GURU NANAK INSTITUTIONS TECHNICAL CAMPUS

(An UGC Autonomous Institution - Affiliated to JNTUH)
Ibrahimpatnam, Ranga Reddy District, Hyderabad - 501 506.

Department of Civil Engineering

GNITC - Regulation – R22

COURSE STRUCTURE AND DETAILED SYLLABUS

for

II YEAR B. TECH

CIVIL ENGINEERING

(Applicable for the batches admitted from 2023-24)

GURU NANAK INSTITUTIONS
TECHNICAL CAMPUS
(An Autonomous Institution)
Campus: Ibrahimpatnam, R.R. District - 501506 (T.S).

GNITC is now NAAC A+ Accredited Institute

GURU NANAK INSTITUTIONS TECHNICAL CAMPUS
(AUTONOMOUS)
Ibrahimpatnam, R.R Dist. – 501506
SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF CIVIL ENGINEERING

BOARD OF STUDIES MEETING No. 8

Name of the Board	:	CIVIL ENGINEERING
Name of the Department	:	CIVIL ENGINEERING
Name of the BOS Chairman	:	Dr. SYED OMAR BALLARI
Date & Time of the Meeting	:	28.03.2023 2.00pm
Venue	:	Board Room, Director's Office, GNITC

Members Present :

1. Dr. Rishi Sayal, Professor & Associate Director, Guru Nanak Institutions Technical Campus, (Autonomous)
2. Dr. Syed Omar Ballari, Professor & HOD, Guru Nanak Institutions Technical Campus, (Autonomous) Chairman, BOS
3. Dr. G.V. Narsimha Reddy, Professor, JNTUCEH, Hyderabad, Member (JNTUH Nominee).
4. Dr. Ramancharla Pradeep Kumar, Registrar & Professor, IIITH, Member (Academic Council Nominee)
5. Dr. P. Rajasekhar, Professor and Head, OU, Hyderabad, Member (Academic Council Nominee)
6. Mr. P. Prabhakar Rao, Executive Director, APCONS, Member (Industry Representative)
7. Dr. P. Jagdeesan, Professor, Guru Nanak Institutions Technical Campus, (Autonomous), Member
8. Mr. D.V.S.P. Rajesh, Assistant Professor, Guru Nanak Institutions Technical Campus (Autonomous), Member
9. Mrs. M.Harini Reddy, Associate Professor, Guru Nanak Institutions Technical Campus (Autonomous), Member
10. Mr. P. Ramesh Chanti Kumar, Assistant Professor, Guru Nanak Institutions Technical Campus (Autonomous), Member
11. Mr. G. Vamshi Krishna, Alumni, Guru Nanak Institutions Technical Campus (Autonomous), Member (Alumni)

AGENDA:

1. Committee discussed about the preparation of R22 Course structure for the upcoming semester.
2. Committee allotted respective subject to subject experts for checking the syllabus given by JNTUH.
3. Committee wants to introduce IDEA Lab of GNITC.
4. Substitute subjects for R18/R22 re- admitted students.

Agenda 1: Committee discussed about the preparation of R22 Course structure for the upcoming semester for B. Tech, Civil Engineering, II Year I Semester and II Semester

BOS Chairman informed the members that the course structure is framed based on JNTUH model curriculum after discussion in Department Academic Committee meeting.

REFERENCE BOOKS:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill – 2000.
2. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004.
3. Surveying (Vol – 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.
4. Chandra A M, "Plane Surveying", New Age International Pvt. Ltd., New Delhi, 2002.
5. Surveying by Bhavikatti; Vikas publishing house ltd.
6. Duggal S K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
7. Surveying and leveling by R. Agor Khanna Publishers 2015.

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Mr. P. Prabhakar Rao **Industry Representative**	**Dr. Syed Omar Ballari** **Chairman-BOS**	**Dr. P. Jagadeesan** **Member**
Mr. Syed Azhar Hussain **Member**	**Mr. D.V.S.P Rajesh** **Member**	**Mr. Raghuveer Narsing** **Member**
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It was resolved as under: "Course Structure for B.Tech (Civil Engineering) II Year I Semester, I & II Semester approved for submission and consideration of Academic Council, Guru Nanak Institutions Technical Campus".

Agenda 2: Committee allotted respective subject to subject experts for checking the syllabus given by JNTUH.

BOS Chairman informed the subject exerts to finalized the course structure of R22 B. Tech, civil engineering
Expert subject faculty name list as follow

SNO	SUBJECT NAME	FACULTY NAME	REMARKS
1	Applied mechanics	Mr. Rana Prathap Mr. Ramesh Chanti Kumar	Applied Mechanics will be termed as ***Engineering Mechanics*** common to CE & ME. Course outcomes modified accordingly.
2	Surveying	Mr. Syed Azhar Hussain Mr. Raghuveer Narsing	Syllabus has to be split into two parts as surveying-I (T) and surveying (T) as prescribed by theory of surveying, and plane table to be add in surveying -I
3	BMCP	Mr. Syed Azhar Hussain Mr. Narsimha Rao	Unit 2 has to be modified. New modified copy is provided below.
4	Strength of materials I	Mrs. Anuradha Mr. Rajesh DVSP	Few topics has to be removed in all the units
5	HHM	Mr. Vamshi Krishna Mrs. Anuradha	In unit 2 and 3,4 few topics are not required

Note: Credits has to be adjusted for surveying –II theory

Agenda 3: Committee wants to introduce IDEA Lab of GNITC.

Committee wants to introduce IDEA Lab of GNITC and explain about initiatives taken in line with the guidelines of AICTE. Zero credit course to the students of CE in any of the semesters suitable to the students. (Sem I)

Agenda 4: Substitute subjects for R18/R22 re- admitted students
The syllabus comparison of R18/R21 is compared with R22 regulation and substitute subjects are proposed accordingly.

