AICTE MODEL CURRICULUM

SCHEME III & IV SEMSTERS & SYLLABUS

CIVIL ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING
UNIVERSITY COLLEGE OF ENGINEERING, O.U.

A.I.C.T.E. MODEL CURRICULUM

With Effect from 2019-20

SCHEME OF INSTRUCTION FOR B.E. (CIVIL ENGG) - III SEMESTER

S.No.	Course Code	Course Title	Scheme of Instruction				Contact hr/week	Scheme of Examination		Credits
			L	T	Dr	P		CIE	SEE	
1	BS 301MT	Mathematics-III (PDE & Probability)	2+1*	-	-	-	3	30	70	2
2	ES 301CE	Surveying and Geomatics	2	1	-	-	3	30	70	3
3	PC 301CE	Introduction to Solid Mechanics	3+1*	-	-	-	4	30	70	3
4	PC 302CE	Introduction to Fluid Mechanics	3+1*	-	-	-	4	30	70	3
5	PC 303CE	Material Testing and Evaluation	3	-	-	-	3	30	70	3
6	ES 101EE	Basic Electrical Engineering	3	1	-	-	4	30	70	4
7	MC 302CE	Environmental Sciences	2	1	-	-	3	30	70	0
8	ES 351CE	Surveying laboratory	-	-	-	2	2	25	50	1
9	PC 351CE	Fluid Mechanics-I laboratory	-	-	-	2	2	25	50	1
		Total	**21**	**03**	**-**	**4**	**28**	**260**	**590**	**20**

* Interactive Session

Service Courses: E.E.E.

S. No.	Course Code	Course Title	Scheme of Instruction				Contact hr/week	Scheme of Examination		Credits
			L	**T**	**Dr**	**P**		**CIE**	**SEE**	
1	ES 101CE	Engineering Mechanics	3	-	-	-	3	30	70	3

Prof. M. Anjaneya Prasad
Chair-Person BOS (A)
Civil Engineering Department

HEAD
Civil Engineering Department

DEPARTMENT OF CIVIL ENGINEERING
UNIVERSITY COLLEGE OF ENGINEERING, O.U.

A.I.C.T.E. MODEL CURRICULUM

With Effect from 2019-20

SCHEME OF INSTRUCTION FOR B.E. (CIVIL ENGG) - IV SEMESTER

S.No.	Course Code	Course Title	Scheme of Instruction				Contact hr/week	Scheme of Examination		Credits
			L	T	Dr	P		CIE	SEE	
1	HS 301MC	Managerial Economics and Accountancy	3+1*	-	-	-	3	30	70	3
2	PC 401CE	Mechanics of Materials	2	1	-	-	3	30	70	3
3	PC 402CE	Structural Engineering	2	1	-	-	3	30	70	3
4	PC 403CE	Hydraulic Engineering	2	1	-	-	3	30	70	3
5	PC 404CE	Hydrology and Water Management	2	1	-	-	3	30	70	3
6	PC 405CE	Construction Engineering and Management	2	1	-	-	3	30	70	3
7	PC 401BS	Engineering Geology	2	0	-	-	2	30	70	2
8	PC 451CE	Material Testing Laboratory	-	-	-	2	2	25	50	1
9	PC 452CE	Fluid Mechanics-II Laboratory	-	-	-	2	2	25	50	1
10	PC 453BS	Engineering Geology Laboratory	-	-	-	2	2	25	50	1
11	ES 461CE	Survey Camp	-	-	-	-	-	50	-	1
		Total	**15**	**05**		**06**	**26**	**335**	**640**	**24**

Service Courses: C.S.E., E.C.E. & E.E.E.

S. No.	Course Code	Course Title	Scheme of Instruction				Contact hr/week	Scheme of Examination		Credits
			L	**T**	**Dr**	**P**		**CIE**	**SEE**	
1	MC 302CE	Environmental Sciences	2	1	-	-	3	30	70	0

Service Course: B.M.E.

2	PC 406CE	Applied Mechanics	2	1	-	-	3	30	70	3

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DETAILED SYLLABUS

AICTE MODEL CURRICULUM
B.E. III – SEMESTER, CIVIL ENGINEERING

BS 301MT With Effect from 2019 – 2020

MATHEMATICS – III
(PDE AND PROBABILITY)

Instruction: 3 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 2

Corse Objectives:

1. To introduce the solution methodologies for first and second order Partial Differential Equations with applications in engineering
2. To provide an overview of probability and statistics to engineers

Course Outcomes:

Upon completion of this course, students will be able to

1. Solve field problems in engineering involving PDEs.
2. They can also formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.

Unit – I

Definition of Partial Differential Equations, First order partial differential equations, Solutions of first order linear PDEs , Solution to homogenous and non-homogenous linear partial differential equations of second order by complimentary function and particular integral method.

Unit – II

Second-order linear equations and their classification, Initial and boundary conditions, Heat diffusion and vibration problems, Separation of variables method to Solve simple problems in Cartesian coordinates.

