design of concrete chimney
4. Design of circular and rectangular water tank resting on the ground
5. Design of cantilever and counter forte retaining wall with horizontal back fill

FINAL EXAMINATION PATTERN:

The question paper shall contain 2 questions of either or type covering all the syllabus where each question carries 35 marks out of 35 marks, 20 marks shall be for the design and 15 marks are for the drawing.

TEXT BOOKS :-

1. Structural Design and drawing (RCC and steel) by Krishnam Raju, Universites .Press , New Delhi
3. R.C.C Structures by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications, New Delhi
4. Advanced RCC by Varghese , PHI Publications, New Delhi.
5. Design of RCC structures by M.L.Gambhir P.H.I. Publications, New Delhi.

Reference books :-

1. R.C.C Designs by Sushil kumar , standard publishing house.
2. Fundamentals of RCC by N.C.Sinha and S.K.Roy, S.Chand Publications, New Delhi.

Subject Code	Title of the Subject	L	T	P	C
17A80101	**BUILDING CONSTRUCTION MANGEMENT (ELECTIVE-II)**	3	-	-	3

Objective: The objective of the course is to make the student to understand about fundamentals of construction management and techniques to be used to perform and complete the construction works intime by saving time and money.

UNIT - I
FUNDAMENTALS OF CONSTRUCTION TECHNOLOGY :
Definitions and Discussion – Construction Activities – Construction Processes - Construction Works – Construction Estimating – Construction Schedule – Productivity and Mechanized Construction – Construction Documents – Construction Records – Quality – Safety – Codes and Regulations.
PREPARATORY WORK AND IMPLEMENTATION
Site layout – Infrastructure Development – Construction Methods – Construction Materials – Deployment of Construction Equipment – Prefabrication in Construction – Falsework and Temporary Works.

UNIT - II
EARTHWORK :
Classification of Soils – Project Site – Development – Setting Out - Mechanized Excavation – Groundwater Control – Trenchless (No-dig) Technology – Grading – Dredging.Rock Excavation – Basic Mechanics of Breakage – Blasting Theory – Drillability of Rocks – Kinds of Drilling – Selection of the Drilling Method and Equipment – Explosives – Blasting Patterns and Firing Sequence – Smooth Blasting – Environmental Effect of Blasting.

UNIT - III
PROJECT MANAGEMENT AND BAR CHARTS AND MILESTONE CHARTS :
Introduction – Project planning – Scheduling – Controlling – Role of decision in project management – Techniques for analyzing alternatives Operation research – Methods of planning and programming problems – Development of bar chart – Illustrative examples – Shortcomings of bar charts and remedial measures – Milestone charts – Development of PERT net work problems.

UNIT - IV
ELEMENTS OF NETWORK AND DEVELOPMENT OF NETWORK :
Introduction – Event – Activity – Dummy – Network rules – Graphical guidelines for network – Common partial situations in network – Numbering the events – Cycles Problems – Planning for network construction – Modes of network construction – Steps in development of network – Work breakdown structure –Hierarchies – Illustrative examples – Problems.

UNIT - V
PERT AND CPM: TIME COMPUTATIONS & NETWORK ANALYSIS

Introduction – Uncertainties : Use of PERT – Time estimates – Frequency distribution – Mean, variance and standard deviation – Probability distribution – Beta distribution – Expected time Problems -Earliest expected time – Formulation for T_E - Latest allowable occurrence time – Formulation for T_L - Combined tabular computations for T_E and T_L problems.Introduction - Slack – Critical path – Illustrative examples – Probability of meeting scheduled date Problems – CPM : process – CPM : Networks – Activity time estimate – Earliest event time – Latest allowable occurrence time – Combined tabular computations for T_E and T_L - Start and f inish times of activity – Float – Critical activities and critical path – Illustrative examples Problems.

TEXT BOOKS :
1. Construction project management by Jha ,Pearson pubilications,New Delhi.
2. Construction Technology by Subir K.Sarkar and Subhajit Saraswati – Oxford Higher Education- Univ.Press, Delhi.
3. Project Planning and Control with PERT and CPM by Dr.B.C.Punmia, K.K.Khandelwal, Lakshmi Publications New Delhi.

