



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
(Established by Govt. of A.P., Act. No. 30 of 2008)  
ANANTHAPURAMU – 515 002 (A.P) INDIA

**Course Structure & Syllabus for B.Tech. (Regular)**  
**R13 Regulations**  
**CIVIL ENGINEERING**

**B.Tech. I YEAR**

S.No	Course code	Subject	Th	Tu/Drg/Lab.	Credits
1.	13A52101	Communicative English	2	- - -	3
2.	13A56101	Engineering Physics	2	- - -	3
3.	13A51101	Engineering Chemistry	2	- - -	3
4.	13A54101	Mathematics - I	3	1 - -	5
5.	13A12101	Programming in C & Data Structures	3	1 - -	5
6.	13A01101	Engineering Mechanics	3	1 - -	5
7.	13A03101	Engineering Drawing *	1	- 5 -	5
8.	13A12102	Programming in C & Data Structures Lab	-	- - 3	4
9.	13A99102	Engineering Physics & Engineering Chemistry Lab **	-	- - 3	4
10.	13A99103	Engineering & IT Workshop #	-	- - 3	4
11.	13A52102	English Language Comm. Skills Lab	-	- - 3	4
Total Credits					45

Th = Theory; Tu = Tutorial, Drg= Drawing & Lab = Laboratory:

\* Engineering Drawing will have University External Exam.

\*\* The students shall attend the Physics lab and Chemistry lab in alternate weeks. The end exam shall be conducted separately and average of the two exams shall be recorded by the University exam section.

# The students shall attend Engineering workshop and IT work shop as a single lab every week and the end exam is conducted as a single lab. Sharing the Maximum marks and time for one task each from Engineering workshop and IT workshop. The sum of the marks awarded shall be recorded

**B.Tech. II - I Semester**

S.No	Course code	Subject	Theory	Tu / Lab	Credits
1.	13A54301	Mathematics – II	3	1 -	3
2.	13A99301	Electrical & Mechanical Technology	3	1 -	3
3.	13A01301	Strength of Materials – I	3	1 -	3
4.	13A01302	Surveying – I	3	1 -	3
5.	13A01303	Fluid Mechanics	3	1 -	3
6.	13A01304	Building Materials & Construction	3	1 -	3
7.	13A01305	Surveying Lab – I	-	- 3	2
8.	13A01306	Strength of Materials Lab	-	- 3	2
Total Credits					22

**B.Tech. II - II Semester**

S.No	Course code	Subject	Theory	Tu / Lab	Credits
1.	13A54303	Probability & Statistics	3	1 -	3
2.	13A01401	Strength of Materials – II	3	1 -	3
3.	13A01402	Hydraulics & Hydraulic Machinery	3	1 -	3
4.	13A01403	Environmental Science	3	1 -	3
5.	13A01404	Structural Analysis – I	3	1 -	3
6.	13A01405	Surveying – II	3	1 -	3
7.	13A01406	Fluid Mechanics & Hydraulic Machinery Lab	-	- 3	2
8.	13A01407	Surveying Lab – II	-	- 3	2
Total Credits					22

**Note:** Survey Camp for a duration of two weeks to be conducted before the commencement of III B.Tech. – I Sem classwork, in the II B.Tech. – II Sem break. This survey camp has to be evaluated for 50 marks by the internal faculty. It has a weightage of 2 credits. The marks and credits will be incorporated in IV B.Tech. – II Sem marks memo.

**B.Tech. III - I Semester**

S.No	Course code	Subject	Theory	Tu/ Drg / Lab	Credits
1.	13A01501	Building Planning & Drawing	2	- 2 -	3
2.	13A01502	Design & Drawing of Reinforced Concrete Structures	2	- 2 -	3
3.	13A01503	Concrete Technology	3	1 - -	3
4.	13A01504	Water Resources Engineering – I	3	1 - -	3
5.	13A01505	Structural Analysis – II	3	1 - -	3
6.	13A01506	Engineering Geology	3	1 - -	3
7.	13A01507	Engineering Geology Lab	-	- - 3	2
8.	13A01508	Concrete Technology Lab	-	- - 3	2
9.	13A52502	Advanced English Language Communication Skills Lab (Audit)	-	- - 3	-
<b>Total Credits</b>					<b>22</b>



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Revised Course Structure for B.Tech.- R13 Regulations

**CIVIL ENGINEERING**

**III - II Semester**

S.No	Course code	Subject	Theory	Tu	Lab	Credits
1.	13A01601	Design & Drawing of Steel Structures	3	1	-	3
2.	13A01602	Geotechnical Engineering - I	3	1	-	3
3.	13A01603	Environmental Engineering	3	1	-	3
4.	13A01604	Water Resources Engineering - II	3	1	-	3
5.	13A01605	Transportation Engineering - I	3	1	-	3
6.	13A01606 13A01607 13A01608	Choice Based Credit Courses 1. Finite Element Methods in Engineering 2. Disaster management and Mitigation 3. Intellectual Property Rights	3	1	-	3
7.	13A01609	Geotechnical Engineering Lab	-	-	4	2
8.	13A01610	Environmental Engineering Lab	-	-	4	2
9.	13A01611	Comprehensive Online Examination-II	-	-	-	1
			18	6	8	23

**DIRECTOR**  
Academic & Planning  
JNT University Anantapur,  
Ananthapuramu-515 002.



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**Course Structure for Civil Engineering  
B. Tech Course  
(2013-14)**

**IV B. Tech – I Sem**

S.No.	Course Code	Subject	Theory	Tu	Lab	Credits
1	13A52701	Managerial Economics & Financial Analysis (MEFA)	3	1	-	3
2	13A01701	Estimation, Costing and Valuation	3	1	-	3
3	13A01702	Geotechnical Engineering – II	3	1	-	3
4	13A01703	Transportation Engineering – II	3	1	-	3
5	13A01704 13A01705 13A01706	CBCC -2 1. Design & Drawing of Irrigation Structures 2. Ground Improvement Techniques 3. Air Pollution and Quality Control	3	1	-	3
6	13A01707 13A01708 13A01709	CBCC - 3 1. Bridge Engineering 2. Earth Quake Resistant Design of structures 3. Rehabilitation and Retrofitting of Structures	3	1	-	3
7	13A01710	CAD Laboratory	-	-	4	2
8	13A01711	Transportation Engineering Laboratory	-	-	4	2
		<b>Total</b>	<b>18</b>	<b>06</b>	<b>08</b>	<b>22</b>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR****Course Structure for CIVIL ENGINEERING  
B. Tech Course (2013-14)****IV B. Tech – II Sem**

<b>S.N o.</b>	<b>Course Code</b>	<b>Subject</b>	<b>Theory</b>	<b>Tu</b>	<b>Lab</b>	<b>Credits</b>
1	13A01801 13A01802	MOOC – I* 1. Urban Transportation Planning 2. Environmental Impact Assessment and Management	3	1	-	3
2	13A01803 13A01804	MOOC – II* 1. Remote Sensing & GIS 2. Advanced Structural Engineering	3	1	-	3
3	13A01805 13A01806	MOOC – III* 1. Pre Stressed Concrete 2. Cost Effective Housing Techniques	3	1	-	3
4	13A01807	Technical Seminar	-	-	4	2
5	13A01808	Project Work	-	-	20	10
6	13A01809	Survey Camp**	-	-	4	2
		<b>Total</b>	<b>9</b>	<b>03</b>	<b>28</b>	<b>23</b>

3 Theory + 1 Survey Camp + 1 Technical Seminar + 1 Project work

\*Either by MOOCS manner or Self study or Conventional manner

\*\* The survey camp conducted after II year – II semester, shall be evaluated in IV – II semester

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

**B.Tech. I Year**

<b>Th</b>	<b>Tu</b>	<b>C</b>
<b>2</b>	<b>0</b>	<b>3</b>

**Common to All Branches**

## **(13A52101) COMMUNICATIVE ENGLISH**

### **Preamble:**

*English is an international language as well as a living and vibrant one. People have found that knowledge of English is a passport for better career and for communication with the entire world. As it is a language of opportunities in this global age, English is bound to expand its domain of use everywhere. The syllabus has been designed to enhance communication skills of the students of Engineering and Technology. The prescribed books serve the purpose of preparing them for everyday communication and to face global competitions in future.*

*The first text prescribed for detailed study focuses on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and student-centered. They should be encouraged to participate in the classroom activities keenly.*

*The text for non-detailed study is meant for extensive reading/reading for pleasure by the students. They may be encouraged to read some selected topics on their own, which could lead into a classroom discussion. In addition to the exercises from the texts done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.*

### **Course Objective:**

- To enable the students to communicate in English for academic and social purpose.
- To enable the students to acquire structure and written expressions required for their profession.
- To develop the listening skills of the students.
- To inculcate the habit of reading for pleasure.
- To enhance the study skills of the students with emphasis on LSRW skills.

### **Learning Outcome:**

- The students will get the required training in LSRW skills through the prescribed texts and develop communicative competence.

## **UNIT I**

### **Chapter entitled ‘Humour’ from “Using English”**

### **Chapter entitled ‘Biography - (Homi Jehangir Bhabha)’ from “New Horizons”**

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 ‘Biography - (Jagadish Chandra Bose)’ 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 ‘Short Story - (The Happy Prince)’ from “New Horizons”**

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 ‘Poem - (IF by Rudyard Kipling)’ from “New Horizons”**

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 ‘Autobiography - (My Struggle for an Education by Booker T.Washington)’ from “New Horizons”**

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* published by Orient Black Swan.
2. *New Horizons* published by Pearson.

#### **Reference Books:**

1. *Raymond Murphy’s English Grammar with CD*, Murphy, Cambridge University Press, 2012.
2. *English Conversation Practice* –Grant Taylor, Tata McGraw Hill, 2009.
3. *Communication Skills*, Sanjay Kumar & Pushpalatha Oxford University Press, 2012.
4. *A Course in Communication Skills*- Kiranmai Dutt & co. Foundation Books, 2012.
5. *Living English Structures*- William Standard Allen-Pearson, 2011.
6. *Current English Grammar and Usage*, S M Guptha, PHI, 2013.
7. *Modern English Grammar*-Krishna SWAMI,McMillan, 2009.
8. *Powerful Vocabulary Builder*- Anjana Agarwal, New Age International Publishers, 2011.



B.Tech. I Year

Th	Tu	C
2	0	3

Common to All Branches

(13A56101) ENGINEERING PHYSICS

**Preamble:**

*There has been an exponential growth of knowledge in the recent past opening up new areas and challenges in the understanding of basic laws of nature. This helped to the discovery of new phenomena in macro, micro and nano scale device technologies. The laws of physics play a key role in the development of science, engineering and technology. Sound knowledge of physical principles is of paramount importance in understanding new discoveries, recent trends and latest developments in the field of engineering.*

*To keep in pace with the recent scientific advancements in the areas of emerging technologies, the syllabi of engineering physics has been thoroughly revised keeping in view of the basic needs of all engineering branches by including the topics like optics, crystallography, ultrasonics, quantum mechanics, free electron theory. Also new phenomenon, properties and device applications of semiconducting, magnetic, superconducting and nano materials along with their modern device applications have been introduced.*

**Course Objective:**

- 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.*
- To enlighten the periodic arrangement of atoms in crystals, direction of Bragg planes, crystal structure determination by X-rays and also to understand different types of defects in crystals adnoun-destructive evaluation using ultrasonic techniques.*
- To get an insight into the microscopic meaning of conductivity , classical and quantum free electron model, the effect of periodic potential on electron motion, evolution of band theory to distinguish materials and to understand electron transport mechanism in solids.*
- To open new avenues of knowledge and understanding on semiconductor based electronic devices, basic concepts and applications of semiconductor and magnetic materials have been introduced which find potential in the emerging micro device applications.*
- To give an impetus on the subtle mechanism of superconductors in terms of conduction of electron pairs using BCS theory, different properties exhibited by them and their fascinating applications. Considering the significance of microminiaturization of electronic devices and significance of low dimensional materials, the basic concepts of nanomaterials, their synthesis, properties and applications in modern emerging technologies are elicited.*

**Learning Outcome:**

- The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fibre optics.*
- The important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction are focused along with defects in crystals and ultrasonic non-destructive techniques.*
- The discrepancies between the classical estimates and laboratory observations of physical properties exhibited by materials would be lifted through the understanding of quantum picture of subatomic world.*
- The electronic and magnetic properties of materials were successfully explained by free electron theory and focused on the basis for the band theory.*
- The properties and device applications of semiconducting and magnetic materials are illustrated.*

- *The importance of superconducting materials and nanomaterials along with their engineering applications are well elucidated.*

## UNIT 1

### PHYSICAL OPTICS, LASERS AND FIBRE OPTICS:

**Physical Optics:** Introduction - Interference in thin films by reflection – Newton’s Rings – Fraunhofer diffraction due to single slit, double slit and diffraction grating.