Unit – III

Discrete random variables, expectation of discrete random variables, moments, variance of a sum, continuous random variables & their properties.

Unit – IV

Probability distributions: Binomial, Poisson and Normal, evaluation of statistical parameters for these three distributions,

Unit – V

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

Suggested Reading:

1. R.K.Jain & S.R.K Iyengar, Advanced Engineering Mathematics, Narosa Publications, 4th Edition 2014.

2. B.S.Grewal, *Higher Engineering Mathematics*, Khanna Publications, 43rd Edition.

3. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons.2006.

4. S. Ross, "A First Course in Probability", Pearson Education India, 2002.

5. S.C Gupta & Kapoor: Fundamentals of Mathematical statistics, Sultan Chand & Sons, New Delhi.

AICTE MODEL CURRICULUM
B.E. III – SEMESTER, CIVIL ENGINEERING

ES 301CE With Effect from 2019 – 2020

SURVEYING AND GEOMATICS

Instruction: 3 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 3

Course Objectives:

With the successful completion of the course, the student should have the capability to:

1. Describe the function of surveying in civil engineering construction,
2. Work with survey observations, and perform calculations,
3. Customary units of measure. Identify the sources of measurement errors and mistakes;
4. understand the difference between accuracy and precision as it relates to distance, differential leveling, and angular measurements,

Course Outcomes:
The course will enable the students to:

1. Apply the knowledge, techniques, skills, and applicable tools of the discipline to Engineering and surveying activities.
2. Translate the knowledge gained for the implementation of Civil infrastructure facilities
3. Relate the knowledge on Surveying to the new frontiers of science like Hydrographic surveying and Electronic Distance Measurement

Unit – I:
Introduction to Surveying: Principles, Linear, methods, Leveling: Plane table surveying, Principles of levelling- reducing levels; differential, reciprocal leveling, Digital and Auto Level, contouring: Characteristics, uses; areas and volumes.
*Triangulation and Tri-lateration***:** Theodolite survey: Instruments, Measurement of
Horizontal and vertical angle; - methods -triangulation - network- Signals. Baseline - choices - instruments and accessories - corrections - Satellite station - reduction to centre - Indivisibility of height and distances - Trigonometric leveling.

Unit – II:
Curves Elements of simple and compound curves – Method of setting out- Transition curve — Elements of transition curve and Vertical curves.

Unit – III:
Modern Field Survey Systems: Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories – Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments, GPS measurements, , Surveying with GPS.

Unit – IV:
Photogrammetric Surveying: Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, flight planning; Stereoscopy, ground control extension for photographic mapping- photographic mapping- mapping using paper prints, mapping using stereo plotting instruments, mosaics, map substitutes.

Unit –V:
Remote Sensing: Introduction – Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors; visual image interpretation;

Suggested Reading:

1. Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.
2. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011
3. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010
4. Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.
5. Anji Reddy, M., Remote Sensing and Geographical Information System, B.S. Publications, 2001
6. Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.

AICTE MODEL CURRICULUM
B.E. III – SEMESTER, CIVIL ENGINEERING

PC 301CE With Effect from 2019 – 2020

INTRODUCTION TO SOLID MECHANICS

Instruction: 3+1 periods per week* *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 3

Course Objectives:

1. Understand the basic concept of the stress and strain for different materials.
2. Know the mechanism of development of shear force and bending moments in beams.
3. Understand and analyze the stresses for the combined action of direct load and Bending Moment
4. Know the concept of unsymmetrical bending and shear centre for different members
5. Understand the concepts of pure torsion, thick and thin cylinder and their practical applications

Course Outcomes:

1. Apply the fundamental concepts of stress and strain in the design of various structural components.
2. Analyze determinate beams to determine shear forces, bending moments and design forces in trusses.
3. Determine the bending stresses and shear stresses produced in a beam subjected to system of loads
4. Define pure torsion and derive torsional equation and know the advantage of hollow shafts in communicating power

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 – 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:
Compound Stresses and Strains- Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, ellipse of stress and their applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain and ellipse of strain

Unit – III:
Bending moment and Shear Force Diagrams- Bending moment (BM) and shear force (SF) diagrams.BM and SF diagrams for cantilevers simply supported and fixed beams with or without over hangs. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part of span, combination of concentrated loads (two or three) and uniformly distributed loads, uniformly varying loads, application of moments.

Unit – IV:
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 angle sections.

Unit – V:
Direct and Bending: Basic concept , Eccentric loading, limit of eccentricity-Core of sections-rectangular and circular, solid and hollow sections-wind pressure on chimneys and water pressure on dams.
Thin Cylinders - Derivation of formulae and calculations of hoop stress, longitudinal stress in a cylinder.
Thick Cylinders: Lame's equations, stresses under internal and external fluid pressures-Compound cylinders- Shrink fit pressure.