SURVEYING (22PC0CE02)

I Year B. Tech. Civil. II - Sem

L	T	P	C
2	0	0	2

Course Objectives: The objective of this Course is

- To understand the surveying and there uses on any civil engineering work.
- To improve the Knowledge on surveying by using different instruments and their methods.
- To enhance the knowledge on calculations of areas, elevations, levels, rectifiable errors and improve the accuracies of instruments.
- To impart the knowledge on latest technologies in surveying.

UNIT - I

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

Measurement of Distances and Directions

Linear distances: Chains- Tapes, ranging, Tape corrections, indirect methods- optical methods

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

UNIT - II

Leveling and Contouring Leveling- Basics definitions, types of levels and leveling staves, temporary adjustments, methods of leveling, booking and Determination of levels- HI Method-Rise and Fall method, Contouring- Characteristics and uses of Contours

Areas - Determination of areas consisting of irregular boundary and regular boundary (coordinates, MDM, DMD methods).

UNIT - III

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

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

UNIT - IV

Tacheometric Surveying: Principles of Tachometry, stadia and tangential methods of Tachometry.

Curves: Types of curves and their necessity, elements of simple curve

UNIT - V

Modern Surveying Methods: Total Station and Global Positioning System: Basic principles, classifications, applications, comparison with conventional surveying.

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

- Calculate angles, distances and levels
- Identify data collection methods and prepare field notes
- Understand the working principles of survey instruments
- Estimate measurement errors and apply corrections
- Interpret survey data and compute areas
-

TEXT BOOKS:

1. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi.

2. Chandra A M, "Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.

3. Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System - Theory and Practice, Springer -Verlag Publishers, 2001.

ENGINEERING MECHANICS (22PC0CE04)

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

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to

- Explain the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium
- Perform analysis of bodies lying on rough surfaces.
- Locate the centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections
- Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal motion and plane motion of rigid bodies.
- Explain the concepts of work-energy method and its applications to translation, rotation and plane motion and the concept of vibrations

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

- Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to a system of forces.
- Solve problem of bodies subjected to friction and find the location of centroid.
- Find the location of centroid and calculate moment of inertia of a given section.
- Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.
- Apply the concepts of work energy principles to single and connected centrifuged system

UNIT - I

Introduction to Engineering Mechanics - Force Systems: Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

UNIT - II

Friction: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, ladder friction Centroid and Centre of Gravity -Centroid of Lines, Areas and Volumes from first principle, centroid of composite sections; Centre of Gravity and its implications. – Theorem of Pappus.

UNIT - III

Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Product of Inertia, Parallel Axis Theorem, Perpendicular Axis Theorem.

Mass Moment of Inertia: Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia – Mass moment of inertia of composite bodies.

UNIT - IV

Kinematics of Particles: Kinematics of particles – Rectilinear motion – Curvilinear motion – Projectiles. Kinetics of Particles: Kinetics of particles – Newton's Second Law – Differential equations of rectilinear and curvilinear motion – Dynamic equilibrium – Inertia force – D. Alembert's Principle applied for rectilinear and curvilinear motion.

UNIT - V

Work - Energy Principle: Equation of translation, principle of conservation of energy, work - energy principle applied to particle motion and connected systems, fixed axis rotation. Impulse – Momentum

Principle: Introduction, linear impulse momentum, principle of conservation of linear momentum, elastic impact and types of impact, loss of kinetic energy, co efficient of restitution.

TEXT BOOKS:

1. Shames and Rao (2006), Engineering Mechanics, Pearson Education
2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010), Singer's Engineering Mechanics – Statics & Dynamics

REFERENCE BOOKS:

1. Timoshenko S.P and Young D.H., "Engineering Mechanics", McGraw Hill International Edition, 1983.
2. S S Bhavikatti "A Text Book of Engineering Mechanics", New Age International., 2 nd edition
3. R K Bansal " Engineering Mechanics" Laxmi Publications. Latest edition.
4. Hibbeler R. C & Ashok Gupta, "Engineering Mechanics", Pearson Education, 2010.
5. Tayal A.K., "Engineering Mechanics – Statics & Dynamics", Umesh Publications, 2011.
6. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press, 2008.
7. Meriam. J. L., "Engineering Mechanics", Volume-II Dynamics, John Wiley & Sons, 2008.
8. "Engineering Mechanics" K.L Kumar, Tata McGraw hill. 2015.

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SURVEYING LABORATORY – I (22PC0CE023)

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

L	T	P	C
0	0	2	1

Course Objective:

- Student will be able to learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying, and Levelling Surveying.
- Student will be able to learn and understand various instrument used in surveying.
- Student will learn and understand how to calculate Area of plot and Ground.
- Student will learn and understand about Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the ground profile.

CYCLE - I

- Chaining of a line using chain, measurements of area by cross staff survey.
- Measurement of distance between two points when there is an obstacle for both chaining and ranging. Compass survey
- Traversing by compass and adjustments in included angles and measurement of area - graphical adjustments.
- Distance between two inaccessible points by compass. Plane Table Surveying
- Measurement & Plotting of the area by Radiation method.
- Determination of Positions objects by Intersection Method – Plane Table Survey.
- Traverse by Plane table Survey.

CYCLE – II

LEVELING

8. Measurement of elevation of various given points.
9. Elevation difference between two given points by reciprocal levelling.
10. Longitudinal Levelling
11. Cross – section Levelling
12. Plotting of Contours by Indirect Method

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I Year B. Tech. Civil. I-Sem

L	T	P	C
0	0	2	1

ELEMENTS OF CIVIL ENGINEERING (22PC0CEN01)

Pre-requisites: Nil

Course objectives:

- To provide practical knowledge about physical properties of minerals and rocks.
- To determine the characteristics of cement, Coarse & Fine aggregates.