**Lasers:** Introduction - Characteristics of laser – Spontaneous and stimulated emission of radiation – Einstein’s coefficients - Population inversion – Excitation mechanisms and optical resonator - Ruby laser - He-Ne laser – Applications of lasers.

**Fibre optics:** Introduction– Construction and working principle of optical fiber –Numerical aperture and acceptance angle – Types of optical fibers – Attenuation and losses in fibers - Optical fiber communication system – Applications of optical fibers in communications, sensors and medicine.

## UNIT II

### CRYSTALLOGRAPHY AND ULTRASONICS:

**Crystallography:** Introduction – Space lattice –Unit cell – Lattice parameters –Bravais lattice – Crystal systems – Packing fractions of SC, BCC and FCC - Structures of NaCl and Diamond – Directions and planes in crystals – Miller indices – Interplanar spacing in cubic crystals – X-ray diffraction - Bragg’s law –Laue and Powder methods – Defects in solids: point defects, line defects (qualitative) - screw and edge dislocation, burgers vector.

**Ultrasonics:** Introduction – Production of ultrasonics by piezoelectric method – Properties and detection – Applications in non-destructive testing.

## UNIT III

### QUANTUM MECHANICS AND FREE ELECTRON THEORY:

**Quantum Mechanics:** Introduction to matter waves – de’Broglie hypothesis - Heisenberg’s uncertainty principle and its applications - Schrodinger’s time independent and time dependent wave equation – Significance of wave function - Particle in a one dimensional infinite potential well - Eigen values and Eigen functions.

**Free electron theory:** Classical free electron theory — Sources of electrical resistance - Equation for electrical conductivity - Quantum free electron theory – Fermi-Dirac distribution –Kronig-Penny model(qualitative) – Origin of bands in solids – Classification of solids into conductors, semiconductors and insulators.

## UNIT IV

### SEMICONDUCTORS AND MAGNETIC MATERIALS:

**Semiconductor Physics:** Introduction – Intrinsic and extrinsic semiconductors – Drift & diffusion currents and Einstein’s equation – Hall effect - Direct and indirect band gap semiconductors – Working principle of p-n junction diode, LED, laser diode and photodiode.

**Magnetic materials:** Introduction and basic definitions – Origin of magnetic moments – Bohr magneton – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials – Hysteresis - Soft and hard magnetic materials and applications.

## UNIT V

### SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS:

**Superconductivity:** Introduction – Meissner effect - Properties of superconductors – Type I and type II superconductors – Flux quantization – London penetration depth – ac and dc Josephson effects – BCS theory(qualitative) – High  $T_c$  superconductors - Applications of superconductors.

**Physics of Nanomaterials:** Introduction - Significance of nanoscale - Surface area and quantum confinement – Physical properties: optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterials: ball mill, chemical vapour deposition, sol-gel, plasma arcing and thermal evaporation – Properties of Carbon nanotubes – High strength applications – Properties of graphene – Graphene based Field Effect Transistor - Applications of nanomaterials.

**Text Books:**

1. *Engineering physics* – S. ManiNaidu, Pearson Education, I Edition, 2012.
2. *Engineering Physics* – V. Rajendran, MacGraw Hill Publishers, I Edition, 2008.

**Reference Books:**

1. *Engineering Physics* – V. Rajendran, K.Thyagarajan Tata MacGraw Hill Publishers, III Edition, 2012.
2. *Engineering Physics* – RV.S.S.N. Ravi Kumar and N.V. Siva Krishna, Maruthi Publications, 2013
3. *Engineering Physics* - Sanjay D. Jain, D. Sahasrambudhe and Girish University Press, I Edition, 2009.
4. *Engineering Physics* – D K Pandey, S. Chaturvedi, Cengage Learning, I Edition, 2012
5. *Engineering Physics* – Hitendra K Mallik and AK Singh, McGraw Hill Education Pvt. Ltd, New Delhi, I Edition, 2010
6. *Engineering Physics* – M. Arumugam, Anuradha Publications II Edition, 1997.
7. *Engineering physics* – M.N. Avadhanulu and P.G. KshirSagar, Chand and Co, Revised Edition, 2013.
8. *Solid State Physics* – A.J. Dekkar, McMillan Publishers, Latest edition, 2012.
9. *Engineering Physics* – Gaur and Gupta Dhanapati, Rai Publishers, 7<sup>th</sup> Edition, 1992.
9. *Text book of Nanoscience and Nanotechnology: B S Murthy, P.Shankar, Baldev Raj B B Rath, James Murday, University Press, I Edition, 2012.*
10. *Carbon Nanotubes and Graphene Device Physics* – H.S. Philip Wong, Deji Akinwande, Cambridge University Press, 2011.

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year

Th Tu C  
2 0 3

Common to All Branches

## (13A51101) ENGINEERING CHEMISTRY

### **Preamble:**

Knowledge in chemistry serves as basic nutrient for the understanding and thereby design of materials of importance in life. Thus the advancement in Engineering is depend on the outcome of basic sciences. Many advances in engineering either produce a new chemical demand as in the case of polymers or wait upon chemical developments for their applications as in the case of implants and alloys. Currently the electronics and computer engineers are looking forward for suitable biopolymers and nano materials for use in miniature super computers, the electrical materials engineers are in search of proper conducting polymers, the mechanical engineers are on lookout for micro fluids and the civil engineers are looking for materials that are environmental friendly, economical but long lasting.

### **Course Objective:**

- 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.
- The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
- 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.
- The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example.
- 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, analytical methods, engineering materials and water chemistry.

### **Learning Outcome:**

The student is expected to:

- Understand the electrochemical sources of energy
- Understand industrially based polymers, various engineering materials.
- Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable treatments domestically and industrially.

## **UNIT 1**

### **ELECTROCHEMISTRY:**

Review of electrochemical cells, Numerical calculations, Batteries: Rechargeable batteries (Lead acid, Ni-Cd, Lithium Ion Batteries). Fuels cells: (Hydrogen-Oxygen and Methanol-Oxygen).

**Electrochemical sensors:** Potentiometric Sensors and voltammetric sensors. Examples: analysis of Glucose and urea.

**Corrosion:** Electrochemical Theory of corrosion, Factors affecting the corrosion. Prevention: Anodic and cathodic protection and electro and electroless plating.

## UNIT II

### POLYMERS:

Introduction to polymers, Polymerisation process, mechanism: cationic, anionic, free radical and coordination covalent, Elastomers (rubbers), Natural Rubber, Compounding of Rubber, Synthetic Rubber: Preparation, properties and engineering applications of Buna-S, buna-N, Polyurethane, Polysulfide (Thiokol) rubbers. Plastomers: Thermosetting and Thermoplastics, Preparation, properties and Engineering applications, PVC, Bakelite, nylons.

**Conducting polymers:** Mechanism, synthesis and applications of polyacetylene, polyaniline. Liquid Crystals: Introduction, classification and applications.

**Inorganic Polymers:** Basic Introduction, Silicones, Polyphosphazins  $(-R)_2-P=N-$  applications.

## UNIT III

### FUEL TECHNOLOGY:

Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems, Solid Fuels–Coal, Coke : Manufacture of Metallurgical Coke by Otto Hoffmann's by product oven processes.

**Liquid Fuels:** Petroleum: Refining of Petroleum, Gasoline: Octane Number, Synthetic Petrol: Bergius Processes, Fischer Troph's synthesis.

Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol

**Gaseous Fuels:** Origin, Production and uses of Natural gas, Producer gas, Water gas, Coal gas and Biogas. Flue Gas analysis by Orsat's apparatus, Solving of problems on Combustion.

## UNIT IV

### CHEMISTRY OF ENGINEERING MATERIALS:

Semiconducting and Super Conducting materials-Principles and some examples, Magnetic materials – Principles and some examples, Cement: Composition, Setting and Hardening (Hydration and Hydrolysis), Refractories: Classification, properties and applications, Lubricants: Theory of lubrication, properties of lubricants and applications, Rocket Propellants: Classification, Characteristics of good propellant

## UNIT V

### 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, ozonisation)

Industrial Use of water: For steam generation, troubles of Boilers: Scale & Sludge, Priming and Foaming, Caustic Embrittlement and Boiler Corrosion.

Treatment of Boiler Feed water: Internal Treatment: Colloidal, Phosphate, Carbonate, Calgon and sodium aluminate treatment. External Treatment: Ion-Exchange and Permutit processes.

Demineralisation of brackish water: Reverse Osmosis and Electrodialysis

### Text Books:

1. *Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, New Delhi, Fourth Edition, 2012.*
2. *A Text book of Engineering Chemistry by S.S Dhara, S.S.Umare, S. Chand Publications, New Delhi, 12<sup>th</sup> Edition, 2010.*

### Reference Books:

1. *A Text Book of Enigneering Chemistry, Jain and Jain, Dhanapath Rai Publishing Company, New Delhi, 15<sup>th</sup> Edition, 2010.*
2. *Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH, Publications India Pvt Limited, Chennai, 2<sup>nd</sup> Edition, 2012.*
3. *Concepts of Engineering Chemistry- Ashima Srivastava and N.N. Janhavi, Acme Learning Pvt Ltd, First Edition, 2013.*

4. *Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V. Agarwal and Andra Naidu, BS Publications, Hyderabad, 3<sup>rd</sup> Edition, 2008.*
5. *Text Book of Engineering Chemistry, Shashichawla, Dhanapath Rai Publications, New Delhi, 4<sup>th</sup> Edition, 2011.*
6. *Engineering Chemistry, K. Sesa Maheswaramma and Mrudula Chugh, Pearson Education, First Edition, 2013.*

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# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year

Th	Tu	C
3	1	5

Common to All Branches

## (13A54101) MATHEMATICS – I

### Course Objective:

- To train the students thoroughly in Mathematical concepts of ordinary differential equations and their applications in electrical circuits, deflection of beams, whirling of shafts.
- To prepare students for lifelong learning and successful careers using mathematical concepts of differential, Integral and vector calculus, ordinary differential equations and Laplace transforms.
- To develop the skill pertinent to the practice of the mathematical concepts including the student abilities to formulate the problems, to think creatively and to synthesize information.

### Learning Outcome:

- The students become familiar with the application of differential, integral and vector calculus, ordinary differential equations and Laplace transforms to engineering problems.
- The students attain the abilities to use mathematical knowledge to analyze and solve problems in engineering applications.

### UNIT I

Exact, linear and Bernoulli equations, Applications to Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ , polynomials in  $x$ ,  $e^{ax} V(x)$ ,  $xV(x)$ , method of variation of parameters. Applications to oscillatory electrical circuits, Deflection of Beams, whirling of shafts.

### UNIT II

Taylor's and Maclaurin's Series - Functions of several variables – Jacobian – Maxima and Minima of functions of two variables, Lagrange's method of undetermined Multipliers with three variables only. Radius of curvature, center of curvature, Involute evolutes, envelopes.