Suggested Reading:

1. Timoshenko, S. and Young, D. H., "Elements of Strength of Materials", DVNC, New York, USA.
2. Kazmi, S. M. A., "Solid Mechanics" TMH, Delhi, India.
3. Hibbeler, R. C. Mechanics of Materials. 6th ed. East Rutherford, NJ: Pearson,Prentice Hall, 2004
4. Crandall, S. H., N. C. Dahl, and T. J. Lardner. An Introduction to the Mechanics of Solids. 2nd edn. New York, NY: McGraw Hill, 1979
5. Laboratory Manual of Testing Materials - William Kendrick Hall
6. Mechanics of Materials - Ferdinand P. Beer, E. Russel Jhonston Jr., John T. DE wolf – TMH 2002.
7. Strength of Materials by R. Subramanian, Oxford University Press, New Delhi

AICTE MODEL CURRICULUM
B.E. III – SEMESTER, CIVIL ENGINEERING

PC 302CE With Effect from 2019 – 2020

INTRODUCTION TO FLUID MECHANICS

Instruction: 3+1 periods per week* *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 3

Course Objectives:

1. Concepts of various fluid properties
2. Understand the basic concepts of fluid motion
3. Knowledge of forces due to fluids and energy principles
4. Study of flow measurement devices
5. Study of compressible fluid flows for different conditions of expansion

Course Outcomes:

1. Application of basic principles in Fluid Mechanics
2. Application of the concepts of Bernoulli's equation to Fluid mechanics problems
3. Knowledge of incompressible flows and its applications

Unit – I:

Fluid Properties: Basic concepts: Specific weight, specific volume, specific mass, gravity, viscosity, bulk modulus, vapour pressure, capillarity and surface tension, viscosity-Newton's law of viscosity, Newtonian and Non-Newtonian fluids, classification of fluids-ideal and real.

Unit – II:

Fluid Kinematics: Fundamentals of fluid flow-description of flow pattern, stream lines, path lines, streak lines, stream tubes, classification of fluids, steady and unsteady flows, laminar and turbulent flows, uniform and non-unsteady flows, rotational and irrotational flows, laminar and turbulent flows, uniform and non- uniform flow, one, two and three dimensional flows, stream function, and velocity potential function, flow net-significance and use.

Unit – III:

Fluid Statics: Fluid pressure at a point, variation of pressure in a fluid, measurement of pressure - simple and differential manometers.

Fluid Dynamics: Convective and local acceleration, concept of continuity, three-dimensional continuity equation, body forces and surface forces, body force potential, Euler's equation of motion for 3-D flow, Bernoulli's equation by integration of Euler's equation, significance of Bernoulli's equation and its limitations, applications of Bernoulli's equation- venturimeter, pitot tube. Impulse-momentum equation and its applications- forces on a pipe bend.

Unit – IV:

Flow Through Pipes: Introduction, types of flows-laminar and turbulent, Reynolds experiment, Darcy-Weisbach equation, and steady laminar flow through circular pipes-Hagen-Poiseuille's equation, hydro-dynamically smooth and rough boundaries- criteria and resistance to flow of fluid in smooth and rough boundaries, variation of friction factor.

Unit – V:

Compressible Flow: Compressibility of liquids and gases, differential form of continuity equation, Bernoulli's energy equation for isothermal and adiabatic conditions, velocity of pressure wave, wave velocity for adiabatic and isothermal conditions, Mach Number and Mach cone, stagnation pressure and temperature.

Suggested Reading:

1. K. Subramanya, '*Theory and Applications of Fluid Mechanics*', Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1993
2. Vijay Gupta and Santosh K. Gupta, '*Fluid Mechanics and its applications*', Wiley Eastern Ltd., New Delhi,1984
3. K.L. Kumar, '*Engineering Fluid Mechanics*', Eurasia Publishing House Pvt Ltd., New Delhi, 2009
4. Valentine, H.R., '*Applied Hydrodynamics*', Butterworths & Co Ltd., London, 1959
5. P.N. Modi and S.M.Seth, '*Hydraulics and Fluid Mechanics*', Standard Book House, New Delhi, 2013

AICTE MODEL CURRICULUM
B.E. III – SEMESTER, CIVIL ENGINEERING

MATERIAL TESTING AND EVALUATION

PC 303CE With Effect from 2019 – 2020

Instruction: 3 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 3

Course Objectives:

1. Study about the basic building materials, properties and their applications
2. Know the smart building materials, external paints and their uses
3. Understand different types of masonries and their applications
4. Study about standard dimensions of doors, windows ,ventilators and other components of buildings

Course Outcomes:

1. Differentiate between various building materials i.e, both conventional and smart building materials
2. Know the importance of energy conservation, damp proof course and fire protection in buildings.
3. Understand different materials used and construction of various form works and scaffoldings

Unit – I:

Introduction: Uses of stones as building materials, classification, characteristics, dressing and polishing of stones, methods of quarrying and construction.

Bricks: Methods of manufacturing bricks. Classification and methods of construction.

Timber: Timber as a building material and its uses. Methods of seasoning and preservation laminates and their uses, defects in Timber.

Cement: Introduction to cement, different grades, IS specifications and OPC and PPC Cements (blended cements).