REFERENCES:
1. Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003.
2. Total Project management, the Indian context- by : P.K.JOY- Mac Millan Publishers India Limited.

IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80101	**WATER HARVESTING AND CONSERVATION (ELECTIVE-II)**	3	-	-	3

OBJECTIVE:
The main aim of this course is to discuss various aspects of water resources development and management on watershed basis. The various sections in the course will focus on the technical aspects of watershed management; perspectives on water management; skills of analyzing the complex issues in water management and on specific knowledge on issues of watershed management.

Unit – I
Water Harvesting: Principles of water harvesting-methods of rainwater harvesting-design of rainwater harvesting structures-Purification Techniques for direct use- Harvesting of surface runoff-onsite detention basin - ponds - types - Recycling of harvested water

Unit – II
Water Recovery and Reuse: Perspective on recycle and reuse- factors affecting the development of water reclamation and reuse criteria- elements/components of water reclamation and reuse criteria / guidelines- sewage irrigation- Waste water reclamation-waste water recharge for reuse – Treatment Requirements for Water Reuse-methods

Unit – III
Sustainable Watershed Approach & Watershed Management Practices: Concept of watershed-Introduction to watershed management- Integrated water resources management- natural resources management-agricultural practices-integrated farming-Conjunctive use of water resources-Community participation-Watershed Management Practices in Arid and Semiarid Regions-Case studies-Short term and long term strategic planning.

Unit – IV
Watershed Modeling: Standard modeling approaches and classifications, system concept for watershed modeling, overall description of different hydrologic processes, modeling of rainfall-runoff process, subsurface flows and groundwater flow.

Unit – V
Soil and Water Conservation: Scope of soil and water conservation-Mechanics and types of erosion-their causes-Soil erosion control measures - bank protection-vegetative barriers-contour bund- contour trenches-contour stone walls-contour ditches-terraces-outlets and grassed waterways-Gully control structures - temporary and permanent - design of permanent soil conservation structures-Design of farm ponds and percolation ponds.

Text books and Reference books:

1. Pierce, F.J. and Frye, W. W. (1998): Advances in Soil and Water Conservation, Ann Arbor Press, Michigan.
2. Schwab, G. O., Fangmeier, D. D., Elliot, W. J. and Frevert, R. K. (1993): Soil and Water Conservation Engineering, 4th Ed. John Wiley and Sons Inc., USA
3. Murty, J.V.S. "Watershed Management", New Age Intl., New Delhi 1998.
4. Murthy, J.V.S., Watershed Management in India, Wiley Eastern, New Delhi, 1994 .
5. 5.Dilip Kumar Majumdar, Irrigation water management - Principles and Practice, PHI Pvt.Ltd.NewDelhi-1.
6. Madan Mohan Das&Mimi Das Saikia, Irrigation and water power Engineering,PHI learning pvt. Ltd., NewDelhi-1
7. Chatterjee, S. N., Water Resources Conservation and Management, Atlantic Publishers, 2008

OUTCOMES:
After completion of this course the student will be able to understand various concepts related to
1. Water harvesting methods and principles
2. Water recovery and reuse
3. Sustainable watershed management practices
4. Watershed modeling techniques
5. Methods of soil and water conservation

IV Year B.Tech (Civil Engineering) – IISemester

Subject Code	Title of the Subject	L	T	P	C
17A80102	**DESIGN AND DRAWING OF IRRIGATION STRUCTURES (ELECTIVE-III)**	3	-	-	3

Design and drawing of the following irrigation structures.

1. Sloping glacis weir
2. Surplus weir.
3. Tank sluice with tower head
4. Type III Syphon aqueduct.
5. Canal regulator.

Final Examination pattern: Any two questions of the above Five designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

TEXT BOOKS:
1. Design of minor irrigation and canal structures by C.Satyanarayana Murthy, Wiley eastern Ltd.
2. Irrigation engineering and Hydraulic structures by S.K.Garg, Standard Book House.

IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80102	**ADVANCED FOUNDATION ENGINEERING (ELECTIVE –III)**	3	-	-	3

UNIT - I
SHALLOW FOUNDATIONS-I:

General Requirements Of Foundations. Types Of Shallow Foundations And The Factors Governing The Selection Of A Type Of Shallow Foundation. Bearing Capacity Of Shallow Foundations By Terzaghi's Theory And Meyerhof's Theory (Derivation Of Expressions And Solution To Problems Based On These Theories). Local Shear And General Shear Failure And Their Identification. Bearing Capacity Of Isolated Footing Subjected To Eccentric And Inclined Loads. Bearing Capacity Of Isolated Footing Resting On Stratified Soils-Button's Theory And Siva Reddy Analysis.

UNIT - II
ANALYSIS AND STRUCTURAL DESIGN OF R.C.C. FOOTINGS:
Analysis and structural design of R.C.C. isolated, combined and strap footings.

UNIT - III
DEEPFOUNDATIONS:

Pile foundations-types of pile foundations. Estimation of bearing capacity of pile foundation by dynamic and static formulae. Bearing capacity and settlement analysis of pile groups. Negative skin Friction, Pile load tests. Well foundations – elements of well foundation. Forces acting a on a well foundation. Depth and bearing capacity of well foundation. Design of individual components of well foundation (only forces acting and principles of design). Problems associated with well sinking.

UNIT - IV
SHEET PILE WALLS:
Cantilever sheet piles and anchored bulkheads, Earth Pressure diagram, Determination of depth of embedment in sands and clays-Timbering of Trenches – Earth Pressure Diagrams – Forces in struts.
DESIGN OF UNDER REAMED PILES FOUNDATIONS:
Under reamed piles-principle of functioning of under reamed pile-Analysis and structural design of under reamed pile.

UNIT - V
FOUNDATIONS IN PROBLEMATIC SOILS :
Foundations in black cotton soils- basic foundation problems associated with black cotton soils. Lime column techniques – Principles and execution. Use of Cohesive Non Swelling (CNS) layer below shallow foundations.

TEXT/ REFERENCE BOOKS :

1. Analysis and Design of Foundations and Retaining Structures- Shamsher Prakash, Gopal Ranjan and Swami Saran.
2. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Pubilications
3.Geotechnical Engg. – C.Venkatramaiah. New age International Pvt . Ltd, (2002).

REFERENCES:-
1. Analysis and Design of Foundations – E.W.Bowles.
2. Foundation engineering by Brije.M.Das, Cengage pubilications,New Delhi.
3. Foundations Design and Construction – Tomlinson.
4. Foundation Design-Teng.

IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80102	**ARCHITECTURE AND TOWN PLANNING (ELECTIVE-III)**	3	-	-	3

Objective:-   To know the western architecture and Indian architecture and also to gain knowledge on the principles of architectural design and historical background of town planning.

A) ARCHITECTURE:
UNIT-I
　　　History of Architecture:
a)　**Western Architecture:** Egyptian, Greek, Roman Architectures; influences-Comparative Analysis Orders.
b)　**Indian Architecture:** Vedic age - Indus Valley civilization - Buddhist period; stambas, Slenstas. Roranas, Chaityans, Viharas with one example for each Hindu temples - Evaluation of Dravidian and Indo Aryan Styles - Principle factors. Temple of Aibole, Mahabalipuram, Madurai, Deograph, Bhuvaneshwar, Mount Abu.
c)　Indo - Sarsanic Architecture; Mosque - Place- Fort Tomb.

UNIT - II
　　　Architectural Design:
a)　**Principle of designing** : Composition of plan Relationship between plan and elevation elements, form, surface Mass, Texture, Color, Tone.
b)　**Principle of Compositions:** Unity, contrast, proportion, scale, Bab Rhuthm, character. Principles of Planning a Residence; Site Orientation prospect, Grouping, circulation, privacy, services and other factors.
UNIT – III
　　　Introduction of Post-classic Architecture and contribution of eminent architects to modern period.
　　　Brief summary of post - classic architecture - Indian and Western Architectural contribution of Edward Lutyens, Le Corbusier), Frank Lloyd Wrigt, Walter Groping, Vender Rohe, Caarihan, Nervi, Oscar Niemyer, Edward Durell stone.