### UNIT III

Curve tracing – Cartesian, polar and parametric curves. Length of curves.

Multiple integral – Double and triple integrals – Change of Variables – Change of order of integration. Applications to areas and volumes, surface area of solid of revolution in Cartesian and polar coordinates using double integral.

### UNIT IV

Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function.

Differentiation and integration of transform – Application of Laplace transforms to ordinary differential equations of first and second order.

### UNIT V

Vector Calculus: Gradient – Divergence – Curl and their properties; Vector integration – Line integral - Potential function – Area – Surface and volume integrals. Vector integral theorems: Green's theorem – Stoke's and Gauss's Divergence Theorem (Without proof). Application of Green's – Stoke's and Gauss's Theorems.

**Text Books:**

1. *Higher Engineering Mathematics*, B.S.Grewal, Khanna publishers-42 Edition(2012)
2. *Engineering Mathematics, Volume - I*, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher 1<sup>st</sup> Edition (2010)

**Reference Books:**

1. *Engineering Mathematics Volume-I*, by T.K.V. Iyengar, S.Chand publication-12<sup>th</sup> Edition(2013)
2. *Engineering Mathematics, Volume - I*, by G.S.S.Raju, CENGAGE publisher.(2013)
3. *Advanced Engineering Mathematics*, by Erwin Kreyszig, Wiley India-10<sup>th</sup> Edition(2012)
4. *Higher Engineering Mathematics*, by B.V.Ramana, Mc Graw Hill publishers(2008)
5. *Advanced Engineering Mathematics*, by Alan Jeffrey, Elsevier-1<sup>st</sup> Edition(2001)

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. - I Year

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(13A12101) PROGRAMMING IN C & DATA STRUCTURES

**Course Objective:**

- To make the student understand problem solving techniques
- Students will be able to understand the syntax and semantics of C programming language and other features of the language
- Get acquaintance with data structures, searching and sorting techniques

**Learning Outcome:**

- Student can effectively apply problem solving techniques in designing the solutions for a wide-range of problems
- Student can choose appropriate data structure and control structure depending on the problem to be solved
- Student can effectively use existing data structures and design new data structures appropriate to the problem to be solved
- Student can modularize the problem and also solution
- Student can use appropriate searching and sorting technique to suit the application.

**UNIT I**

**Introductory Concepts:** Introduction to computers, What is a Computer, Block diagram of Computer, Computer Characteristics, Hardware Vs Software, How to develop a program, Software development life cycle, Structured programming, Modes of operation, Types of programming languages, Introduction to C, Desirable program characteristics.

**Introduction to Computer problem solving:** Introduction, The problem solving aspect, Top down design, Implementation of algorithms.

**Introduction to C programming:** The C character set, Writing first program of C, Identifiers and key words, A more useful C program, Entering the program into the computer, Compiling and executing the program, Data types, Constants, Variables and arrays, Declarations, Expressions, Statements, Symbolic Constants.

**Operators and Expressions:** Arithmetic operators, Unary operators, Relational and Logical operators, Assignment operators, Conditional operator, Library functions.

**Fundamental algorithms:** Exchanging the values of two variables, Factorial computation, Sine function computation, Reversing the digits of an integer, Generating prime numbers.

**UNIT II**

**Data Input and Output:** Preliminaries, Single character input-getchar function, Single character output-putchar function, Entering input data-the scanf function, More about the scanf function, Writing output data-The printf function, More about the printf function, The gets and puts functions, Interactive(conversational) programming.

**Preparing and running a complete C program:** Planning a C program, Writing a C program, Error diagnostics, Debugging techniques.

**Control statements:** Preliminaries, Branching: if-else statement, Looping: The while statement, More looping: The do-while statement, Still more looping: The for statement, Nested control structures, The switch statement, Break statement, Continue statement, The comma operator, The goto statement.

**Functions:** A brief overview, Defining a function, Accessing a function, Function prototypes, Passing arguments to a function, Recursion

### UNIT III

**Program Structure:** Storage classes, Automatic variables, External (global) variables, Static variables, Multi file programs, More about library functions.

**Arrays:** Defining an array, Processing an array, Passing arrays to functions, Multi dimensional arrays.

**Array Techniques:** Array order reversal, Removal of duplicates from an ordered array, Finding the K<sup>th</sup> smallest element.

**Merging, Sorting and Searching:** The two way merge, Sorting by selection, Sorting by exchange, Sorting by insertion, Sorting by partitioning, Recursive Quick sort, Binary Search.

**Strings:** Defining a string, NULL character, Initialization of strings, Reading and Writing a string, Processing the strings, Character arithmetic, Searching and Sorting of strings, Some more Library functions for strings

### UNIT IV

**Pointers:** Fundamentals, Pointer Declarations, Passing pointer to a function, Pointers and one dimensional array, Dynamic memory allocation, Operations on pointers, Pointers and multi dimensional arrays, Arrays of pointers, Passing functions to other functions, More about pointer declarations.

**Structures and Unions:** Defining a structure, Processing a structure, User defined data type (typedef), Structures and Pointers, Passing structures to functions, Unions.

**File Handling:** Why files, Opening and closing a data file, Reading and Writing a data file, Processing a data file, Unformatted data files, Concept of binary files, Accessing the file randomly (using fseek).

**Additional Features:** Register variables, Bitwise operations, Bit Fields, Enumerations, Command line parameters, More about Library functions, Macros, The C Preprocessor

### UNIT V

**Introduction to Data Structures:** Data abstraction

**Stacks and Queues:** Stacks, Stacks using dynamic arrays, Queues, Circular Queues using dynamic arrays

**Evaluations of expressions:** Expressions, Evaluating postfix expressions, Infix to Postfix, Multiple Stacks and Queues.

**Linked Lists:** Singly Linked lists and chains, Representing chains in C, Linked Stacks and Queues.

**Text Books:**

1. *“Programming with C”*, Byron Gottfried, Third Edition, Schaum’s Outlines, Mc Graw Hill.
2. *“Fundamentals of Data Structures in C”*, Horowitz, Sahni, Anderson-freed, Second Edition, Universities Press.
3. *“How to Solve it by Computer”*, R.G. Dromey, Pearson. (Pascal implementations may be considered without loss of generality or Instructors may replace them with C language programs)

**Reference Books:**

1. *“Programming in C”*, Pradip Dey, Manas Ghosh, Oxford Higher Education
2. *“Programming in C and Data Structures”*, Hanly, Koffman, Kamthane, Ananda Rao, Pearson.
3. *“Programming in C”*, Reema Thareja, Oxford Higher Education.
4. *“Computer Fundamentals and C Programming”*, First Edition, Dr.P.Chenna Reddy, Available at: [www.pothi.com](http://www.pothi.com).
5. *“Data Structure and Program Design in C”*, Second Edition, Kruse, Tondo, Leung, Mogalla, Pearson.
6. *“Programming with C”*, R.S. Bichkar, University Press.
7. *“Computer Science A Structured Programming Approach Using C”*, Third Edition, Fourouzan & Gilberg, Cengage Learning.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year

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(13A01101) ENGINEERING MECHANICS

**Course 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 Shames & Rao – Pearson Education.
2. *Engineering Mechanics* by Dr.R.k.Bansal, Lakshmi Publications.
3. *Engineering Mechanics* – B. Bhattacharyya, Oxford University Publications.

**Reference Books:**

1. *Engineering Mechanics* by Fedrinand L.Singer – Harper Collings Publishers.
2. *Engineering Mechanics* by Seshigiri Rao, Universities Press, Hyderabad.
3. *Engineering Mechanics* by Rajsekharan, Vikas Publications.
4. *Engineering Mechanics (Statics and Dynamics)* by Hibler 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.

B.Tech. I Year

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**(13A03101) ENGINEERING DRAWING**

**Course Objective:**

- *By studying the engineering drawing, a student becomes aware of how industry communicates technical information. Engineering drawing teaches the principles of accuracy and clarity in presenting the information necessary about objects.*
- *This course develops the engineering imagination i.e., so essential to a successful design, By learning techniques of engineering drawing changes the way one things about technical images.*
- *It is ideal to master the fundamentals of engineering drawing first and to later use these fundamentals for a particular application, such as computer aided drafting. Engineering Drawing is the language of engineers, by studying this course engineering and technology students will eventually be able to prepare drawings of various objects being used in technology.*

**UNIT I**

**Introduction to Engineering Drawing:** Principles of Engineering Graphics and their Significance- Conventions in Drawing-Lettering – BIS Conventions. Curves used in Engineering Practice.

- a) Conic Sections including the Rectangular Hyperbola- General method only,
- b) Cycloid, Epicycloids and Hypocycloid
- c) Involutives
- d) Helices

**UNIT II**

**Projection of Lines:** Inclined to one or both planes, Problems on projections, Finding True lengths & traces only.

**Projections of Planes:** Projections of regular plane surfaces/figures, Projection of lines and planes using auxiliary planes.

**UNIT III**

**Projections of Solids:** Projections of Regular Solids inclined to one or both planes-Auxiliary Views.

**Sections and Developments of Solids:** Section Planes and Sectional View of Right Regular Solids- Prism, cylinder, Pyramid and Cone. True shapes of the sections. Development of Surfaces of Right Regular Solids- Prism, Cylinder, Pyramid, Cone and their Sectional Parts.

**UNIT IV**

**Isometric and Orthographic Projections:** Principles of isometric projection- Isometric Scale- Isometric Views- Conventions- Isometric Views of lines, Planes Figures, Simple and Compound Solids- Isometric Projection of objects having non-isometric lines. Isometric projections of spherical parts. Conversion of isometric Projections/Views of Orthographic Views-Conventions.

**UNIT V**

**Interpenetration of Right Regular Solids:** Projections of Curves of intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone, Square Prism Vs Square Prism.

**Perspective Projections:** Perspective View of Plane Figures and simple Solids, Vanishing point method ( General Methods only).

**Text Books:**

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

**Reference Books:**

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, K.C. John, PHI, 2013*
5. *Engineering Drawing and Graphics, Venugopal / New age Publishers*
6. *Engineering Drawing, B.V.R. Gupta, J.K. Publishers*

**Suggestions:**

1. *Student is expected to buy a book mentioned under 'Text books' for better understanding.*
2. *Students can find the applications of various conics in engineering and application of involute on gear teeth. The introduction for drawing can be had on line from:*
  - *Introduction to engineering drawing with tools – youtube*
  - *Http-sewor. Carleton.ca /- g kardos/88403/drawing/drawings.html*
  - *Conic sections-online. red woods.edu*
3. *This subject also paves the way for learning Auto Cad, CAD / CAM, CATIA and Pro E which are advanced software packages needed for every mechanical engineer (To be taught & examined in First angle projection). The skill acquired by the student in this subject is very useful in conveying his ideas to the layman easily.*

**(13A12102) PROGRAMMING IN C & DATA STRUCTURES LAB**

**Course Objective:**

- To make the student learn C Programming language.
- To make the student solve problems, implement them using C language.
- To strengthen the ability to identify and apply the suitable data structure for the given real world problem.

**Learning Outcome:**

- Apply problem solving techniques to find solutions to problems.
- Able to use C language features effectively and implement solutions using C language.
- Be capable to identify the appropriate data structure for a given problem or application.
- Improve logical skills.