Mortar and Sand: Characteristics of good mortar making sand, availability of sand ant its classification, bulking of sand, manufacturing methods of mortar. Different types of mortars- preparation, setting and curing.

Unit – II:

Coarse and fine Aggregate: Characteristics of good coarse and fine aggregates for manufacture of concrete. Significance and application of coarse and fine aggregate for the production of good quality concrete.

Concrete: Introduction to Nominal mix and Design mix

Unit – III:

Type of joints in Concrete - Construction, expansion, contraction, and isolation joints.

Cracks in Buildings- Type of cracks in buildings, principal causes-moisture movement, thermal variations, elastic deformation, creep, chemical reaction.

Smart building Materials: Energy conservation in buildings- use of recycled materials, regional materials and industrial waste products as means of sustainable development. Green Building Materials

Unit – IV:

Plastering and Pointing: Different types of plasters and plastering process, defects in plastering.

Paints, Varnish and Distemper: Constituents, characteristics of good paints, bases, vehicles, thinners and coloring pigments. Painting of different types of surfaces varnish and its types, application. Distemper, dry and oil bound, and application of distemper.

Unit – V:

Form work- Types of Form work, types of materials used in form work

Scaffoldings- Types of Scaffoldings, Scaffolding Erection & dismantling, Scaffolding Inspection

Fire protection in structures- Classification of fire, general causes of fire, detection of fire, methods for fire control, Analysis for structural components for fire resistance (wood, steel, concrete and masonry).

Damp Proof Course-Causes of dampness, effects of dampness, methods of damp proofing

Tutorials *from the above modules covering*, understanding

i) Tests & testing of bricks, ii) Tests & testing of sand, iii) Tests & testing of concrete, iv) Tests & testing of soils, v) Tests & testing of bitumen & bituminous mixes, vi) Tests & testing of polymers and polymer based materials, vii) Tests & testing of metals & viii) Tests & testing of other special materials, composites and cementations materials.

Explanation on mechanical behavior of these materials.

Suggested Reading:

1. VN. Vazirani, and S.P. Chandola, *Engineering Materials*, Khanna Publishers 1993.
2. Sushil Kumar, Building Construction, Standard Publilshers 1992.
3. S.P. Arora and S.P. Bindra, *Text book on Building Construction*, Dhanpath Raj Publications, 1999.
4. M.S.Shetty, *Concrete Technology,* S.Chand Publishers,2012.
5. Gurucharan singh, *Building materials and construction*, Standard book house

AICTE MODEL CURRICULUM
B.E. III – SEMESTER, CIVIL ENGINEERING

BASIC ELECTRICAL ENGINEERING

EE 101ES With Effect from 2019 – 2020

Instruction: 3L + 1T periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 4

Course Objectives:

1. To understand the fundamentals of DC and AC electrical circuits.
2. To understand the working principles of DC motor, DC generator, Transformers and single phase induction motors.
3. To understand working principles of protection devices used in electrical circuits.

Course Outcomes:

The students will able to

1. Analyze the performance of simple electrical circuits exciting with Dc and AC excitations.
2. Apply different theorems to solve complicated electrical circuits to obtain the current, voltage and power.
3. Understand the main components, Characteristics, applications of different DC and AC electrical machines used in industry.
4. Understand the importance of protective devices and their rating used in electrical circuits.

Unit – I:

DC Circuits Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.

Unit – II:

AC Circuits Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, and RL, RC, RLC combinations (series only). Three phase balanced circuits, voltage and current relations in star and delta connections.

Unit – III:

Transformers and 3-ph Induction Motors Transformers: Electromagnetic induction, Faradays laws, Statically induced emf, Lenz law, BH characteristics, ideal and practical transformer, losses and efficiency, Auto-transformer and three-phase transformer connections. Three Phase Induction motor: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, squirrel cage IM, slip-ring IM, Applications With effect from the Academic year 2018-2019

Unit – IV:

Single-phase induction motor & DC Machines Single-phase induction motor: Construction and principle of operation, Capacitor start & capacitor run motor, applications DC Generators: Dynamically induced emf, Flemming's Right hand and Left hand rules, Construction and principle of operation of DC generator, EMF equation, Types of DC Generators, OCC characteristics, applications DC Motors: principle of operation of DC Motor, Types of DC motors, applications

Unit – V:

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.

Suggested Reading:

1. J.B.Gupta, "Fundamentals of Electrical Engineering and Electronics" S.K.Kataria & Sons Publications, 2002.
2. J.B.Gupta, "Utilization of Electric Power and Electric Traction" S.K.Kataria & Sons Publications, 2010
3. Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, " Basic Elactrical Engineering" Tata McGraw Hill, Publications, 2009
4. Hughes, "Electrical Technology", VII Edition, International Student -on, Addison Welsey Longman Inc., 1995.