B) TOWN PLANNING:
UNIT – IV
　　　Historical Back Ground:
　　　Town planning in India - town plans of Magad - town plans of ancient Indian towns; Mourya, Pataliputra vijayanagara, Delhi.Town planning in the West-town plans of Acropolis, Rome,   Paris, London.

UNIT – V
Components of Planning;
　　　a)　Zoning
　　　b)　Roads and road Traffic.

a)   Housing-Slums, Parks, Play grounds.
b)   Public Utility Services.
c)   Surveys and maps for planning.
d)   Neighbourhood Planning.
Planning New town, planning standards, National and regional Planning, town planning and legislation.
Garden cities and satellite town

REFERENCES:

A)   ARCHITECTURE
1.   Indian Architecture – Vol:- I and II by Percy Brown, Taraporevala Publications, Bombay.
2.   Planning and 'Design of Building -Section of Architecture by Y.S.Sane.
3.   Modern Architecture and Design by Nikolans, Pevshar.
4.   Modern Ideal Hol11nes for India by R.S.Deshpande.
B)   TOWN PLANNING
1.   Town and Country .Planning - A.J.Brown and H.M.Sherrard.
2.   Town Design .- Federik Gibbard, Architectural press, London.
3.   National Building Code of India.
4.   Town Planning in India - Town and Country Planning Organisation, New Delhi 1962.
5.   Regional Planning - Misra R.P., Mysore University.
6.   Urban and Regional Planning; Principles and case studies by K.S.Rama Gouda, Mysore University Publications.
7.   Town and Country Planning - P. Abercrombe, Oxford University press.

IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80103	**REHABILITATION AND RETROFITING OF STRUCTURES (ELECTIVE –IV)**	3	-	-	3

UNIT – I

Introduction – Deterioration of Structures – Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage

UNIT – II

Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation.

UNIT – III

Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment – NDT.

UNIT – IV

Repair of Structure – Common Types of Repairs – Repair in Concrete Structures – Repairs in Under Water Structures – Guniting – Shot Create – Underpinning. Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing.

UNIT – V

Health Monitoring of Structures – Use of Sensors – Building Instrumentation.

TEXT BOOKS:
1. Concrete Technology by A.R. Santakumar, Oxford University press
2. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.

REFERENCES

1. Defects and Deterioration in Buildings, EF & N Spon, London
2. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press
3. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W.H. Ranso, (1981)
4. Building Failures : Diagnosis and Avoidance, EF & N Spon, London, B.A. Richardson, (1991).

IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80103	**TRANSPORTATION ENGINEERING - II (ELECTIVE –IV)**	3	-	-	3

OBJECTIVE: *It deal with different components of Transportation Engineering like Railway , Airport Engineering & harbours. Sound knowledge can acquire on components of airports, docks and harbours.*

Unit – I
Railway Engineering:
Introduction – permanent way components – cross section of permanent way – functions and requirements of rails, sleepers and ballast – types of gauges – creep of rails – theories related to creep – coning of wheels – adzing of sleepers – rail fastenings.

Unit – II
Geometric design of railway track
Gradients – grade compensation – cant and negative super elevation – cant deficiency – degree of curves – safe speed on railway track – points and crossings – layout and functioning of left hand turn out and right hand turn outs – station yards – signaling and interlocking.

Unit –III
Airport Engineering
Airport site selection – factors affecting site selection and surveys- runway orientation – wind rose diagram – basic runway length – correction for runway length – terminal area – layout and functions – concepts of terminal building – simple building , linear concept, pier concept and satellite concept – typical layouts .

Unit – IV
Geometric design of runways and taxiways
Aircraft characteristics – influence of characteristics on airport planning and design – geometric design elements of runway – standards and specifications as per   - functions of taxiways – taxiway geometric design – geometric elements and standard specifications – runway and taxiway lighting.