**LIST OF EXPERIMENTS/TASKS**

1. Practice DOS and LINUX Commands necessary for design of C Programs.
2. Study of the Editors, Integrated development environments, and Compilers in chosen platform.
3. Write, Edit, Debug, Compile and Execute Sample C programs to understand the programming environment.
4. Practice programs: Finding the sum of three numbers, exchange of two numbers, maximum of two numbers, to read and print variable values of all data types of C language, to find the size of all data types, to understand the priority and associativity of operators using expressions, to use different library functions of C language.
5. Write a program to find the roots of a quadratic equation.
6. Write a program to compute the factorial of a given number.
7. Write a program to check whether the number is prime or not.
8. Write a program to find the series of prime numbers in the given range.
9. Write a program to generate Fibonacci numbers in the given range.
10. Write a program to find the maximum of a set of numbers.
11. Write a program to reverse the digits of a number.
12. Write a program to find the sum of the digits of a number.
13. Write a program to find the sum of positive and negative numbers in a given set of numbers.
14. Write a program to check for number palindrome.
15. Write a program to evaluate the sum of the following series up to 'n' terms e  
$$x=1+x+\frac{x^2}{2!}+\frac{x^3}{3!}+\frac{x^4}{4!}+\dots$$
16. Write a program to generate Pascal Triangle.
17. Write a program to read two matrices and print their sum and product in the matrix form.
18. Write a program to read matrix and perform the following operations.
  - i. Find the sum of Diagonal Elements of a matrix.
  - ii. Print Transpose of a matrix.
  - iii. Print sum of even and odd numbers in a given matrix.
19. Write a program to accept a line of characters and print the count of the number of Vowels, Consonants, blank spaces, digits and special characters.
20. Write a program to insert a substring in to a given string and delete few characters from the string. Don't use library functions related to strings.
21. Write a program to perform the operations addition, subtraction, multiplication of complex numbers.
22. Write a program to split a 'file' in to two files, say file1 and file2. Read lines into the 'file' from standard input. File1 should consist of odd numbered lines and file2 should consist of even numbered lines.

23. Write a program to merge two files.
24. Write a program to implement numerical methods Lagrange's interpolation, Trapezoidal rule.
25. Write a program to read a set of strings and sort them in alphabetical order.
26. Write a program to sort the elements of an array using sorting by exchange.
27. Write a program to sort the elements of an array using Selection Sort.
28. Write a program to perform Linear Search on the elements of a given array.
29. Write a program to perform Binary Search on the elements of a given array.
30. Write a program to find the number of occurrences of each number in a given array of numbers.
31. Write a program to read two strings and perform the following operations without using built-in string Library functions and by using your own implementations of functions.
  - i. String length determination
  - ii. Compare Two Strings
  - iii. Concatenate them, if they are not equal
  - iv. String reversing
32. Write programs using recursion for Factorial of a number, GCD, LCM, Towers of Hanoi.
33. Write a program to convert infix expression to postfix expression and evaluate postfix expression.
34. Write a program to exchange two numbers using pointers.
35. Write a program to implement stack, queue, circular queue using array and linked lists.
36. Write a program to perform the operations creation, insertion, deletion, and traversing a singly linked list
37. Write a program to read student records into a file. Record consists of rollno, name and marks of a student in six subjects and class. Class field is empty initially. Compute the class of a student. The calculation of the class is as per JNTUA rules. Write the first class, second class, third class and failed students lists separately to another file.
38. A file consists of information about employee salary with fields employeeid, name, Basic, HRA, DA, IT, other-deductions, Gross and Net salary. Initially only employeeid, name, and basic have valid values. HRA is taken as 10% of the basic, DA is taken as 80% of basic, IT is 20% of the basic, other deductions is user specified. Compute the Gross and Net salary of the employee and update the file.
39. Write a program to perform Base (decimal, octal, hexadecimal, etc) conversion.
40. Write a program to find the square root of a number without using built-in library function.
41. Write a program to convert from string to number.
42. Write a program to generate pseudo random generator.
43. Write a program to remove duplicates from ordered and unordered arrays.
44. Write a program to sort numbers using insertion sort.
45. Write a program to implement quick sort using non-recursive and recursive approaches. Use randomized element as partitioning element.
46. Write a program to search a word in a given file and display all its positions.
47. Write a program to generate multiplication tables from 11 to 20.
48. Write a program to express a four digit number in words. For example 1546 should be written as one thousand five hundred and forty six.
49. Write a program to generate a telephone bill. The contents of it and the rate calculation etc should be as per BSNL rules. Student is expected to gather the required information through the BSNL website.
50. Write a program for tic-tac-toe game.
51. Write a program to find the execution time of a program.
52. Design a file format to store a person's name, address, and other information. Write a program to read this file and produce a set of mailing labels

*Note: The above list consists of only sample programs. Instructors may choose other programs to illustrate certain concepts, wherever is necessary. Programs should be there on all the concepts studied in the Theory on C programming and Data structures. Instructors are advised to change atleast 25% of the programs every year until the next syllabus revision.*

**References:**

1. *“Programming with C”, Byron Gottfried, Third Edition, Schaum’s Outlines, Mc Graw Hill.*
2. *“Fundamentals of Data Structures in C”, Horowitz, Sahni, Anderson-freed, Second Edition, Universities Press.*
3. *“How to Solve it by Computer”, R.G. Dromey, Pearson.*
4. *“The C Programming Language”, Brian W. Kernighan, Dennis M. Ritchie, Pearson.*
5. *“Classic Data Structures”, Samantha, PHI*
6. *“Let us C”, Yeswant Kanetkar, BPB publications*
7. *“Pointers in C”, Yeswant Kanetkar, BPB publications*

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**Common to All Branches**  
**(13A99102) ENGINEERING PHYSICS & ENGINEERING CHEMISTRY LAB**

**ENGINEERING PHYSICS LAB**

**LIST OF EXPERIMENTS**

**Any 10 of the following experiments has to be performed:**

1. Determination of wavelengths of various colours of mercury spectrum using diffraction grating in normal incidence method
2. Determination of dispersive power of the 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. Melde's 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. Determination of thermistor coefficients ( $\alpha$ ,  $\beta$ )
14. Hall effect : Determination of mobility of charge carriers in semiconductor
15. B-H curve
16. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
17. Determination of lattice constant using X-ray spectrum.

**ENGINEERING CHEMISTRY LAB**

**Preamble:**

*The experiments are designed in a manner that the students can validate their own theory understanding in chemistry by self involvement and practical execution. Thus the execution of these experiments by the student will reinforce his/her understanding of the subject and also provide opportunity to refine their understanding of conceptual aspects. As a result, the student gets an opportunity to have feel good factor at the laboratory bench about the chemical principles that he/she learned in the classroom.*

**Course Objective:**

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

**Learning Outcome:**

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

## LIST OF EXPERIMENTS

**Any 10 of the following experiments has to be performed:**

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 Alkalinity of Water
7. Determination of acidity of Water
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)

### References:

1. *Vogel's Text book of Quantitative Chemical Analysis, J. Mendham et al, Pearson Education, Sixth Edition, 2012.*
2. *Chemistry Practical – Lab Manual by K.B.Chandra Sekhar, G.V. Subba Reddy and K.N.Jayaveera, SM Publications, Hyderabad, 3<sup>rd</sup> Edition, 2012.*

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**Common to All Branches  
(13A99103) ENGINEERING & I.T. WORKSHOP**

**ENGINEERING WORKSHOP**

**Course Objective:**

*The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially he should know the labour involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.*

**1. TRADES FOR EXERCISES:**

- a. Carpentry shop– Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, cross lap joint, mortise and tenon T joint, Bridle T joint from out of 300 x 40 x 25 mm soft wood stock
- b. Fitting shop– Two joints (exercises) from: square joint, V joint, half round joint or dove tail joint out of 100 x 50 x 5 mm M.S. stock
- c. Sheet metal shop– Two jobs (exercises) from: Tray, cylinder, hopper or funnel from out of 22 or 20 gauge G.I. sheet
- d. House-wiring– Two jobs (exercises) from: wiring for ceiling rose and two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a water pump with single phase starter.
- e. Foundry– Preparation of two moulds (exercises): for a single pattern and a double pattern.
- f. Welding – Preparation of two welds (exercises): single V butt joint, lap joint, double V butt joint or T fillet joint.

**2. TRADES FOR DEMONSTRATION:**

- a. Plumbing
- b. Machine Shop
- c. Metal Cutting

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

**References:**

1. *Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009*
2. *Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.*
3. *Engineering Practices Lab Manual, Jeyapoovan, SaravanaPandian, 4/e Vikas*
4. *Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.*

## **I.T. WORKSHOP**

### **Course Objective:**

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- 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
- To learn about Networking of computers and use Internet facility for Browsing and Searching.

### **Learning Outcome:**

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use.
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Interconnect two or more computers for information sharing
- Access the Internet and Browse it to obtain the required information
- Install single or dual operating systems on computer

### **Preparing your Computer ( 5 weeks)**

**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 (4 weeks)**

**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. Crimping 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 (6 weeks)**

**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 color, 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, colors, 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.

#### **Optional Tasks:**

**Task 11: Laboratory Equipment:** Students may submit a report on specifications of various equipment that may be used by them for the laboratories in their curriculum starting from I B.Tech to IV. B.Tech. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit
- Lathe machine
- Generators
- Construction material
- Air conditioner
- UPS and Inverter
- RO system
- Electrical Rectifier
- CRO
- Function Generator
- Microwave benches

**Task 12: Software:** Students may submit a report on specifications of various software that may be used by them for the laboratories in their curriculum starting from I B.Tech to IV. B.Tech. The software may be proprietary software or Free and Open source software. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop operating system
- Server operating system
- Antivirus software
- MATLAB

- *CAD/CAM software*
- *AUTOCAD*

**References:**

1. *Introduction to Computers, Peter Norton, Mc Graw 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*

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## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year

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Common to All Branches

### (13A52102) ENGLISH LANGUAGE COMMUNICATION SKILLS (ELCS) LAB

The Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

#### **Course Objective:**

- To train students to use language effectively in everyday conversations.
- To expose the students to a varied blend of self-instructional learner-friendly modes of language learning through computer-aided multi-media instruction.
- To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

#### **Learning Outcome:**

- Becoming active participants in the learning process and acquiring proficiency in spoken English of the students
- Speaking with clarity and confidence thereby enhancing employability skills of the students

#### **PHONETICS**

Importance of speaking phonetically correct English  
Speech mechanism-Organs of speech  
Uttering letters-Production of vowels sounds  
Uttering letters -Production of consonant sounds  
Uttering words-Stress on words and stress rules  
Uttering sentences-Intonation-tone group

#### **LISTENING**

Listening as a skill  
Listening activities

#### **PRESENTATIONAL SKILLS**

Preparation  
Prepared speech  
Impromptu speech  
topic originative techniques  
JAM (Just A Minute)  
Describing people/object/place

Presentation-  
Stage dynamics

Body language

#### **SPEAKING SKILLS**

Telephone skills  
Role plays  
Public Speaking

#### **GROUP ACTIVITIES**

Debates  
Situational dialogues

## **MINIMUM REQUIREMENT FOR ELCS LAB:**

The English Language Lab shall have two parts:

### **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.
- 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:
  - P – IV Processor
  - Speed – 2.8 GHZ
  - RAM – 512 MB Minimum
  - Hard Disk – 80 GB
  - Headphones of High quality

### **SUGGESTED SOFTWARE:**

- Clarity Pronunciation Power – Part I (Sky Pronunciation)
- Clarity Pronunciation Power – part II
- K-Van Advanced Communication Skills
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- *DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.*
- Lingua TOEFL CBT Insider, by Dreamtech
- English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
- Cambridge Advanced Learners' English Dictionary with CD.
- Oxford Advanced Learner's Compass, 8<sup>th</sup> Edition
- Communication Skills, Sanjay Kumar & Pushp Lata. 2011. OUP

### **References:**

1. *Strengthen Your Steps*, Maruthi Publications, 2012.
2. *A Course in Phonetics and Spoken English*, [Dhamija Sethi](#), Prentice-Hall of India Pvt.Ltd.
3. *A Textbook of English Phonetics for Indian Students 2<sup>nd</sup> Ed T. Balasubramanian.* (Macmillan),2012.
4. *Speaking English Effectively, 2<sup>nd</sup> Edition Krishna Mohan & NP Singh, 2011.* (Mcmillan).
5. *Listening in the Language Classroom, John Field (Cambridge Language Teaching Library),2011*
6. *A Hand Book for English Laboratories, E.Suresh Kumar, P.Sreehari, Foundation Books,2011*
7. *English Pronunciation in Use. Intermediate & Advanced, Hancock, M. 2009. CUP.*
8. *Basics of Communication in English, Soundararaj, Francis. 2012.. New Delhi: Macmillan*
9. *Spoken English (CIEFL) in 3 volumes with 6 cassettes, OUP.*
10. *English Pronouncing Dictionary, Daniel Jones, Current Edition with CD.Cambridge, 17<sup>th</sup> edition, 2011.*



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - I Sem.