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

- Understands the method and ways of investigations required for Civil Engineering projects
- Identify the various rocks, minerals depending on geological classifications
- Evaluate the properties of cement, fine and coarse aggregates and determine its suitability for construction.

List of Experiments:

1. Identification of Minerals – Silica Group, Feldspar Group, Crystalline Group, Carbonate Group, Pyroxene Group, Mica Group, Amphibole Group.
2. Identification of Rocks – Igneous Petrology, Sedimentary Petrology, Metamorphic Petrology.
3. 1. Study of topographical features from Geological maps. Identification of symbols in maps.
   2. Simple structural Geology Problems (Folds, Faults & Unconformities)
4. Tests on Cement
   a. Fineness test & Normal Consistency test.
   b. Specific gravity test, Initial and Final setting time of cement.
5. Tests on Fine Aggregates
   a. Specific Gravity test.
   b. Bulking of sand & Fineness modulus of Fine aggregate.
6. Tests on Coarse Aggregate
   a. Specific Gravity test.
   b. Fineness modulus of Coarse aggregate.

TEXT BOOK:

1. IS 383 :1993 "Specification for Coarse and Fine Aggregates from Natural Sources for Concrete".
2. Engineering Geology by N. Chennakesavulu, McMillan, India Ltd. 2005
3. Engineering Methods by D. Venkat Reddy; Vikas Publishers 2015.
4. Engineering Geology by S K Duggal, H K Pandey Mc Graw Hill Education Pvt Ltd 2014

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DEPARTMENT OF CIVIL ENGINEERING

REGULATION - R22

COURSE STRUCTURE

(APPLICABLE FROM THE BATCH ADMITTED DURING 2023-24 ONWARDS)

II YEAR I SEMESTER

Course Code	Course Title	L	T	P	Credits
22BS0MA03	Probability and Statistics	3	1	0	4
22PC0CE05	Building Materials, Construction and Planning	3	0	0	3
22PC0CE06	Engineering Geology	3	0	0	3
22PC0CE07	Strength of Materials – I	3	0	0	3
22PC0CE08	Fluid Mechanics	3	0	0	3
22PC0CE09	Surveying Laboratory - II	0	1	2	2
22PC0CE10	Strength of Materials Laboratory	0	0	2	1
22PC0CE11	Computer Aided Drafting Laboratory	0	0	2	1
22MC0MB01	Constitution of India	3	0	0	0
	Total Credits	**18**	**2**	**6**	**20**

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L	T	P	C
3	1	0	4

PROBABILITY AND STATISTICS (22BS0MA03)

Pre-requisites: Mathematics courses of first year of study.

Course Objectives: To learn

- The theory of Probability, and probability distributions of single and multiple random variables
- The sampling theory and testing of hypothesis and making statistical inferences

UNIT - I

Probability: Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Baye's Rule.

Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions.

UNIT - II

Expectation and discrete distributions

Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem.

Discrete Probability Distributions: Binomial Distribution, Poisson distribution.

UNIT - III:

Continuous Distributions and sampling: Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial Distributions.

Fundamental Sampling Distributions: Random Sampling, Some Important Statistics, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, t –Distribution, F-Distribution.

UNIT – IV

Estimation & Tests of Hypotheses : Introduction, Statistical Inference, Classical Methods of Estimation, And Single Sample: Estimating the mean, standard error of a point estimate, prediction interval. Two samples: Estimating the difference between two means, Single sample: Estimating a proportion, Two samples: Estimating the difference between two proportions, Two samples: Estimating the ratio of two variances.

Statistical Hypotheses: General Concepts, Testing a Statistical Hypothesis, Single sample: Tests concerning a single mean, Two samples: tests on two means, One sample: test on a single proportion. Two samples: tests on two proportions, Two- sample tests concerning variances.

UNIT – V

Applied Statistics: Curve fitting by the method of least squares, fitting of straight lines, second degree parabolas and more general curves, Correlation and regression, Rank correlation.

Course outcomes: After learning the contents of this paper the student must be able to

- Apply the concepts of probability and distributions to some case studies.
- Correlate the concepts of one unit to the concepts in other units.

TEXT BOOKS:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Ed. Pearson Publishers.
2. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.

REFERENCE BOOKS:

1. T. Soong, Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons, Ltd, 2004.
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, academic press.

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II Year B. Tech. Civil. I-Sem

L	T	P	C
3	0	0	3

BUILDING MATERIALS, CONSTRUCTION AND PLANNING (22PC0CE05)

Course Objectives: The objectives of the course is to

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

UNIT - I

Stones and Bricks, Tiles: Properties Building stones—relation to their requirement, structural–classifications of stones requirements – Composition of good brick earth –Classification and type of brick, Qualities of good brick. Tiles-Characteristics of good tile, Type of tiles. Use of other materials their properties and importance like, wood/Timber, Aluminum, Glass, Plastic and Paints.

UNIT - II

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

UNIT - III

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

Building Services: Plumbing Services: Water Distribution, Sanitary – Lines & Fittings; Ventilations: Functional requirements systems of ventilations. Air-conditioning - Essentials and Types; Fire protection – Fire Hazards, Fire alarm system - resistant materials and constructions, CCTV system and PA system.

UNIT - IV

Masonry and Finishing: Brick masonry – types – bonds; Stone masonry – types; Composite masonry – Brick-stone composite;

Finishers: Plastering, Pointing, Painting, Claddings – Types

Form work: Requirements – Standards – Scaffolding –Shoring, Underpinning.

UNIT – V

Building Planning: Classification of buildings, functional planning of buildings: building bye-laws and regulations, Selection of site for building construction, Principles of planning, Introduction of BIM (Building information Module), Real estate regulation authority rules (Telangana State).