AICTE MODEL CURRICULUM
B.E. III – SEMESTER, CIVIL ENGINEERING

ENVIRONMENTAL SCIENCES

MC 302CE With Effect from 2019 – 2020

Instruction: 3 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 0

Course Objectives:

1. Comprehend the need of environmental science, ethics and issues
2. Illustrate the characteristics and functions of ecosystem
3. Understand the concepts of Biodiversity and its conservation needs
4. Study various environmental pollution effects, prevention and control acts

Course Outcomes:

1. Application of awareness on environmental Issues for sustainable society
2. Acquaintance with utilization of various natural resources and ecosystems
3. Ability in conserving and protecting the biodiversity
4. Knowledge of social and environment related issues and their preventive measures

Unit – I

Multidisciplinary nature of Environmental studies: Definition, scope and importance, Need for public awareness. Environmental ethics: issues and possible solutions. Population growth. Sustainable development and SDGs.
Current Environmental Issues: global warming and Climate change, acid rain, ozone layer depletion. Environment protection Acts. Environment and human health

Unit – II

Natural Resources: Renewable and nonrenewable resources: Natural resources and associated problems Forest resources, Water resources, Mineral Resources, Water conservation, Food Resources Energy Resources.
Land Resources: Land as a resource, land degradation, soil erosion, and desertification Role of individual in conservation of natural resources, Equitable use of resources for sustainable life styles.

Unit – III

Ecosystems: Concept of an ecosystem Structure and function of an ecosystem, Producers, consumers, decomposers. Energy flow in the eco systems. Ecological succession, Food chains, food webs and ecological pyramids,

Introduction, types, characteristic features, structure and functions: Terrestrial ecosystem, Forest ecosystem, Grass land ecosystem, Desert ecosystem. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit – IV

Biodiversity and its Conservation: Introduction-Definition: genetics, species and ecosystem diversity. Biogeographically classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, national and local level. India as a mega diversity nation.

Hot-spots of biodiversity, Threats to biodiversity: habitats loss, poaching of wild life, man wildlife conflicts. Endangered and endemic spaces of India, Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity, Wildlife conservation and protection act, Forest conservation and protection act

Unit – V

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

Air (prevention and control of pollution) Act, Water (prevention and control of pollution) Act Solid waste Management: Causes, effects and control measures of urban and industrial wastes Role of an individual's, communities and NGOs in prevention of pollution

Suggested Reading:

1. Gilbert, M. Masters Introduction to Environmental Engineering and Science, Prentice- Hall of India Pvt. Ltd., New Delhi, 1995.
2. Textbook of Environmental studies, Erach Bharucha, UGC.
3. Hammer. M J. and Hammer. MJ. Jr., Water and Wastewater Technology.
4. Prentice-Hall of India Pvt. Ltd., New Delhi. 1998
5. Fundamental concepts in Environmental Studies, D D Mishra, S Chand & Co Ltd.
6. Sasi Kumar, K. and Sanoop Gopi Krishna., Solid waste Management, Prentice-Hall of India Pvt. Ltd., New Delhi, 2009

AICTE MODEL CURRICULUM
B.E. III – SEMESTER, CIVIL ENGINEERING

SURVEYING LABORATORY

ES 351CE With Effect from 2019 – 2020

Instruction: 2 practical classes per week *Duration of Semester End Examination: 3 hours*
CIE: 25marks *SEE: 50 marks*
Credits: 1

Course Objectives:

1. Know the importance of Theodolite, total station and their practical applications
2. Study the basic concept of trigonometrical leveling, and field applications
3. Analyze the horizontal and vertical curves for survey work related to Roads and
    a. Railways
4. Know the principles of aerial photogrametry and its applications
5. Study the various applications of GPS, GIS and remote sensing for field work.

Course Outcomes:

1. Understand the basic working principles of theodolite and total station
2. Calculation of applicable corrections to the measured values
3. Computation of omitted measurements areas
4. Computation of setting out data for setting out of horizontal and vertical curves by various methods
5. Understand and learn the basic concepts related to Photogrammetry, GIS and GPS
6. Learn various applications of the Photogrammetry, GIS and GPS for land surveying

List of Experiments:

1. Applications of traversing to locate a building and field objects by taking perpendicular and oblique offsets; and recording in the field book.
2. To determine the area of the given site by cross staff survey
3. Closed traverse by chain and compass, plotting and adjustment by graphical method
4. Plane tabling: Radiation and intersection methods
5. Introduction to leveling: Fly leveling using dumpy level
6. Measurement of horizontal angles by repetition and reiteration methods using Vernier Theodolite.
7. Measurement of vertical angle: Application to simple problems of height and distance by measuring angle of elevation and depression
8. Single plane method: Determination of R.L. of an elevated Object using two Instrument Stations which are placed in a same vertical plane- when base of the Object inaccessible.
9. Two plane method: Determination of R.L. of an elevated Object using two Instrument Stations which are not placed in the same vertical plane- when base of the Object inaccessible.