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(13A54301) MATHEMATICS – II

**Course Objective:**

- This course aims at providing the student with the concepts of Matrices, Fourier series, Fourier transforms and partial differential equations which find the applications in engineering.
- Our emphasis will be more on the logical and problem solving development in the Numerical methods and its applications.

**Learning Outcome:**

- The student becomes familiar with the application of Mathematical techniques like Fourier series and Fourier transforms.
- The student gains the knowledge to tackle the engineering problems using the concepts of Partial differential equations and Numerical methods.

**UNIT I**

Rank – Echelon form, normal form – Consistency of System of Linear equations. Linear transformations

Complex Matrices:- Hermitian, Skew-Hermitian and Unitary matrices and their properties. Eigen Values, Eigen vectors for both real and complex matrices. Cayley – Hamilton Theorem and its applications – Diagonalization of matrix. Calculation of powers of matrix. Quadratic forms – Reduction of quadratic form to canonical form and their nature.

**UNIT II**

Solution of Algebraic and Transcendental Equations: Introduction – The Method of False Position – Newton-Raphson Method.

Interpolation:-Introduction – Newton’s forward and backward interpolation formulae – Lagrange’s Interpolation formula.

Curve fitting: Fitting a straight line – Second degree curve – Exponential curve-Power curve by method of least squares.

**UNIT III**

Numerical Differentiation and Integration – Trapezoidal rule – Simpson’s 1/3 Rule – Simpson’s 3/8 Rule.

Numerical solution of Ordinary Differential equations: Solution by Taylor’s series-Picard’s Method of successive Approximations-Euler’s Method-Runge-Kutta Method – Predictor-Corrector Method – Milne’s Method.

**UNIT IV**

Fourier Series: Determination of Fourier coefficients – Fourier series – Even and odd functions – Fourier series in an arbitrary interval – Even and odd period, continuation – Half-range Fourier sine and cosine expansions.

Fourier integral theorem – Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

**UNIT V**

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. *Introductory Methods of Numerical Analysis, S.S. Sastry, PHI publisher.*

**Reference Books:**

1. *Engineering Mathematics, Volume - II, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.*
2. *Engineering Mathematics, Volume - II, by G.S.S.Raju, CENGAGE publisher.*
3. *Mathematical Methods by T.K.V. Iyengar, S. Chand publication.*
4. *Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.*
5. *Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.*

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## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - I Sem.

Th	Tu	C
3	1	3

### (13A99301) ELECTRICAL & MECHANICAL TECHNOLOGY PART – A ELECTRICAL TECHNOLOGY

#### **Course Objective:**

- In this course the different types of DC generators and motors, Transformers, 3 Phase AC Machines which are widely used in industry are covered and their performance aspects will be studied.

#### **UNIT I DC MACHINES**

**D.C.GENERATOR:** Principles of Operation –Constructional Details-Expression for Generated Emf-Types of Generators-Losses in D.C.Generator – Characteristics of D.C.Generators-Applications of D.C.Generators.

**D.C. MOTOR:** Principles of Operation –Constructional Details-Back EMF-Types of Motors-Armature Torque of a D.C. Motor - Characteristics of D.C.Motors -Applications of D.C.Motors-3 Point Starter-Speed Control of Shunt Motors

#### **UNIT II TRANSFORMERS**

Principles of Operation- Constructional Details- Types of Transformers- Emf Equation of a Transformer –Voltage Transformation Ratio-Equivalent Circuit- Equivalent Resistance- Equivalent Reactance-Losses in the Transformer-Copper Loss, Iron Loss-Transformer Tests-Open Circuit, Short Circuit Test-Efficiency of a Transformer –Regulation of Transformer

#### **UNIT III 3 PHASE AC MACHINES**

**INDUCTION MACHINES:** Introduction to 3-Phase Induction Motor- Principle of Operation-Constructional Details-Slip, Frequency of Rotor Current-Expression for Torque -Torque-Slip Characteristics- Applications of 3 Phase Induction Motors.

**ALTERNATORS:** Principle of Operation-Constructional Details-EMF Equation-Voltage Regulation by Synchronous Impedance Method.

#### **Text Books:**

1. *Basic Electrical Engineering* by D P KOTHARI & I J NAGRATH, Tata McGraw Hill, Second Edition, 2007.
2. *Electrical Circuit Theory and Technology* by JOHN BIRD, Routledge publisher, 4<sup>th</sup> Edition, 2011.

#### **Reference Books:**

1. *Electrical & Electronic Technology* by Edward Hughes, 10<sup>th</sup> Edition, Pearson, 2008

### **PART – B MECHANICAL TECHNOLOGY**

#### **UNIT I**

Classification of IC Engines. Description and working of I.C. Engines - 4 stroke and 2 stroke engines – comparison - Reciprocating Air Compressors – description and working of single stage and multistage reciprocating air compressors – inter cooling.

## **UNIT II**

Block diagram of a vapor compression refrigeration system. Names of common refrigerants. Basic principles of air-conditioning. Room and General air conditioning systems. Ducting – Different types of ventilation system.

## **UNIT III**

Transmission of power, Belt, Rope, Chain and gear drive-simple problems. Earth moving machinery and Mechanical handling equipment – bull dozers – power showels – Excavators – concrete mixer – Belt and bucket conveyers.

### ***Text Books:***

1. *Electrical Technology, B.L. Theraja, S.Chand Publishers.*
2. *Introduction to Electrical Engineering, M.S. Naidu & S. Kamakshaiah, TMH*
3. *Mechanical Technology, Khurmi.*
4. *Mechanical Technology, Kondandaraman C.P.*
5. *Construction Planning, Equipment and methods – Purify.*

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - I Sem.

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3	1	3

(13A01301) STRENGTH OF MATERIALS - I

**Course Objective:**

- The subject provides 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.

**Reference Books:**

1. *Strength of Materials by Jindal , Pearson publications*
2. *Strength of Materials by Dr.R.K.Bansal, Lakshmi Publications.*
3. *Strength of Materials by S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.*
4. *Strength of materials by A.R.Basu, Dhanpathi Rai & Co, New Delhi.*
5. *Strength of materials by Sadhu Singh, Khanna Publications, NewDelhi.*
6. *Strength of materials by Surendar Singh, CBS Publications.*
7. *Strength of Materials by – Timoshenko*

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## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - I Sem.

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3	1	3

### (13A01302) SURVEYING - I

#### **Course 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 subdivision 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 Satheesh Gopi, R.Shanta Kumar and N.Madhu, Pearson education.

**Reference Books:**

1. Duggal S.K, “*Surveying (Vol – 1 & 2)*, Tata McGraw Hill Publishing Co.Ltd. New Delhi, 2004.
2. Arora K R “*Surveying (Vol-1 & 2)*, Standard Book House, Delhi, 2004
3. Chandra AM, “*Plane Surveying*”, New age International PVt.Ltd., Publishers, New Delhi, 2002.
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, PHI Publications.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - I Sem.

Th	Tu	C
3	1	3

(13A01303) FLUID MECHANICS

**Course 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 vortex 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**

**FLOW THROUGH 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, CSP Ojha, Oxford Higher Education*

**Reference Books:**

1. *Fluid mechanics and machinery by S.C.Gupta, Pearson publication*
2. *Theory and applications of fluid mechanics by K.Subramanyam, TMH Publications, New Delhi.*
3. *Principles of Fluid Mechanics and Fluid Machines by M.Narayana Pillai, Universities Press.*
4. *Fluid Mechanics and Machinery by D. Ramdurgaia New Age Publications.*
5. *Fluid Mechanics by J.F.Douglas, J.m.Gaserek and J.A.Swaffird (Longman)*
6. *Introduction to Fluid Machines by S.K.Som & G.Biswas .Tata Mc.Grawhill publishers PVt.Ltd.*
7. *Fluid Mechanics by A.K.Mohanty, Prentice Hall of India PVt.Ltd., New Delhi.*

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## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - I Sem.

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### (13A01304) BUILDING MATERIALS AND CONSTRUCTION

#### Course Objective:

- To give the students a basic idea about the construction materials, building components and to introduce component methodologies.

#### UNIT I

##### STONES, BRICKS :

Properties of building stones – relation to their structural requirements. Classification of stones – Stone quarrying – precautions in blasting, Dressing of stone, Composition of good brick earth, various methods of manufacture of bricks. Comparison between clamp burning and kiln burning. Qualities of a good brick.

**WOOD:** Structure – properties – Seasoning of timber. Classification of various types of woods used in buildings – Defects in timber. Alternative materials for wood, Galvanized Iron, Fiber-reinforced plastics, steel, Aluminum.

#### UNIT II

##### LIME AND CEMENT:

Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of Cement concrete and their importance – various test for concrete.

#### UNIT III

##### ROOFING MATERIALS & FINISHINGS:

Characteristics of good tile – manufacturing methods, Types of tiles. Use of Materials like aluminium, gypsum, glass and bituminous materials – their quality. Damp proofing and water proofing- materials used. Plastering, pointing, white washing and distempering – Painting – Constituents of a paint – Types of paints – Painting of new/old Wood – Varnish – Form work and scaffolding.

#### UNIT IV

**BUILDING COMPONENTS:** Lintels, Arches, Vaults-stair cases – Types. Different types of floors- Concrete, Mosaic, Terrazo floors, Pitched, flat and curved Roofs. Lean-to-Roof, Coupled Roofs, Trussed roofs- King and Queen Post Trusses. RCC Roofs, Madras Terrace/Shell Roofs.

#### UNIT V

##### MASONRY & FOUNDATIONS:

Types of masonry, English and Flemish bonds, □ Rubble and Ashlar masonry, cavity and partition walls. Foundations : Shallow foundations – Spread, combined strap and mat footings. Reinforced masonry

#### 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. *Building construction* by W.B.Mckay, Vol.I, II, III & IV Pearson Publications, 2013 edition.
4. *Building Materials and construction* by S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.

#### Reference Books:

1. R.Chudly “Construction Technology “– Volumes I and II” 2nd Edition, Longman, UK, 1987.
2. *Building Construction* by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.
3. *Text book on Building Construction* by S.P.Arora and S.P.Bindra, Dhanpathi Rai Publications.
4. *Building materials* by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi
5. I.S. 1905, SP.20

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - I Sem.

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(13A01305) SURVEYING LAB-I

**Course 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.

**LIST OF MAJOR EQUIPMENT:**

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

B.Tech. II - I Sem.

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**(13A01306) STRENGTH OF MATERIALS LAB**

**Course Objective:**

- *The objective of the course is to make the student to understand the behaviour 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.

**LIST OF MAJOR EQUIPEMNT:**

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

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - II Sem.

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### (13A54303) PROBABILITY AND STATISTICS

#### **Course Objective:**

- To help the students in getting a thorough understanding of the fundamentals of probability and usage of statistical techniques like testing of hypothesis, ANOVA, Statistical Quality Control and Queuing theory

#### **Learning Outcome:**

- The student will be able to analyze the problems of engineering & industry using the techniques of testing of hypothesis, ANOVA, Statistical Quality Control and Queuing theory and draw appropriate inferences.

#### **UNIT I**

Conditional probability – Baye’s theorem. Random variables – Discrete and continuous Distributions – Distribution functions. Binomial and poison distributions Normal distribution – Related properties.