Course Outcomes: After the completion of the course student should be able to

- Understand the different construction material.
- Understand the different component parts of building and their construction practices and techniques
- Understand the functional requirements to be considered for design and construction of building
- Identify the factors to be considered in planning and construction of buildings
- Plan a building based on the factors and principles of planning

TEXT BOOKS:

1. Building Materials and Construction – Arora & Bindra, Dhanpat Roy Publications.
2. Building Materials and Construction by G C Sahu, Joygopal Jena McGraw hill Pvt Ltd 2015.
3. Building Construction by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) ltd., New Delhi.

REFERENCE BOOKS:

1. Building Materials by Duggal, New Age International.
2. Building Materials by P. C. Varghese, PHI.
3. Building Construction by PC Varghese PHI.
4. Construction Technology – Vol – I & II by R. Chubby, Longman UK.
5. Alternate Building Materials and Technology, Jagadish, Venkatarama Reddy and others; New Age Publications.

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II Year B. Tech. Civil. I-Sem

L	T	P	C
3	0	0	3

ENGINEERING GEOLOGY (22PC0CE06)

Course Objectives: The objective of this Course is

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

UNIT - I

Introduction: Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

Weathering of Rocks: Its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like "Granite"

UNIT - II

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

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

UNIT - III

Structural Geology: Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints - their important types and case studies. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India, Stabilization of soils. Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration.

UNIT - IV

Earth Quakes: Causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Landslides, their causes and effect; measures to be taken to prevent their occurrence.

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

UNIT - V

Considerations (i.e. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

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

UNIT – I

Pure shear and Complementary shear - Elastic modulus, Elastic constants and the relationship between them – Bars of varying section – composite bars –.

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

UNIT – II

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

UNIT – III

Flexural Stresses: Theory of simple bending – Assumptions – Derivation of bending equation- Section Modulus Determination of flexural/bending stresses of rectangular and circular sections (Solid and Hollow), I,– Design of simple beam sections.

Shear Stresses: Derivation of formula for shear stress distribution – Shear stress distribution across various beam sections like rectangular, circular, triangular, I Sections

UNIT – IV

Deflection of Beams: Slope, deflection and radius of curvature – Differential equation for the elastic line of a beam –Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L, Uniformly varying load andcouple -Mohr's theorems – Moment area method – Application to simple cases.

Conjugate Beam Method: Introduction – Concept of conjugate beam method - Difference between a real beam and a conjugate beam - Deflections of determinate beams with constant moments of inertia.

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STRENGTH OF MATERIALS – I (22PC0CE07)

Pre-Requisites: Engineering Mechanics

Course Objectives: The objective of this Course is

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

UNIT – I

Simple Stresses and Strains: Concept of stress and strain- St. Venant's Principle-Stress and Strain Diagram - Elasticity and plasticity – Types of stresses and strains- Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain, Pure shear and Complementary shear - Elastic modules, Elastic constants and the relationship between them – Bars of varying section – composite bars –.

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

UNIT – II

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

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Deflection of Beams: Slope, deflection and radius of curvature – Differential equation for the elastic line of a beam –Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L, Uniformly varying load and couple -Mohr's theorems – Moment area method – Application to simple cases.

Conjugate Beam Method: Introduction – Concept of conjugate beam method - Difference between a real beam and a conjugate beam - Deflections of determinate beams with constant moments of inertia.

UNIT – V

Principal Stresses: Introduction – Stresses on an oblique plane of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear –Principal stresses – Mohr's circle of stresses – ellipse of stress - Analytical and graphical solutions.

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

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

- Describe the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's law relationships; and perform calculations, related to the strength of structured and mechanical components.
- Recognize various types loads applied on structural components of simple framing geometries and understand the nature of internal stresses that will develop within the components.
- To evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading.
- Analyze various situations involving structural members subjected to plane stresses by application of Mohr's circle of stress.

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FLUID MECHANICS (22PC0CE08)

Course Objectives: The objectives of the course are to

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

UNIT – I

Properties of Fluid: Distinction between a fluid and a solid; Properties of fluids – Viscosity, Newton law of viscosity; vapor pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility. Fluid Statics

Fluid Pressure: Pressure at a point, Pascals law, Hydrostatic law, Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micromanometers. Pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces.

UNIT - II

Fluid Kinematics: Classification of fluid flow: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; One, two- and three-dimensional flows; Streamline, path line, streak line and stream tube; stream function, velocity potential function , flow net , One, two- and three-dimensional continuity equations in Cartesian coordinates applications.

Fluid Dynamics: Surface and Body forces -Euler's and Bernoulli's equation; Momentum equation. correction factors. Bernoulli's equation to real fluid flows.

UNIT - III

Flow Measurement in Pipes

Practical applications of Bernoulli's equation: venturi meter, orifice meter and pitot tube, applications of Momentum equations; Forces exerted by fluid flow on pipe bend, sudden enlargement in pipes.

Flow Over Notches & Weirs: Flow through rectangular; triangular and trapezoidal notches and weirs; End contractions; Velocity of approach. Broad crested weir

UNIT – IV

Flow through Pipes: Reynolds experiment, Reynolds number, Loss of head through pipes, Darcy-Wiesbatch equation, minor losses, total energy line, hydraulic grade line, Pipes in series, equivalent pipes, pipes in parallel, siphon, branching of pipes, three reservoir problem, power transmission through pipes.

Analysis of pipe networks: Hardy Cross method and EPA NET, water hammer in pipes and control measures

UNIT - V

Laminar & Turbulent Flow: Laminar flow through circular pipes, and fixed parallel plates.

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

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

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

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SURVEYING LABORATORY – II (22PC0CE09)

Course Objectives:

- Student will be able to learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying, and Levelling Surveying.
- Student will be able to learn and understand about theodolite and total station in surveying.
- Student will learn and understand how to calculate Area of plot and Ground.
- Student will learn and understand about Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the ground profile using total station.