10. Setting out of a simple circular curve by linear method
11. Setting out of a simple circular curve by angular method
12. Setting out of a transition curve by linear method
13. Introduction to Total station and applications: To determine difference in elevation of any two given points. The introduction includes, setting up of the Total station over a station, input values, field measurements, downloading of the data in to a computer.
14. Total station and applications: Application to simple problems of height and distance by measuring angle of elevation and depression and determination of **R.L** of the target object.
15. Total station and applications: Determination of area enclosed in a closed traverse having minimum 5 stations. Plot the measured values by using a software package.
16. Geographic Position System (GPS),Geographical Information system(GIS) and their applications: Determination of Latitude and Longitude of any four stations and computation of the area. Check trust worthiness of the measured results.

Suggested Reading:

1. B.C. Punmia, *Surveying, Vol. I and Vol. II*, Laxmi Publications, 1994.
2. Arora, K.R., *Surveying, Vol. I, II and III*, Standard Book House., 1995.
3. T.M. Lillesand and R.W. Kiefer, *Remote Sensing and Image Interpretation*, John Wiley & Sons, 1994.
4. R. Srinivasa Kumar, *A Text Book of Highway Engineering*, Universities Press, Hyderabad, 2011.
5. M. Chandra, *Advanced Surveying*, New Age International Publishers New Delhi, 2000.

AICTE MODEL CURRICULUM
B.E. III – SEMESTER, CIVIL ENGINEERING

FLUID MECHANICS – I LABORATORY

PC 351CE With Effect from 2019 – 2020

Instruction: 2 practical classes per week *Duration of Semester End Examination: 3 hours*
CIE: 25marks *SEE: 50 marks*
Credits: 1

Course Objectives:

- Calibration of flow measuring devices
- Verification of the Bernoulli's theorem
- Demonstration of the various losses in pipes

Course Outcomes:

- Ability to measure flow in closed conduits and flumes
- Application of Bernoulli's principle in Hydraulics
- Computation of various losses in pipes and pipe fittings

List of Experiments:

1. Determination of C_d and C_v of an orifice
2. Calibration of a mouth piece
3. Determination of C_d of a mouth piece for unsteady flow in a hemi-spherical tank
4. Calibration of a rectangular notch
5. Calibration of a triangular notch
6. Calibration of a broad crested weir
7. Verification of Bernoulli's principle
8. Determination of types of flows
9. Determination of major and minor losses in the pipes
10. Calibration of a Venturi meter

SERVICE COURSE IN

III – SEMESTER (EEE)

AICTE MODEL CURRICULUM
B.E. III – SEMESTER, CIVIL ENGINEERING

CE 101ES *With effect from 2018-2019*

Instruction: 3 classes per week *Duration of Semester End Examination: 3 hours*
CIE: 30marks *SEE: 70 marks*
Credits: 3

ENGINEERING MECHANICS

Course Objectives:

1) Understand the resolution of forces, equilibrium of force systems
2) Learn the analysis of forces in the structures
3) Understand the concept of centroid, moment of inertia and dynamics

Course Outcomes:

1) Determine the resultant and moment of a force system
2) Apply the equations of equilibrium for a generalized force system
3) Analyze the forces in trusses and frames
4) Determine the centroid and moment of inertia for 1D & 2D bodies
5) Apply the concepts of dynamics in solving the engineering problems

Unit – I

Introduction to Engineering Mechanics covering, Force SystemsBasic 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

Basic Structural Analysis covering, Equilibrium in three dimensions; Method of Sections; Method of Joints; How to determine if a member is in tension or compression; Simple Trusses; Zero force members; Beams & types of beams; Frames & Machines.

Unit – III

Centroid and Centre of Gravity covering, Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; 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; Mass moment inertia of circular plate, Cylinder, Cone, Sphere and Hook.

Unit – IV

Virtual Work and Energy Method- Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mechanical efficiency. Conservative forces and potential energy (elastic and gravitational), energy equation for equilibrium. Applications of energy method for equilibrium. Stability of equilibrium.

UNIT – V

Mechanical Vibrations covering, Basic terminology, free and forced vibrations, resonance and its effects; Degree of freedom; Derivation for frequency and amplitude of free vibrations without damping and single degree of freedom system, simple problems, types of pendulum, use of simple, compound and torsion pendulums.

Suggested Reading:

1.F.L. Singer, *Engineering Mechanics*, Collins, Singapore, 1975.
2.S.P. Timoshenko and D.H. Young, *Engineering Mechanics*, McGraw-Hill International Edition, 1983.
3.S. Rajeshakharam and G. Sankarasubrahmanyam, *Mechanics*, Vikas Publications, 2002.
4.S.B. Junarkar and H.J. Shah, *Applied Mechanics*, 2001.
5.J.H. Shames, *Engineering Mechanics*, Prentice Hall, 1987.
*6.*B. Bhattacharyya, *Engineering Mechanics*, Oxford Higher Education, 2015.

e-Resources:

1. http://nptel.ac.in/
2. http://mhrd.gov.in/e-contents
3. http://spoken-tutorial.org/

IV – SEMESTER

AICTE MODEL CURRICULUM
B.E. IV – SEMESTER, CIVIL ENGINEERING

HS 301MC (CM 355UE) *With effect from 2019-2020*

MANAGERIAL ECONOMICS AND ACCOUNTANCY

Instruction: 3+1 classes per week* *Duration of Semester End Examination: 3 hours*
CIE: 30marks *SEE: 70 marks*
Credits: 3

Course Objectives:

- To learn important concepts of Managerial Economics and apply them to evaluate business decisions.
- To understand various parameters that determine the consumers' behavior.
- To evaluate the factors that affect production.
- To understand the concepts of capital budgeting and payback period.
- To study the concepts of various book-keeping methods.