Unit – V
Ports and Harbours
Requirements of ports and harbours – types of ports – classification of harbours – docks and types of docks – dry docks, wharves and jetties – breakwaters: layouts of different types of harbours and docks – dredging operations – navigation aids.

Text books:
1. A Text Book of Railway Engineering-S.C.Saxena and S.Arora, Dhanpatrai and Sons, New Delhi.
2. Satish Chandra and Agarwal, M.M. (2007) "Railway Engineering" Oxford Higher Education, University Press New Delhi.
3. Airport Planning and Design- S.K. Khanna and M.G Arora, Nemchand Bros.

4. A Text book of Transportation Engineering – S.P.Chandola – S.Chand & Co. Ltd. – (2001).
5. Railway Track Engineering by J.S.Mundrey

References:
1. Highway, railway, Airport and Harbour Engineering – K.P. Subramanian, Scitech pubilishers.
2. Harbour, Dock and Tunnel Engineering – R. Srinivasan, Charotar Publishing House Pvt. Limited, 2009
3. Dock and Harbour Engineering – Hasmukh P Oza, Gutam H Oza, Chartor Publishers pvt ltd.

Subject Code	Title of the Subject	L	T	P	C
17A80103	**REMOTE SENSING AND GIS (ELECTIVE –IV)**	3	-	-	3

UNIT – I
INTRODUCTION TO PHOTOGRAMMETRY:
Principles& types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

UNIT – II
REMOTE SENSING :
Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT – III
GEOGRAPHIC INFORMATION SYSTEM:
Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.
TYPES OF DATA REPRESENTATION:
Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

UNIT – IV
GIS SPATIAL ANALYSIS:
Computational Analysis Methods(CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT – V
WATER RESOURCES APPLICATIONS:
Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics.
Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

TEXT BOOKS:

1. Remote Sensing and GIS by B.Bhatta, Oxford University Press,New Delhi.
2. Advanced surveying : Total station GIS and remote sensing – Satheesh Gopi – Pearson publication.

REFERENCES:

1. Fundamentals of remote sensing by gorge Joseph , Universities press, Hyderabad.
2. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
3. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
4. Remote sensing and GIS by M.Anji reddy ,B.S.Pubiliications,New Delhi.
5. Remote Sensing and its applications by LRA Narayana University Press 1999.
6. GIS by Kang – tsung chang, TMH Publications & Co.,
7. Principals of Geo physical Information Systems – Peter A Burragh and Rachael Mc Donnell, Oxford Publishers 2004

IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80104	**AIR POLLUTION AND CONTROL (ELECTIVE –V)**	3	-	-	3

UNIT – I
INTRODUCTION : Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution- stationary and mobile sources.
EFFECTS OF AIR POLLUTION : 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
THERMODYNAMIC OF AIR POLLUTION:
Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like Sox, Nox, CO, HC etc., air-fuel ratio. Computation and Control of products of combustion.
PLUME BEHAVIOUR : 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.

UNIT-III
POLLUTANT DISPERSION MODELS : Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.
CONTROL OF PARTICULATES : Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control, Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

UNIT – IV
CONTROL OF GASEOUS POLLUTANTS : General Methods of Control of Nox and Sox emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

UNIT – V
AIR QUALITY MANAGEMENT : Air Quality Management – Monitoring of SPM, SO; NO and CO Emission Standards.

TEXT BOOKS:
1. Air Quality by Thod godish, Levis Publishers, Special India Edition, New Delhi
2. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.
3. Air pollution by Wark and Warner.- Harper & Row, New York.

REFERENCE:
1. An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S. Publications.

2. Air Pollution and Control by K.V.S.G.Murali Krishna, Kousal & Co. Publications, New Delhi.
3. Enivronmental meteorology by S.Padmanabham murthy , I.K.Internationals Pvt Ltd,New Delhi.

IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80104	**PRESTRESSED CONCRETE (ELECTIVE –V)**	3	-	-	3

UNIT – I
INTRODUCTION:
Historic development – General principles of prestressing pretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.
METHODS OF PRESTRESSING:-
Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System.