#### **UNIT II**

Test of Hypothesis: Population and Sample - Confidence interval of mean from Normal distribution - Statistical hypothesis - Null and Alternative hypothesis - Level of significance - Test of significance - Test based on normal distribution - Z test for means and proportions; Small samples - t- test for one sample and two sample problem and paired t-test, F-test and Chi-square test (testing of goodness of fit and independence).

#### **UNIT III**

Analysis of variance one way classification and two way classification (Latic square Design and RBD)

#### **UNIT IV**

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 X- bar Chart, R-Chart, P-Chart and C-Chart.

#### **UNIT V**

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

#### **Text Books:**

1. *Probability & Statistics for engineers* by Dr. J. Ravichandran WILEY-INDIA publishers.
2. *Probability & Statistics* by T.K.V. Iyengar, S.Chand publications.

#### **Reference Books:**

1. *Probability & Statistics* by E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.
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.

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(13A01401) STRENGTH OF MATERIALS – II

**Course 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 Lamé's theory for thick cylinders – Derivation of lamé'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**

**UNSYMMETRICAL 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 D.S. Prakasa rao, University press.*

**Reference Books:**

1. *Strength of Materials by Schaum's out line series – Mc.Graw hill International Editions.*
2. *Strength of Materials by S.Ramkrishna and R.Narayan – Dhanpat Rai Publications.*
3. *Strength of Materials by R.Subramanian, Oxford University Press.*
4. *Strength of Materials by L.S.Srinath et al., Macmillan India Ltd., Dew Delhi.*
5. *Strength of Materials by B.C.Punmia.- Laxmi publications.*
6. *Fundamentals of Solid Mechancis by M.L.Gambhir, PHI Learning Pvt. Ltd*
7. *Mechanics of Structures, by S.B.Junnarkar, Charotar Publishing House, Anand, Gujrat*



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(13A01402) HYDRAULICS AND HYRAULIC MACHINERY

**Course 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 I**

**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.

**Reference Books:**

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

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

**B.Tech. II - II Sem.**

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### (13A01403) ENVIRONMENTAL SCIENCE

#### **Course 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:

- Forest ecosystem.
- Grassland ecosystem
- Desert ecosystem
- 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-soports 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 :

- Air Pollution.
- Water pollution
- Soil pollution
- Marine pollution
- Noise pollution
- Thermal pollution
- Nuclear hazards

**SOLID WASTE MANAGEMENT:** Causes, effects and control measures of urban and industrial wates – 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 Programme – 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, 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, 2005.*
2. *Environmental Studies by Palanisamy, Pearson education, 2012.*
3. *Environmental Studies by R.Rajagopalan, Oxford University Press, 2<sup>nd</sup> edition, 2011.*

### **Reference Books:**

1. *Textbook of Environmental Studies by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications, 2<sup>nd</sup> edition, 2012.*
2. *Text book of Environmental Science and Technology by M.Anji Reddy, BS Publication, 2009.*
3. *Comprehensive Environmental studies by J.P.Sharma, Laxmi publications, 2<sup>nd</sup> edition, 2006.*
4. *Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited, 2<sup>nd</sup> edition, 1996.*
5. *Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited, 3<sup>rd</sup> edition, 2007.*

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - II Sem.

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### (13A01404) STRUCTURAL ANALYSIS – I

#### Course Objective:

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

#### UNIT I

**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 II

**SLOPE-DEFLECTION & MOMENT DISTRIBUTION METHOD:** Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports. Introduction to moment distribution method- application to continuous beams with and without settlement of supports.

#### UNIT III

**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 IV

**MOVING LOADS & INFLUENCE LINES:** Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U.D load longer than the span, U.D load shorter than the span, two point loads with fixed distance between them and several point loads – Equivalent uniformly distributed load – Focal length. Definition of influence line for SF, Influence line for BM – load position for maximum SF at a section – Load position for maximum BM at a section Point loads, UDL longer than the span, UDL shorter than the span

#### UNIT V

**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..

#### 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.

#### Reference Books:

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. *Basic Structural Analysis* by K.U.Muthu et al., I.K.International Publishing House Pvt.Ltd.
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.

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B.Tech. II - II Sem.

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(13A01405) SURVEYING - II

**Course 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, Subtense 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

**Reference Books:**

1. Surveying Vol. 1 and 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. *Text book of Surveying, Shahani, P.B., Vol.I & II, Oxford & IBH Publications, 1998*
4. *Principles of GIS for land resource assessment by P.A. Burrough –Clerendon Press, Oxford.*
5. *Advanced Surveying by Mahajan, Santhos K. Dhanpat Rai & Sons, Nai Sarak, Delhi, 1987.*
6. *Remote sensing and Image Interpretation by Lillesand, T.M., and Kiefer R.W., John Wiley and Sons, Inc, New York, 1997*
7. *Advanced Surveying: Total Station, GIS and remote Sensing by R. Sathikumar, Satheesh Gopi and N. Madhu, Pearson Education, India*

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**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech. II – II Sem.**

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**(13A01406) FLUID MECHANICS AND HYDRAULIC MACHINERY LAB**

**Course Objective:**

- *The objective of the course is to make the students understand the fluid flow concepts and get familiarity with flow measuring devices.*

**LIST OF EXPERIMENTS:**

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. Verification 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.

**LIST OF EQUIPMENT:**

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



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B.Tech. II - II Sem.

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(13A01407) SURVEYING LAB – II

**Course 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 EXPERIMENTS:**

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.

**LIST OF EQUIPMENT:**

1. Heodolite and leveling staffs.
2. Tachometers.
3. Total station.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. III - I Sem.

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(13A01501) BUILDING PLANNING AND DRAWING

**Course 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; elegance; 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.

**PROJECT NETWORKING** – Planning of construction projects; scheduling and monitoring Bar chart; CPM and PERT Network planning; computation of times and floats – their significance.

**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. Charitor publications.*
3. *PERT and CPM – Project planning and control with by Dr.B.C.Punmia & Khandelwal – Laxmi publications.*

**Reference Books:**

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.*

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech. III - I Sem.**

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**(13A01502) DESIGN & DRAWING OF REINFORCED CONCRETE STRUCTURES**

**Course 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*
3. *Limit state designed of reinforced concrete – P.C.Varghese, Printice Hall of India, New Delhi*

**Reference Books:**

1. *Limit State Design* by A. K.Jain , Nem chand & Brothers, 7<sup>th</sup> edition.
2. *Structural Design and Drawing* by N.Krishna Raju, University Press, Hyderabad
3. *Reinforced concrete structural elements – behavior, Analysis and design* by P.Purushotham, Tata Mc.Graw-Hill, 1994.
4. *Analysis of skeletal structures* by seetharamulu kaveti, TMH publications.
5. *Reinforced concrete design* by S.Unnikrishna Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi.
6. *Fundamentals of reinforced concrete* by N.C. Sinha and S.K Roy, S. Chand publishers
7. *Principles and detailing of concrete structures* by D.S.Prakash Rao, TMH publishers.

**Codes/Tables:** IS 456-2000 and IS-800 code books to be permitted into the examinations Hall.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. III - I Sem.

Th	Tu	C
3	1	3

(13A01503) CONCRETE TECHNOLOGY

**Course 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
3. *Concrete Technology* by A.R. Santha Kumar, Oxford university Press, New Delhi

**Reference Books:**

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 publishers.
4. *Non-Destructive Test and Evaluation of materials* by J.Prasad & C.G.K. Nair , Tata Mcgraw hill Publishers, New Delhi.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. III - I Sem.

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3	1	3

(13A01504) WATER RESOURCES ENGINEERING-I

**Course Objective:**

*To study the concepts of*

- *Engineering Hydrology and its applications like Runoff estimation, estimation of design discharge and flood routing.*
- *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 permeable foundations; Blighs creep theory; Khosla's theory; Determination of uplift pressure, impervious floors using Blighs and Khosla's theory; Exit gradient.

**CANAL OUTLETS:** 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. *Engineering Hydrology* by Srinivasan, Oxford Publishers, New Delhi
3. *Irrigation Engineering and Hydraulic structures* by S. K. Garg; Khanna Publishers, Delhi.

### **Reference Books:**

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.
4. *Irrigation Water Management* by D.K. Majundar, Printice Hall of India.

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**B.Tech. III - I Sem.**

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**(13A01505) STRUCTURAL ANALYSIS – II**

**Course 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.

**UNIT 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 – Vol. I & 2 by Bhavikatti, Vikas publications*
2. *Analysis of structures by Vazrani & Ratwani – Khanna Publications.*
3. *Theory of structures by Ramamuratam, jain book depot , New Delhi.*

**Reference Books:**

1. *Structural analysis – Hibbler, 6<sup>th</sup> edition – Pearson publilcation.*
2. *Structural Analysis (Matrix Approach) by Pundit and Gupta – Tata Mc.Graw Hill publishers.*
3. *Strength of Materials and mechanics of solids Vol-2 by B.C. Punmia, Laxmi Publications, New Delhi*
4. *Structural analysis by R.S.Khurmi, S.Chand Publications, New Delhi.*
5. *Basic Structural Analysis by K.U.Muthu et al., I.K.International Publishing House Pvt.Ltd*

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. III - I Sem.

Th	Tu	C
3	1	3

### (13A01506) ENGINEERING GEOLOGY

#### **Course Objective:**

*The objective 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 drawbacks. 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 , Quartz , Flint , Jasper, Olivine , Augite , Hornblende , Muscovite , Biotite , Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economic minerals such as Pyrite, Hematite, Magnetite, Chromite , 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 and unconformities, and joints – their important types. Their importance In situ 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.*
3. *Engineering Geology by D.Venkata Reddy, Vikas Publications, New Delhi.*

#### **Reference Books:**

1. *Engineerring geology by Prabin singh, Katson Pubilcations*
2. *Engineering Geology by Subinoy Gangopadhyay, Oxford University press.*
3. *Principals of Engineering Geology by K.V.G.K. Gokhale – B.S publications*
4. *F.G. Bell, Fundamental of Engineering Geology Butterworths, Publications, New Delhi, 1992*
5. *Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution,*
6. *Engineering Geology by Mukarjee, World Press.*
7. *Foundations of Engineering Geology by Tony Waltham, Special Indian Edition, CRC Press New Delhi.*

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**B.Tech. III - I Sem.**

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**(13A01507) ENGINEERING GEOLOGY LAB**

**LIST OF EXERCISES:**

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

**LAB EXAMINATION PATTERN:**

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

**Text Books:**

1. *Elementary Exercises in Geology* by CVRK Prasad, Universities press.