Unit – I

Meaning and Nature of Managerial Economics: Managerial Economics and its usefulness to Engineers, Fundamental Concepts of Managerial Economics-Scarcity, Marginalism, Equimarginalism, Opportunity costs, Discounting, Time Perspective, Risk and Uncertainty, Profits, Case study method.

Unit – II

Consumer Behavior: Law of Demand, Determinants, Types of Demand; Elasticity of Demand (Price, Income and Cross-Elasticity); Demand Forecasting, Law of Supply and Concept of Equilibrium. (Theory questions and small numerical problem can be asked)

Unit – III

Theory of Production and Markets: Production Function, Law of Variable Proportion, ISO quants, Economics of Scale, Cost of Production (Types and their measurement), Concept of Opportunity Cost, Concept of Revenue, Cost-Output relationship, Break-Even Analysis, Price - Output determination under Perfect Competition and Monopoly (theory and problems can be asked)

Unit – IV

Capital Management: Significance, determination and estimation of fixed and working capital requirements, sources of capital, Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems. (Theory questions and numerical problems on estimating working capital requirements and evaluation of capital budgeting opportunities can be asked)

Unit – V

Book-keeping: Principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts, Trial Balance, concept and preparation of Final Accounts with simple adjustments, Analysis and interpretation of Financial Statements through Ratios.

(Theory questions and numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement, calculation of some ratios)

Suggested Reading:

1. Mehta P.L., *Managerial Economics* —Analysis, Problems and Cases , Sulthan Chand & Sons Educational Publishers, 2011
2. Maheswari S.N., *Introduction to Accountancy* , Vikas Publishing House, 2005
3. Pandey I.M., *Financial Management* , Vikas Publishing House, 2009

AICTE MODEL CURRICULUM
B.E. IV – SEMESTER, CIVIL ENGINEERING

PC 401CE *With effect from 2019-2020*

MECHANICS OF MATERIALS

Instruction: 2+1 T classes per week *Duration of Semester End Examination: 3 hours*
CIE: 30marks *SEE: 70 marks*
Credits: 3

Course Objectives:

1. Study the basic concept of deflections by using various methods and to predict the deformations of a member subjected to various loads and its combination
2. Differentiate statically determinate and indeterminate structures and to analyse members by applying the principles of equilibrium and compatibility in deformation
3. Know about the concept of strain energy principle and its applications to beams for finding their deflection
4. Understand basic methods for the analysis of statically indeterminate beams and frames and know the difference between different methods
5. Students will be able to understand Euler's formula, secant and straight line formula and their application to long and short columns.

Course Outcomes:

1. To calculate the deflections of a member due to various loads and its combinations.
2. Analyze statically indeterminate structural members
3. Solve statically indeterminate beams and portal frames using classical methods
4. Calculate the deflections in beams and pin jointed trusses
5. Distinguish the failures of columns by crushing and crippling and analyze with different end conditions by using different theories

Unit – I

Deflection: Slope and deflection by double integration method for cantilever, simply supported beams and overhanging beams carrying one, two point loads, u.d.l. and uniformly varying load over entire span. Moment area and conjugate beam method

Propped cantilevers: Cantilever beams on elastic and rigid props for point loads and UDL only. Calculation of reactions, B.M. and S.F. diagrams, and deflections.

Fixed Beams: Determination of shear force, ·)ending moment slope and deflection in fixed beams with and without sinking of supports for (i) point loads (ii) u.d.l. (iii)uniformly varying load over entire span.

Continuous Beams: Determination of moments in continuous beams with and without sinking of supports by theorem of three moments, S.F. and B.M. diagrams.

Unit – II

Column analogy method: Application to fixed beams- analogous column- stiffness and carryover factors

Strain energy: Strain energy and resilience in statically determinate bars subjected to gradually applied, suddenly applied, impact and shock loads. Resilience of beams. Deflections from resilience. Castigliano Theorem - I and its application to beams- Reciprocal theorem. Static indeterminacy and kinematic indeterminacy of structures.

Unit – III

Strain energy method: Deflections of statically determinate trusses and frames using unit load method.

Redundant trusses and frames: Analysis of plane trusses with one degree of redundancy (internal / external) and plane frames with one degree of redundancy, Lack of fit and temperature effect.

Unit – IV

Torsion and Springs- Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts, torsional rigidity, Combined torsion and bending of circular shafts, principal stress and maximum shear stresses under combined loading of bending and torsion. Analysis of close-coiled-helical springs.