UNIT – II
LOSSES OF PRESTRESS:-
Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of stress in steel, slip in anchorage ,bending of member and wobble frictional losses.

UNIT – III
ANALYSIS & DESIGN OF SECTIONS FOR FLEXURE;-
Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure – Kern – lines, cable profile.

UNIT – IV
DESIGN OF SECTION FOR SHEAR :
Shear and Principal Stresses – Design for Shear in beams.
COMPOSITE SECTION:
Introduction – Analysis of stress – Differential shrinkage – General designs considerations.

UNIT – V
DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS:
Importance of control of deflections – factors influencing deflections – short term deflections of uncracked members prediction of long term deflections.

TEXT BOOKS:
1. Prestressed Concrete by N. Krishna Raju; - Tata Mc.Graw HillPublications.
2. Prestressed Concrete by Ramamrutham,Dhanpatrai Publications
3. Prestressed Concrete design Praveen Nagrajan, Pearson publications, 2013 editions.

REFERENCES:
1. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns, John Wiley & Sons.
2. Pre stressed concrete by E.G.Nawy

Codes/Tables:
Codes: BIS code on prestressed concrete, IS 1343 to be permitted into the examination Hall.
Code:15A01804c

IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80104	**EARTHQUAKE RESISTANT STRUCTURES (ELECTIVE – V)**	3	-	-	3

UNIT – I

Introduction to Structural Dynamics : – Theory of vibrations – Lumped mass and continuous mass systems – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Undamped and damped free vibration – Damping – Response to harmonic excitation – Concept of response spectrum.

UNIT – II

Multi-Degree of Freedom (MDOF) Systems : - Formulation of equations of motion – Free vibration – Determination of natural frequencies of vibration and mode shapes – Orthogonal properties of normal modes – Mode superposition method of obtaining response.

UNIT – III

Earthquake Analysis : - Introduction – Rigid base excitation – Formulation of equations of motion for SDOF and MDOF Systems – Earthquake response analysis of single and multi-storyed buildings – Use of response spectra.Review of the latest Indian seismic code IS:1893 – 2002 (Part-I) provisions for buildings – Earthquake design philosophy – Assumptions – Design by seismic coefficient and response spectrum methods – Displacements and drift requirements – Provisions for torsion.

UNIT – IV

Earthquake Engineering : - Engineering Seismology – Earthquake phenomenon – Causes and effects of earthquakes – Faults – Structure of earth – Plate Tectonics – Elastic Rebound Theory – Earthquake Terminology – Source, Focus, Epicenter etc – Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic Zoning Map of India – Seismograms and Accelegrams.Review of the latest Indian Seismic codes IS:4326 and IS:13920 provisions for ductile detailing of R.C buildings – Beam, column and joints

UNIT – V

Aseismic Planning : - Plan Configurations – Torsion Irregularities – Re-entrant corners – Non-parallel systems – Diaphragm Discontinuity – Vertical Discontinuities in load path – Irregularity in strength and stiffness – Mass Irregularities – Vertical Geometric Irregularity – Proximity of Adjacent Buildings.
Shear walls : - Types – Design of Shear walls as per IS:13920 – Detailing of reinforcements.

TEXT BOOKS:
1. Dynamics of Structures by A.K.Chopra – Pearson Education, Indian Branch, Delhi.
2. Dynamics of Structures – Clough & Penzien, McGraw Hill – International Edition.

3. Earthquake Resistant Design of Structures by S.K.Duggal, Oxford University press, New Delhi

REFERENCES:
1. Structural Dynamics by Mario Paaz , Academic Pubilishers.
2. Earthquake Resistant Design of Structures – Pankaj Agarwal & Manish Shrikhande – Printice Hall of India, New Delhi
3. Earthquake Tips by C.V.R.Murty, I.I.T. Kanpur.
4. Earthquake Hazardous Mitijation by R.Ayothiraman and Hemanth Hazarika, I.K.International Publishing House Pvt.Ltd., New Delhi.

Codes/Tables:
IS Codes: IS:1893, IS:4326 and IS:13920 to be permitted into the examinations Hall.