CYCLE - I

Theodolite surveying:

1. Measurement of horizontal angles and vertical angles.
2. Distance between two inaccessible points.
3. Measurement of area by theodolite traversing (Gales traverse table).
4. Determination of tachometer constants.
5. Distance between two inaccessible points using the principles of tachometer surveying.
6. Distance between two inaccessible points using the principles of trigonometric surveying

CYCLE - II

Total Station:

7. Area Measurement 8. Stake Out
9. Remote Elevation Measurement
10. Missing Line Measurement
11. Longitudinal & Cross Section Profile
12. Contouring
13. Providing a Simple Circular Curve
14. Demonstration using DGPS

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

- Prepare Map and Plan for required site with suitable scale.
- Prepare contour Map and Estimate the Quantity of earthwork required for formation level for Road and Railway Alignment.
- Judge which type of instrument to be used for carrying out survey for a Particular Area and estimate the area.
- Judge the profile of ground by observing the available existing contour map.

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STRENGTH OF MATERIALS LABORATORY (22PC0CE10)

Course Objectives:

- To conduct the Tension test, Compression test on various materials
- To conduct the Shear test, Bending test on determinate beams
- To conduct the Compression test on spring and Hardness test using various machines
- To conduct the Torsion test, Impact test on various materials

List of Experiments:

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

Course Outcomes: After the completion of the course, students should be able to

- Determine the yield stress, ultimate tensile stress, percentage elongation of steel, compressive strength of brick and concrete
- Determine the ultimate shear stress, modulus of elasticity of steel
- Determine the stiffness of the close coiled helical spring and hardness number of mild steel, brass, copper and aluminium.
- Determine the modulus of rigidity and impact strength of steel.

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COMPUTER AIDED DRAFTING LABORATORY (22PC0CE11)

Course Objectives:

- To be able to plan buildings as per NBC.
- To understand various types of conventional signs and brick bonds.
- To draw the plan section and elevation for doors, trusses and staircases.
- To use AutoCAD tools to draw building plans, sections and elevations from a given line diagram and specifications.
- To develop working drawings of residential buildings.

List of Experiments:

1. Planning Aspects of Building systems as per National Building Code (NBC).
2. Brick bonds: English bond & Flemish bond – Odd and Even courses.
3. Developing plan and section of dog-legged staircase.
4. Developing plan of single storied residential building.
5. Developing section and elevation of single storied residential building.
6. Developing plan of single /two storied Residential building as per Building by-laws.
7. Developing plan of public building as per building by-laws.
8. Developing section and elevation of public building.
9. Development of working drawing of building –Electrical Layout.
10. Development of working drawing of building – Plumbing Layout.

Course Outcomes: After completion of the course, the student should be able to

- Plan buildings as per NBC.
- Use different Commands of selected drafting software to draw Conventional signs and brick bonds, Plan, Section and Elevation of buildings.
- Draw section and elevation of panelled doors and trusses.
- Draw and detail the different components of Stair cases.
- Develop and draw single /two storey residential building and public building as per the building by-laws.
- Draw Electrical layout, Plumbing layout for residential buildings.

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CONSTITUTION OF INDIA (22MC0MB01)

Course Objectives: Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Unit - 1 History of Making of the Indian Constitution- History of Drafting Committee.

Unit - 2 Philosophy of the Indian Constitution- Preamble Salient Features

Unit - 3 Contours of Constitutional Rights & Duties - Fundamental Rights

- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

Unit - 4 Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Unit - 5 Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit – 6 Election Commission: Election Commission: Role and Functioning. Chief Election ommissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Course Outcomes: Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
- Discuss the passage of the Hindu Code Bill of 1956.

Suggested Reading:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

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DEPARTMENT OF CIVIL ENGINEERING

REGULATION - R22

II YEAR II SEMESTER

Course Code	Course Title	L	T	P	Credits
22ES0EE03	Basic Electrical and Electronics Engineering	3	0	0	3
22PC0CE12	Concrete Technology	3	0	0	3
22PC0CE13	Strength of Materials – II	3	0	0	3
22PC0CE14	Hydraulics and Hydraulics Machinery	3	0	0	3
22PC0CE15	Structural Analysis - I	3	0	0	3
22PC0CE16	Fluid Mechanics and Hydraulics Machinery Laboratory	0	0	2	1
22ES0EE04	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1
22PC0CE17	Concrete Technology Laboratory	0	0	2	1
22PR0CE01	Real-time Research Project/ Field-Based Project	0	0	4	2
22MC0EN04	Gender Sensitization Laboratory	0	0	2	0
	Total Credits	**15**	**0**	**12**	**20**

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BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (22ES0EE03)

Course Objectives:

I:
ircuits: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis
[illegible] with dc excitation [illegible] peak and rms values, phasor representation, real
[illegible] phase
[illegible] waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of *single-phase ac circuits* , *Three- phase balanced circuits*, voltage and current relations in star and delta connections.

UNIT - II:

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB. Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

UNIT - III:

Electrical Machines: Working principle of Single-phase transformer, equivalent circuit, losses in transformers, efficiency, Three-phase transformer connections. Construction and working principle of DC generators. EMF equation, working principle of DC motors, Torque equations and Speed control of DC motors. Construction and working principle of Three-phase Induction motor, Torques equations and Speed control of Three-phase induction motor. Construction and working principle of synchronous generators.

UNIT - IV:

P-N Junction and Zener Diode: Principle of Operation Diode equation, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Zener diode characteristics and applications.

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

UNIT – V

Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Amplifying Action, Common Emitter, Common Base and Common Collector configurations, Comparison of CE, CB and CC configurations.

Field Effect Transistor (FET): Construction, Principle of Operation, Comparison of BJT and FET, Biasing FET.

Course Outcomes:

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations
- To identify and characterize diodes and various types of transistors.

TEXT BOOKS:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University

2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education

REFERENCE BOOKS:

1. Electronic Devices and Circuits – R. L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.

2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.

3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.

4. Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition by Raymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.

5. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.

6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.

7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.