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**B.Tech. III - I sem.**

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**(13A01508) CONCRETE TECHNOLOGY LAB**

**LIST OF EXPERIMENTS**

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

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

**B.Tech. III - I Sem.**

### **(13A52502) ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS LAB (Audit Course)**

#### **Introduction:**

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

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

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

#### **Course Objective:**

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

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

#### **Learning Outcome:**

- *Accomplishment of sound vocabulary and its proper use contextually*
- *Flair in Writing and felicity in written expression.*
- *Enhanced job prospects.*
- *Effective Speaking Abilities*

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

#### **UNIT I**

##### **COMMUNICATIVE COMPETENCY:**

1. Reading Comprehension
2. Listening comprehension
3. Vocabulary for competitive purpose
4. Spotting errors

**UNIT II**  
**TECHNICAL WRITING**

1. Report writing
2. Curriculum vitae
3. Covering letter
4. E-mail writing

**UNIT III**  
**PRESENTATIONAL SKILLS**

1. Oral presentation
2. Power point presentation
3. Poster presentation
4. Stage dynamics

**UNIT IV**  
**CORPORATE SKILLS**

1. Dress code
2. Telephonic skills
3. Net Etiquettes

**UNIT V**  
**GETTING READY FOR JOB**

1. Group discussions
2. Interview skills
3. Psychometric tests

**MINIMUM REQUIREMENT:**

*The Advanced English Language Communication Skills (AELCS) Laboratory shall have the following infra-structural facilities to accommodate at least 60 students in the lab:*

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

**SUGGESTED SOFTWARE:**

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

1. **K-VAN SOLUTIONS-Advanced communication lab**
2. **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
3. **TOEFL & GRE( KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)**
4. **Train2success.com**

**References:**

1. **Objective English For Competitive Exams, Hari Mohana Prasad, 4<sup>th</sup> edition, Tata Mc Graw Hill.**
2. **Technical Communication by Meenakshi Raman & Sangeeta Sharma, O U Press 2009.**
3. **Books on TOEFL/GRE/GMAT/CAT/ IELTS by Barron's/DELTA/Cambridge University Press.2012.**
4. **Soft Skills for Everyone, Butterfield Jeff, Cengage Publications, 2011.**
5. **Practice Psychometric Tests: How to familiarize yourself with genuine recruitment tests, 2012.**



6. ***Management Shapers Series*** by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
7. ***Handbook for Technical Writing*** by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.
8. ***English for Technical Communication for Engineering Students***, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.
9. ***Word Power Made Handy***, Shalini Verma, S Chand Publications, 2011.
10. ***Effective Technical Communication***, Ashrif Rizvi, TataMcGrahill, 2011.

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B.Tech. III - II sem (C.E.)

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(13A01601) DESIGN & DRAWING OF STEEL STRUCTURES

*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.

  
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**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. 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.

  
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**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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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. III - II sem (C.E.)

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(13A01602) GEOTECHNICAL ENGINEERING – I

**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 Westergaard’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.

  
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#### 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 envelopes – 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 B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
2. Geotechnical Engineering by Iqbal H.Khan, PHI publishers.
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

  
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(13A01603) ENVIRONMENTAL ENGINEERING

**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

  
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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.

  
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**TEXT BOOKS:**

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

**REFERENC S :**

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

  
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(13A01604) WATER RESOURCES ENGINEERING-II

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

**UNIT - I**

**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 Discharge Measurement Area-Velocity method; Slope-Area method; Tracer method, Electromagnetic induction method, Ultrasonic method; Measurement of depth –Sounding rod, Echo-sounder; Measurement of velocity: Floats – Surface floats, Sub-surface float or Double float, Velocity rod; Pitot tube; Current meter- rating of current meter, measurement of velocity; chemical method; Measurement of stage-Staff gauge, wire gauge, water stage recorder, bubble gauge recorder; stage-discharge curve.

**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 of site for a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass

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inflow curve; Determination of safe yield from a reservoir of a given capacity; Sediment flow in streams; Reservoir sedimentation; Life of reservoir; Reservoir sediment control; Flood routing; Methods of 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.

  
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**TEXT BOOKS:**

1. Irrigation and Water Power Engineering by Dr. B.C.Punmia & Dr. Pande B.B. Lal; Laxmi Publications pvt. Ltd., New Delhi.
2. 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

  
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(13A01605) TRANSPORTATION ENGINEERING - I

***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.

  
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**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., 7<sup>th</sup> 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



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(13A01606) FINITE ELEMENT METHODS IN ENGINEERING

(CBCC)

**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.

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**AXI-SYMMETRIC ANALYSIS:** Basic principles-Formulation of 4-noded iso-parametric axis-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, 3<sup>rd</sup> 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

**outcomes:**

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

  
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(13A01607) DISASTER MANAGEMENT AND MITIGATION

(CBCC)

*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 hazards.*

**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

  
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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. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning

#### **References**

1. R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
2. H.K. Gupta (Ed) Disaster Management, Universiters Press, India, 2003

#### **outcomes:**

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

  
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1. This course seeks to provide students with appropriate knowledge and understanding to enable them to make an effective contribution to the implementation of the practices of crisis and disaster management, with appropriate academic rigour in university taught units.
2. A holistic approach is taken in the study of crisis and disaster management and its interfaces with other disciplines.
3. This course provides the students with the skills and knowledge to meet personal and organisational objectives.

  
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**B.Tech. III - II sem (C.E.)**

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**(13A01608) INTELLECTUAL PROPERTY RIGHTS**

**(CBCC)**

**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 learning.
2. Intellectual property right – neashmy the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing company ltd.,

  
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(13A01609) GEOTECHNICAL ENGINEERING LAB

*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, 5.13mm, and 0.075mm.
6. Hydrometer

  
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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 consolidation test apparatus with all accessories.
13. Tri-axial cell with provision for accommodating 38 mm dia specimens.
14. Box shear test apparatus
13. Laboratory vane shear apparatus.
16. Hot Air ovens (Range of Temperature 50-130<sup>0</sup>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.

  
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(13A01610) ENVIRONMENTAL ENGINEERING LAB

**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.

  
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### 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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B.Tech. IV - I sem (C.E.)

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### (13A52701) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

**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 - Relationship of Managerial Economics with Financial Accounting and Management. **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.

#### **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: 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).

## **UNIT V: CAPITAL AND CAPITAL BUDGETING**

Concept of Capital - Over and Undercapitalization – Remedial Measures - Sources of Short 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)

**Learning Outcome:** After completion of this course, the student will be 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. Managerial Economics 3/e, Ahuja H.L, S.Chand, 2013.
2. Financial Management, I.M.Pandey, Vikas Publications, 2013.

### **REFERENCES**

1. Managerial Economics and Financial Analysis, 1/e, Aryasri, TMH, 2013.
2. Managerial Economics and Financial Analysis, S.A. Siddiqui and A.S. Siddiqui, New Age International, 2013.

Accounting and Financial Management, T.S.Reddy & Y. Hariprasad Reddy, Margham Publishers.

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. IV - I sem (C.E.)

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### (13A01701) ESTIMATION, COSTING AND VALUATION

**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 contingent charges.

**VALUATION :** Valuation of buildings.

#### TEXT BOOKS

1. Estimating and Costing 27<sup>th</sup> revised edition by B.N. Dutta, UBS publishers, 2000.
2. Civil Engineering Contracts and Estimations, 4<sup>th</sup> edition by B.S.Patil, Universities Press, Hyderabad.

#### REFERENCES :

1. Engineering Construction Cost 6<sup>th</sup> edition by Peurifoy, TMH Publications
2. Estimation, Costing and Specifications by M. Chakraborti; Laxmi publications. Standard Schedule of rates and standard data book by public works department.
3. I. S. 1200 ( Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)
4. National Building Code

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

**Course 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

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### (13A01702) GEOTECHNICAL ENGINEERING – II

*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 methods

**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, 4<sup>th</sup> edition by C.Venkataramaiah, New Age Publications.
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 Publications
2. Das, B.M., - (1999) Principles of Foundation Engineering –6<sup>th</sup> edition (Indian edition) Thomson Engineering
3. Bowles, J.E., (1988) Foundation Analysis and Design – 4<sup>th</sup> Edition, McGraw-Hill Publishing company, Newyork.
4. Geotechnical Engineering by Debashis Moitra, Univwesities press

**OUTCOMES:**

On successful completion of the course, the students will have the:

1. Ability to apply the principle of shear strength and settlement analysis for foundation system.
2. Ability to design shallow and deep foundations
3. Ability to analyze and design earth retaining structures.
4. Estimate bearing capacity using IS code methods

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**B.Tech. IV - I sem (C.E.)**

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**(13A01703) TRANSPORTATION ENGINEERING – II**

***OBJECTIVE:** It deals with different components of Transportation Engineering like Railway, Airport Engineering, Ports & harbours. Sound knowledge can be acquired on components of airports, railways, docks and harbours after completion of course*

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. Transportation Engineering: Railways,Airports,Docks and Harbours,Bridges and Tunnels, by C.Venkatramaiah, Universities Press,Hyderabad (2016)
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).



**References:**

1. Highway, Railway, Airport and Harbour Engineering – K.P. Subramanian, Scitech publishers.
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.

**OUTCOMES:**

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

- a) Understand the components of Permanent way and their functions
- b) Able to understand the geometric design elements of Railway Track and their design methods
- c) Understand the aircraft characteristics and their influence on various design elements
- d) Acquire the knowledge of types of Docks, Ports and Harbours

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**B.Tech. IV -I sem (C.E.)**

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**(13A01704) DESIGN AND DRAWING OF IRRIGATION STRUCTURES  
(CBCC-II)**

**OBJECTIVES:**

1. To provide the knowledge of design of reservoir, operation and sedimentation
2. To provide knowledge on various hydraulic structures such as energy dissipaters, head and cross regulators, canal falls and structures involved in cross drainage works

**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.

**OUTCOMES:**

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

1. design various channel systems design head and cross regulator structures
2. identify various types of reservoir and their design aspects

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**B.Tech. IV -I sem (C.E.)**

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**(13A01705) GROUND IMPROVEMENT TECHNIQUES  
(CBCC - II)**

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

**OUTCOMES :**

Students will be able to

1. Identify the problems in Expansive soils
2. Implement the stabilization methods
3. Apply grouting and dewatering techniques

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B.Tech. IV - I sem (C.E.)

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## (13A01706) AIR POLLUTION AND QUALITY CONTROL (CBCC - II)

Objectives:

1. To understand the aspects of atmospheric pollution
2. To know about the issues such as atmospheric composition, monitoring, acidic deposition, urban air quality
3. To understand the use of models in air pollution studies

### 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<sub>x</sub>; NO<sub>x</sub> and CO Emission Standards– Air sampling – Sampling Techniques – High volume air sampler – Stack sampling - Analysis of Air pollutants – Air quality standards – Air pollution control act.

### TEXT BOOKS:

1. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.
2. Air Quality by Thod godish, Levis Publishers, Special India Edition, New Delhi
3. Rao C.S. (2006) Environmental Pollution Control Engineering, 2nd edition, New Age International, Newdelhi

**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. Noel De Nevers (2000), Air Pollution Control Engineering, 2nd Edition, McGraw Hill International Edition.

**OUTCOMES :**

Students will be able to

1. Describe the main chemical components and reactions in the atmosphere and examine the factors responsible for perturbing these
2. Implement the methods for monitoring and modeling spatial and temporal patterns of pollution
3. Explore air pollution issues at a range spatial scales and how these are relaxed.
4. Assess the environmental impacts of atmospheric pollution.

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## (13A01707) BRIDGE ENGINEERING

### (CBCC - III)

*OBJECTIVE: It deal with different types of Bridges like deck slab bridge, T – Beam Bridge and gives a good 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.

## **Course outcomes:**

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

1. Design the basic components of bridge structures like bridge deck slabs longitudinal girders transverse girders, piers and well foundations.
2. Understand the IRC classes of loading and railway bridge rules for detailed calculation of loadings and design of various components.
3. Know the methods of design of structural components of different types of Bridges



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## (13A01708) EARTH QUAKE RESISTANT DESIGN OF STRUCTURES (CBCC - III)

### COURSE OBJECTIVES:

1. To introduce the basics of Earthquake Engineering
2. To introduce the engineering seismology, building geometrics & characteristics, structural irregularities,
3. To introduce tips on earthquake engineering - do's and don'ts
4. To introduce cyclic loading behaviour of RC, steel and pre-stressed concrete elements
5. To discuss code provisions and their application on different types of structures

### 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-storied 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 Acceolograms-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 – Clough & Penzien, McGraw Hill – International Edition.
2. Earthquake Resistant Design of Structures by S.K.Duggal, Oxford University press, New Delhi
3. Dynamics of Structures by A.K.Chopra – Pearson Education, Indian Branch, Delhi.

**REFERENCES:**

1. Structural Dynamics by Mario Paaz , Academic Publishers.
2. Earthquake Resistant Design of Structures – Pankaj Agarwal & Manish Shrikhande – Printice Hall of India, New Delhi
3. 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.