8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

9. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

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CONCRETE TECHNOLOGY (22PC0CE12)

Pre-Requisites: Building Materials

Course Objectives: The objectives of the course are to

- Know different types of cement as per their properties for different field applications.
- Understand Design economic concrete mix proportion for different exposure conditions and intended purposes.
- Know field and laboratory tests on concrete in plastic and hardened stage.

UNIT I

Aggregate: Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine, Manufactured sand and coarse Aggregates – Gap graded aggregate – Maximum aggregate size- Properties Recycled aggregate.

UNIT - II

Fresh Concrete: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing, vibration and revibration of concrete – Steps in manufacture of concrete – Quality of mixing water.

UNIT – III

Hardened Concrete: Water / Cement ratio – Abram's Law – Gel/space ratio – Gain of strength of concrete – Maturity concept – Strength in tension and compression – Factors affecting strength – Relation between compression and tensile strength - Curing.

Testing of Hardened Concrete: Compression tests– Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Pull-out test, Non-destructive testing methods – codal provisions for NDT.

UNIT - IV

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

UNIT – V

Admixtures: Types of admixtures – mineral and chemical admixtures.

Mix Design: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design.

Special Concretes: Introduction to Light weight concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Polymer concrete – High performance concrete – Self compacting concrete, Nano silica and Nano Alumina concrete.

Course Outcomes: After the completion of the course student should be able to

- Determine the properties of concrete ingredients i.e., cement, sand, coarse aggregate by conducting different tests. Recognize the effects of the rheology and early age properties of concrete on its long-term behavior.
- Apply the use of various chemical admixtures and mineral additives to design cement-based materials with tailor-made properties
- Use advanced laboratory techniques to characterize cement-based materials.
- Perform mix design and engineering properties of special concretes such as high-performance concrete, self-compacting concrete, and fiber reinforced concrete.

TEXT BOOKS:

1.Concrete Technology by M.S. Shetty. – S. Chand & Co.; 2004

2.Concrete Technology by A.R. Santhakumar, 2nd Edition, Oxford university Press, New Delhi

3.Concrete Technology by M. L. Gambhir. – Tata Mc. Graw Hill Publishers, 5THEdition,New Delhi

REFERENCE BOOKS:

1.Properties of Concrete by A. M. Neville – Low priced Edition – 4th edition

2.Concrete: Micro structure, Properties and Materials – P.K. Mehta and J.M. Monteiro, Mc- Graw Hill Publishers

IS Codes:

IS 383 : 2016 , IS 516 : 2018 (Part -1 - 4), IS 10262 – 2019

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II Year B. Tech. Civil. II-Sem

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STRENGTH OF MATERIALS – II (22PC0CE13)

Pre-Requisites: Strength of Materials - I

Course Objectives: The objective of this Course is

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

UNIT – I

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

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

UNIT – II

Columns and Struts: Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns- assumptions-derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler's critical stress – Limitations of Euler's theory– Long columns subjected to eccentric loading – Secant formula – Empirical formulae — Rankine – Gordon formula- Straight line formula – Prof. Perry's formula.

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

UNIT - III

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

UNIT – IV

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

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

UNIT – V

Unsymmetrical Bending: Introduction – Centroidal principal axes of section –Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis.

Shear Centre: Introduction - Shear center for symmetrical and unsymmetrical (channel, I, T and L) sections.

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

- Describe the concepts and principles, understand the theory of elasticity, and perform calculations, relative to the strength of structures and mechanical components in particular to torsion and direct compression.
- To evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading.
- Analyze strength and stability of structural members subjected to Direct, and Direct and Bending stresses.
- Understand and evaluate the shear center and unsymmetrical bending.

TEXT BOOKS:

1. Strength of Materials by R.K Rajput, S. Chand & Company Ltd.
2. Mechanics of Materials by Dr. B. C Punmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain
3. Strength of Materials by R. Subramanian, Oxford University Press.

REFERENCE BOOKS:

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

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II Year B. Tech. Civil. II-Sem

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HYDRAULICS AND HYDRAULIC MACHINERY (22PC0CE14)

Course Objectives: The objective of the course is

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

UNIT - I

Open Channel Flow – I: Introduction to Open channel flow-Comparison between open channel flow and pipe flow, Classification of open channel flows, Velocity distribution. Uniform flow – Characteristics of uniform flow, Chezy's, Manning's and Bazin formulae for uniform flow – Factors affecting Manning's Roughness Coefficient. Most economical sections. Computation of Uniform flow, Normal depth. Critical Flow: Specific energy – critical depth - computation of critical depth – critical, sub critical and super critical flows-Channel transitions.

UNIT - II

Open Channel Flow – II: Non-uniform flow – Gradually Varied Flow - Dynamic equation for G.V.F; Rapidly varied flow: Elements and characteristics (Length and Height) of Hydraulic jump in rectangular channel– Types, applications and location of hydraulic jump, Energy dissipation and other uses – Positive and Negative Surges (Theory only).

UNIT - III

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

Basics of Turbo Machinery: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, Jet striking centrally and at tip, Velocity triangles at inlet and outlet, expressions for work done and efficiency.

UNIT - IV

Hydraulic Turbines – I: Elements of a typical Hydropower installation – Heads and efficiencies – Classification of turbines – Pelton wheel – Francis turbine – Kaplan turbine – working, working

proportions, velocity diagram, work done and efficiency, hydraulic design. Draft tube – Classification, functions and efficiency.

Hydraulic Turbines – II: Governing of turbines – Surge tanks – Unit and specific turbines – Unit speed- Unit quantity – Unit power – Specific speed .

UNIT - V

Centrifugal Pumps: Pump installation details – classification – work done – Manometric head minimum starting speed – losses and efficiencies – specific speed. Multistage pumps – pumps in parallel performance of pumps – characteristic curves – NPSH – Cavitation. Reciprocating pumps – Working, discharge.

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

- Apply their knowledge of fluid mechanics in addressing problems in open channels and hydraulic machinery.
- Understand and solve problems in uniform, gradually and rapidly varied flows in open channel in steady state conditions.
- Apply dimensional analysis and to differentiate the model, prototype and similitude conditions for practical problems.
- Get the knowledge on different hydraulic machinery devices and its principles that will be utilized in hydropower development and for other practical usages.

TEXT BOOKS:

1.Fluid Mechanics by Modi and Seth, Standard Book House.
2.Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning Private Limited, 2015
3.Open channel flow by V.T. Chow (McGraw Hill Book Company).

REFERENCE BOOKS:

1.Fluid Mechanics by R. C. Hibbeler, Pearson India Education Services Pvt. Ltd
2.Fluid Mechanic & Fluid Power Engineering by D. S. Kumar (Kataria & Sons Publications Pvt. Ltd.).
3.Introduction to Fluid Mechanics and Fluid Machines by SK Som, Gautam Biswas, Suman Chakraborthy, Mc Graw Hill Education (India) Private Limited
4.Hydraulic Machines by Banga& Sharma (Khanna Publishers).

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STRUCTURAL ANALYSIS – I (22PC0CE15)

Pre-Requisites: Strength of Materials – I

Course Objectives: The objective of the course is to

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

UNIT – I

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

UNIT – II

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

Three Hinged Arches – Introduction – Types of Arches – Comparison between Three hinged and Two hinged Arches - Linear Arch - Eddy's theorem - Analysis of Three hinged arches - Normal Thrust and radial shear and bending moment - Geometrical properties of parabolic and circular arches - Three hinged parabolic circular archeshaving supports at different levels.

UNIT - III

Propped Cantilever and Fixed Beams: Determination of static and kinematic indeterminacies for beams- Analysis of Propped cantilever and fixed beams, including the beams with different moments of inertia - subjected to uniformly distributed load - point loads - uniformly varying load, couple and combination of loads - Shear force, Bending moment diagrams and elastic curve for Propped Cantilever and Fixed Beams-

Deflection of Propped cantilever and fixed beams - effect of sinking of support, effect of rotation of a support.

UNIT – IV

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

Slope Deflection Method: Derivation of slope-deflection equation, application to continuous beams with and without sinking of supports -Determination of static and kinematic indeterminacies for frames

- Analysis of Single Bay, Single storey Portal Frames by Slope Deflection Method including Side Sway
- Shear force and bending moment diagrams and Elastic curve.

UNIT – V

Moving Loads and Influence Lines: Introduction maximum SF and BM at a given section and absolute maximum shear force and bending moment due to single concentrated load ,uniformly distributed load longer than the span, uniformly distributed load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length - Definition of influence line for shear force and bending moment - load position for maximum shear force and maximum bending Moment at a section - Point loads, uniformly distributed load longer than the span, uniformly distributed load shorter than the span.

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

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

TEXT BOOKS:

1. Structural Analysis Vol –I & II by V.N. Vazirani and M.M. Ratwani, Khanna Publishers.
2. Structural Analysis Vol I & II by G. S. Pandit and S.P. Gupta, Tata McGraw Hill Education Pvt. Ltd.
3. Structural analysis T. S Thandavamoorthy, Oxford university Press

REFERENCE BOOKS:

1. Structural Analysis by R. C. Hibbeler, Pearson Education
2. Basic Structural Analysis by K.U. Muthu et al., I.K. International Publishing House Pvt. Ltd

3. Mechanics of Structures Vol – I and II by H.J. Shah and S.B. Junnarkar, Charotar Publishing House Pvt. Ltd.

4. Basic Structural Analysis by C. S. Reddy, Tata McGraw Hill Education Pvt. Ltd.

5. Fundamentals of Structural Analysis by M.L. Gamhir, PHI Learning Pvt. Ltd.

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II Year B. Tech. Civil. II-Sem

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FLUID MECHANICS AND HYDRAULICS MACHINERY LABORATORY (22PC0CE16)

Course Objectives

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

List of Experiments

1. Verification of Bernoulli's equation
2. Determination of Coefficient of discharge for a small orifice by a constant head method
3. Calibration of Venturimeter / Orifice Meter
4. Calibration of Triangular / Rectangular/Trapezoidal Notch
5. Determination of Minor losses in pipe flow
6. Determination of Friction factor of a pipe line
7. Determination of Energy loss in Hydraulic jump
8. Determination of Manning's and Chezy's constants for Open channel flow.
9. Impact of jet on vanes
10. Performance Characteristics of Pelton wheel turbine
11. Performance Characteristics of Francis turbine
12. Performance characteristics of Keplan Turbine
13. Performance Characteristics of a single stage / multi stage Centrifugal Pump

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

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

II Year B. Tech. Civil. II-Sem

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BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY
(22ES0EE04)

Pre-requisites: Basic Electrical and Electronics Engineering

Course Objectives:

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.
- To introduce the concepts of diodes & transistors, and
- To impart the knowledge of various configurations, characteristics and applications.

List of experiments/demonstrations:

PART A: ELECTRICAL

1. Verification of KVL and KCL
2. (i) Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
   (ii) Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta- star, Star-Star) in a Three Phase Transformer
3. Measurement of Active and Reactive Power in a balanced Three-phase circuit
4. Performance Characteristics of a Separately Excited DC Shunt Motor
5. Performance Characteristics of a Three-phase Induction Motor
6. No-Load Characteristics of a Three-phase Alternator

PART B: ELECTRONICS

1. Study and operation of
   (i) Multi-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO.
2. PN Junction diode characteristics
3. Zener diode characteristics and Zener as voltage Regulator
4. Input & Output characteristics of Transistor in CB / CE configuration
5. Full Wave Rectifier with & without filters
6. Input and Output characteristics of FET in CS configuration

Course Outcomes:

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits

- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations
- To identify and characterize diodes and various types of transistors.