**COURSE OUTCOMES:**

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

1. apply the basics of Earthquake Engineering
2. demonstrate the dynamics of structural system under earthquake load
3. analyze the influence of the structural / geometrical design in building characteristics
4. demonstrate the cyclic loading behaviour of RC steel and pre-stressed concrete elements
5. apply codal provisions on different types of structures

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### (13A01709) REHABILITATION AND RETROFITTING OF STRUCTURES (CBCC - III)

#### OBJECTIVES:

To know the causes of concrete structures failures and methods available to rehabilitate and retrofitting the structures with economical applications.

#### 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.
3. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press

#### REFERENCES

1. Diagnosis and treatment of structures in distress by R.N.Raikar, Published by R&D Centre of Structural Designers & Consultants Pvt.Ltd., Mumbai, 1994.
2. Handbook on Repair and Rehabilitation of RCC buildings, Published by CPWD, Delhi, 2002.
3. Earthquake resistant design of structures by Pankaj Agarwal and Manish Shrikhande, Prentice-Hall of India, 2006..

#### OUTCOMES:

**After the completion of the course, the student will be able to**

1. Assess strength and materials deficiency in concrete structures
2. Suggest methods and techniques used in repairing / strengthening existing concrete structures
3. Apply Non Destructive Testing techniques to field problems
4. Apply cost effective retrofitting strategies for repairs in buildings

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**(13A01710) CAD LABORATORY.**

**CAD:**

**SOFTWARE:**

1. STAAD PRO or Equivalent

**EXERCISES:**

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

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**B.Tech. IV - I sem (C.E.)**

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**(13A01711) TRANSPORTATION ENGINEERING LABORATORY**

**I. ROAD AGGREGATES:**

1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption.
4. Abrasion Test.
5. Shape tests

**II. BITUMINOUS MATERIALS :**

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.

**III TRAFFIC FIELD STUDIES**

1. Traffic Volume Studies at Mid-block and Data Analysis
2. Traffic Volume Studies at Intersection and Data Analysis
3. Speed Studies and Data Analysis

**LIST OF EQUIPMENT:**

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers.
4. Los angles Abrasion test machine
5. 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. S.K. Khanna and C.E.G Justo, Highway Materials Testing Laboratory Manual, Nem Chand Bros. Roorkee
2. Lab manual on High way Engineering by Ajay.K.Duggal & Vijay .P.Puri, New Age Publications, New Delhi

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. IV -II sem (C.E.)

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## (13A01801) URBAN TRANSPORTATION PLANNING (MOOC – I)

**OBJECTIVES:** *This course aims to introduce the student to the basic concepts of urban transportation planning and various stages of planning such as trip generation, trip distribution, mode split and traffic assignment are dealt here. Concepts of economic evaluation of transportation plans are also introduced.*

### UNIT - I

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Concept of Travel Demand; Travel Characteristics - Origin, Destination, Route, Mode, Purpose; Travel Demand as a function of independent variables; Assumptions in Demand Estimation Relation between land use and Travel.

### UNIT - II

Transportation Planning process; General concept of Trip; Four step process of Transportation planning-Aggregate and disaggregate Models. Delineation of study area; Zoning Principles; Formation of TAZs;Types and sources of Data, Home Interview surveys; Road side interview surveys; Goods. Taxi, IPT surveys; sampling techniques; Expansion factors and accuracy check; Desire line diagram and use.

### UNIT - III

**Trip Generation:** Factors governing Trip Generation and Attraction; Multiple Linear Regression Models, Category Analysis.

**Trip Distribution:** Methods of Trip Distribution; Growth Factor Models Uniform Growth Factor Method; Average Growth Factor Method; Fratar Method; Advantages and limitations of Growth Factor Models; concept of Gravity Model(Elementary Concept Only).

### UNIT -IV

**Mode Split:** Factors affecting mode split; Logit Model.

**Traffic assignment:** Purpose of Assignment and General Principles; Minimum path trees; Assignment Techniques - All - or- nothing Assignment; Capacity restraint Assignment; diversion curves.

### UNIT - V

Economic Evaluation of Transportation plans; Costs and benefits of transportation projects; vehicle operating cost; Time savings; Accident costs. Methods of Economic Evaluation - Benefit cost Ratio Method; Net present value method; Internal Rate of Return method.

**TEXT BOOKS:**

1. L.R.Kadiyali; Traffic Engineering and Transportation Planning, Khanna Publishers, Delhi.
2. Papa Costas C.S.; Fundamentals of Transportation Engineering, Prentice Hall, India.
3. Khisty C.J., Transportation Engineering -An Introduction, Prentice Hall.

**OUTCOMES:**

*On completion of this course the student will be able to*

1. *Understand the concept of Travel Demand and the factors affecting it*
2. *Understand the different stages of Urban Transportation Planning and the mathematical models associated with each stage*
3. *Assess the economic impact of new Transportation plans*

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**(13A01802) ENVIRONMENTAL IMPACT ASSESTMENT & MANAGEMENT  
(MOOC – I)**

**OBJECTIVE**

*This subject deals with the various impacts of infrastructure projects on the components of environment and method of assessing the impact and mitigating the same. The student is able to know about the various impacts of development projects on environment and the mitigating measures.*

**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
3. Environmental Impact Assessment, Canter, L.W., 1977, McGraw Hills, New York.
4. John G. Rau and David C. Wooten (Ed), Environmental Impact Analysis Handbook, McGraw Hill Book Company.

**OUTCOMES:**

*On completion of this course the student will be able to*

1. *Perform a critical quality review of an EIA and EIS;*
2. *Structure the EIA working process considering the need for interdisciplinarity;*
3. *Perform the screening and scoping of an EIA, based on existing requirements, evaluate the impacts and draw meaningful conclusions from the results of the EIA;*
4. *Clarify the concept of EIA and its application in an international context to those involved in or affected by the EIA process;*
5. *Interpretate an EIA, present its conclusions and translate its conclusions into actions.*

**(13A01803) REMOTE SENSING AND GIS  
(MOOC – II)**

**OBJECTIVES:**

1. *To understand the Photogrammetric techniques, concepts, components of Photogrammetry*
2. *To introduce the students to the basic concepts and principles of various components of remote sensing.*
3. *To provide an exposure to GIS and its practical applications in civil engineering*
4. *Analyze the energy interactions in the atmosphere and earth surface features*

**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 Fundamentals of remote sensing by Gorge Joseph, Universities press, Hyderabad

**REFERENCES:**

1. Advanced surveying : Total station GIS and remote sensing – Satheesh Gopi – Pearson publication.
2. Remote Sensing and its applications by LRA Narayana University Press 1999.
3. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
4. Remote sensing and GIS by M.Anji Reddy, B.S. Publications, New Delhi.
5. GIS by Kang – tsung chang, TMH Publications & Co.,

**OUTCOMES:**

*On completion of the course the students will have knowledge on*

1. *Principles of Remote Sensing and GIS*
2. *Analysis of RS and GIS data and interpreting the data for modeling applications*

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**(13A01804) ADVANCED STRUCTURAL ENGINEERING  
(MOOC – II)**

**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
2. R.C.C Structures by [Dr. B. C. Punmia](#), [Ashok Kumar Jain](#), [Arun Kumar Jain](#), Laxmi Publications, New Delhi

**Reference books :-**

1. Design of RCC structures by M.L.Gambhir P.H.I. Publications, New Delhi.
2. Advanced RCC by Varghese , PHI Publications, New Delhi.
3. R.C.C Designs by Sushil kumar , standard publishing house.
4. Fundamentals of RCC by N.C.Sinha and S.K.Roy, S.Chand Publications, New Delhi.

**OUTCOMES:**

*On completion of this course the student will be able to*

1. *Design of roof systems with reference to Indian standards*
2. *Design of water retaining and storage structures*
3. *Design of silos and chimneys*

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**(13A01805) PRESTRESSED CONCRETE  
(MOOC – III)**

**OBJECTIVES:**

*To introduce the need for prestressing as well as the methods, types and advantages of prestressing to the students. Students will be introduced to the design of prestressed concrete structures subjected to flexure and shear.*

**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 Hill Publications.
- 2 Prestressed Concrete by Ramamrutham,Dhanpatrai Publications
- 3 Prestressed Concrete by K.U.Muthu, PHI Publications.

**REFERENCE:**

1. Prestressed Concrete design by Praveen Nagrajan, Pearson publications, 2013 editions.
2. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns, John Wiley & Sons.
3. Prestressed Concrete by Pandit.G.S. and Gupta.S.P., CBS Publishers and Distributers Pvt. Ltd, 2012.
4. Prestressed Concrete by Rajagopalan.N, Narosa Publishing House, 2002.
5. Prestressed Concrete Structures by Dayaratnam.P., Oxford and IBH, 2013

**Codes/Tables:**

**Codes:** BIS code on prestressed concrete, IS 1343 to be permitted into the examination Hall.

**OUTCOMES:**

*Student shall have knowledge on methods of prestressing and able to design various prestressed concrete structural elements.*

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**(13A01806) COST EFFECTIVE HOUSING TECHNIQUES**

**(MOOC – III)**

**OBJECTIVES:**

*The objective of the course is to train the students to have a comprehensive knowledge of planning, design, evaluation, construction and financing of housing projects. The course focuses on cost effective construction materials and methods. Emphasis is given on the principles of sustainable housing policies and programmes.*

**UNIT – I:-**

**INTRODUCTION TO HOUSING**

Definition of Basic Terms – House, Home, Household, Apartments, Multi storied Buildings, Special Buildings, Objectives and Strategies of National Housing Policies including Slum Housing Policy, Principle of Sustainable Housing – Integrated approach on arriving holding capacity and density norms - All basic infrastructure consideration - Institutions for Housing at National, State and Local levels.

**UNIT – II:-**

**HOUSING PROGRAMMES**

Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighborhoods- Plotted land development programs, Open Development Plots, Apartments, Gated communities, Townships, Rental Housing, Co-operative Housing, Slum Housing Programmes – Slum improvement – Slum redevelopment and Relocation – Use of GIS and MIS in Slum Housing Projects,, Role of Public housing agencies, and Private sector in supply , quality, infrastructure and pricing – Role of Non-Government Organizations in slum housing.

**UNIT – III:-**

**DEVELOPMENT AND ADOPTION OF LOW COST HOUSING TECHNOLOGY:**

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

**UNIT – IV:-**

**ALTERNATIVE BUILDING MATERIALS FOR LOW COST HOUSING AND INFRASTRUCTURE SERVICES IN RURAL HOUSES:-**

Introduction - Substitute for scarce materials – Ferrocement - Gypsum boards - Timber substitutions - Industrial wastes - Agricultural wastes - Low cost Infrastructure services: Introduce - Present status - Technological options - Low cost sanitation - Domestic wall - Water supply, energy.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 pre-cost roofing units against Earthquake forces -Status of R& D in earthquake strengthening measures - Floods, cyclone, future safety

### **TEXT BOOKS**

1. Hand book of Low Cost Housing by A.K.Lal – New Age International Publishers.
2. Low cost Housing – G.C. Mathur, IBH publishers.
3. Housing in India by Francis Cherunilam and Odeyar D Heggade, Himalaya Publishing House, Bombay, 1997.

### **REFERENCES:-**

1. Disaster Science and Management by Tushar Bhattacharya, TMH Publications.
2. Building materials for low –income houses – International council for building research studies and documentation.
3. Modern trends in housing in developing countries – A.G. Madhava Rao, D.S. Ramachandra Murthy & G.Annamalai.
4. Properties of concrete – Neville A.m. Pitman Publishing Limited, London.
5. Light weight concrete, Academic Kiado, Rudhai.G – Publishing home of Hungarian Academy of Sciences 1963.

### **OUTCOMES:**

*The students will have a comprehensive knowledge of planning, design, evaluation, construction and financing of housing projects with cost effective housing techniques. The student can be in a position to adopt the suitable techniques in rural and disaster prone areas by using locally available materials.*