TEXT BOOKS:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education

REFERENCE BOOKS:

1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.

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II Year B. Tech. Civil. II-Sem

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CONCRETE TECHNOLOGY LABORATORY (22PC0CE17)

Course Objectives:

1. To know the various procedures to determine the characteristics of cement
2. To understand the test procedures to evaluate the characteristics of aggregates
3. To know the test procedures to find the properties of fresh concrete
4. To understand the test procedures to find mechanical properties of hardened concrete

List of Exercises:

1. Tests on Cement:
a) Soundness.
b) Compressive strength.
2. Tests on Aggregates:
a) Specific gravity of fine aggregate.
b) Specific gravity of coarse aggregate.
c) Bulking of fine aggregate.
d) Grading of fine aggregate
3. IS method of mix design of normal concrete as per IS : 10262
4. Tests on Fresh Concrete:
a) Slump cone test.
b) Compacting factor test.
c) Vee-Bee consistometer test.
5. *Tests on Hardened Concrete:*
a) Compressive & Tensile strength tests.
b) Modulus of elasticity of concrete.
c) Non-destructive testing of concrete.

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REAL TIME RESEARCH PROJECT (22PR0CE01)

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II Year B. Tech. Civil. II-Sem

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GENDER SENSITIZATION LABORATORY (22MC0EN04)

COURSE DESCRIPTION:

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Course Objectives:

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Unit-I: UNDERSTANDING GENDER

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male. First lessons in Caste.

Unit – II: GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

Unit – III: GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Sharethe Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming.

Unit – IV: GENDER - BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No!-Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu". Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life...."

Unit – V: GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature-Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks- The Brave Heart..

Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".

ESSENTIAL READING: The Textbook, "Towards a World of Equals: A Bilingual Textbook on Gender" written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu **published by Telugu Akademi, Telangana Government in 2015.**

ASSESSMENT AND GRADING:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%

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Substitute Subjects/Equivalent subjects for Readmitted students

If a student from **R18/R21 regulation** takes readmission in II Year I Semester with **R22 regulation**

The following subjects to be studied by readmitted student along with R22 regular student as part of regular course

II year I Semester

S.No	Subject Name	Credits in R22
1	Probability and Statistics	4
2	Building Materials, Construction and Planning	3
3	Engineering Geology	3
4	Strength of Materials – I	3
5	Fluid Mechanics	3
6	Surveying Laboratory - II	2
7	Strength of Materials Laboratory	1
8	Computer Aided Drafting Laboratory	1
9	Constitution of India	0
	Total credits	20

II year II Semester

S.No	Subject Name	Credits in R22
1	Basic Electrical and Electronics Engineering	3
2	Concrete Technology	3
3	Strength of Materials – II	3
4	Hydraulics and Hydraulics Machinery	3
5	Structural Analysis - I	3
6	Fluid Mechanics and Hydraulics Machinery Laboratory	1
7	Basic Electrical and Electronics Engineering Laboratory	1
8	Concrete Technology Laboratory	1
9	Real-time Research Project/ Field-Based Project	2
10	Gender Sensitization Laboratory	0
	Total credits	20

The following subjects studied in I year I & II semesters by R22 regulation student and not studied by R18/R21 regulation student in I year I & II semesters. Hence the readmitted student has to study the following subjects in the below mentioned semesters.

S.No	Subject Name	Credits in R22	Year/Semester
1	Elements of Civil Engineering Laboratory	1	II Year I sem
2	Surveying	2	II Year I sem
3	Applied Mechanics	3	II Year I sem
4	Surveying Laboratory-I	1	II Year I sem
5	Python Programming Laboratory	2	II Year II sem

The readmitted student of R18/R21 (II-I) will study a total of 27 **credits (20+7)** in II year I Semester.

The readmitted student of R18/R21 (II-I) will study a total of 22 **credits (20+2)** in II-year II Semester.

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Substitute Subjects/Equivalent subjects for Readmitted students

If a student from **R18/R21 regulation** takes readmission in II Year II Semester with **R22 regulation**

The following subjects to be studied by readmitted student along with R22 regular student as part of regular course (II year II Semester)

S. No	Subject Name	Credits in R22
1	Basic Electrical and Electronics Engineering	3
2	Concrete Technology	3
3	Strength of Materials – II	3
4	Hydraulics and Hydraulics Machinery	3
5	Structural Analysis - I	3
6	Fluid Mechanics and Hydraulics Machinery Laboratory	1
7	Basic Electrical and Electronics Engineering Laboratory	1
8	Concrete Technology Laboratory	1
9	Real-time Research Project/ Field-Based Project	2
10	Gender Sensitization Laboratory	0
	Total credits	20

The following subjects studied up to II year I semesters by R22 regulation student and not studied by R18/R21 regulation student. Hence the readmitted student has to study the following subjects in the below mentioned semesters.

S. No	Subject Name	Credits in R22	Year/Semester
1	Probability and Statistics	4	II Year II sem
2	Constitution of India	0	II Year II sem
3	Python Programming Laboratory	2	II Year II sem
Substitute Subjects			
1	Building Materials, Construction and Planning	3	II Year II sem
2	Surveying Laboratory - II	2	II Year II sem

S. No	Subject Name	Credits in R22
1	Probability and Statistics	4
2	Constitution of India	0
3	Building Materials, Construction and Planning	3
4	Surveying Laboratory - II	2
5	Python Programming Laboratory	2
Total		11

The readmitted student (II-II) will study a total of 27 credits (20-4+11) in II-year II Semester.

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Dr. P. Rajasekhar,
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Industry Representative

Dr. Syed Omar Ballari
Chairman-BOS

Dr. P. Jagadeesan
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Mr. Syed Azhar Hussain
Member

Mr. D.V.S.P Rajesh
Member

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