Columns and Struts: Euler's theory for long columns- different end conditions- equivalent length- Rankine's theory. Eccentrically loaded columns- Secant and Perry's formulae.

Unit – V

Unsymmetrical bending of beams: Location of neural axis, maximum stresses for rectangular section .Symmetric channel section.

Shear Centre: Shear stress, shear flow, locating shear center for angle section channel section and T- section, with one axis of symmetry.

Suggested Reading:

1. D.S. Prakash Rao, *Strength of Materials* - A practical Approach, Universities Press, 1999.
2. S.B. Junarkar, *Mechanics of Structures* (Vol. 1 &2), Charotar Publishing House Anand, 1992.
3. R.K. Rajput, *Strength of Materials*, S. Chand & Co., 2003.
4. B.C. Punmia, *Strength of Materials and Theory of Structures*, Laxmi Publishers, Delhi, 2000.
5. G.H. Ryder, *Strength of Materials*, Third Edition in SI units, Macmillan Indian Limited, Delhi, 2002.
6. A. Pytel and F. L. Singer, *Strength of Materials*, Harper & Row, Fourth Edition, New York, 1987.
7. R.K. Bansal, A Text book of Strength of materials, Lakshmi Publications, New Delhi, 2010.
8. Dr. Sadhu singh, *Strength of Materials*, Khanna Publishers, Delhi, 2006.
9. S.M.A Kazimi, *Solid mechanics*, Tata Mc- raw-Hill Publications Ltd. New Delhi, 2009.
10. B.C. Punmia, Ashok kumar Jain, Arunkumar Jain, *Theory of structures*, Lakshmi publications (P) Ltd, New Delhi, 2007.

AICTE MODEL CURRICULUM
B.E. IV – SEMESTER, CIVIL ENGINEERING

PC 402CE *With effect from 2019-2020*

STRUCTURAL ENGINEERING

Instruction: 2+1 T classes per week *Duration of Semester End Examination: 3 hours*
CIE: 30marks *SEE: 70 marks*
Credits: 3

Course Objectives:

1. Know the IS codal provisions as applicable for the designs.
2. Understand the design philosophies and basics of RCC structural designs.
3. Understand the design principles in flexure, shear and torsion.
4. Learn the design of various components of RCC structures.

Course Outcomes: The students will be able to

1. Apply their knowledge of structural mechanics in addressing design problems of structural engineering
2. They will possess the skills to solve problems dealing with different loads and Concrete and steel
3. They will have knowledge in structural engineering

Unit – I

Materials and Structural Design Criteria Development of design philosophies-Working stress method, Ultimate load method, and Limit state method - Concepts, Characteristics loads and strengths, Partial safety factors, Stress-strain relationship for concrete and steel, stress block parameters.

Working stress method: Design of RCC beams - Balanced, under-reinforced and over reinforced sections - Rectangular, T and L sections, Design of singly and. doubly reinforced rectangular, T and L sections.

Unit – II

Introduction to the analysis and design

Limit state of collapse in flexure: Assumptions, Design for flexure - Singly and doubly reinforced rectangular, T and L sections.

Limit state of collapse in shear and torsion: Design for shear and torsion. Limit states of serviceability: Check for deflection and cracking.

Unit – III

Design of Structural Elements

Design of slabs (Limit state method): Design of one way and two way slabs - Simply supported and continuous slabs subjected to uniformly distributed loads, Detailing of reinforcement, Check for serviceability of slabs.

Design of stair cases (Limit state method): Types of stairs, Effective span, Distribution of loading on stairs, Design and detailing of dog-legged stair cases.

Unit – IV

Design of columns (Limit state method): Assumptions, Design of axially loaded circular, square and rectangular columns, Design of columns with uni-axial and bi-axial bending interaction diagrams

Design of footings (Limit state method): Design of isolated footings of uniform depth and sloped footings, Deign of square, rectangular and circular footings as per IS code, Design of combined rectangular slab footing, Combined rectangular beam and slab footing for two columns

Unit – V

System Design Concepts; Special Topics that may be Covered as Part of the Design Project Discussions; *Introduction* - Types of bridges, materials of construction, codes of practice (Railway and Highway bridges), aesthetics, loading standards (IRC, RDSO, AASHTO), *Concrete Bridges* - Materials and infrastructure requirements, precast systems and materials used for precast and cast in-situ bridges. Bridge deck and approach slabs, design of bridge deck systems, slab-beam systems design philosophies.

Suggested Reading:

1. Nilson, A. H. *Design of Concrete Structures.* 13th edition. McGraw Hill, 2004
2. Punmia B.C., Jain A.K. and Jain A.K., RCC Designs, Laxmi Publications, 2006.
3. Krishna Raju N. and Pranesh R.N., Reinforced Concrete Design, New Age International Pvt. Ltd., 003.
4. Varghese P.C; Limit State Design of Reinforced Concrete, Prentice Hall of India Pvt. Ltd." 2002.
5. Varghese P.C; Design of Reinforced Concrete Foundations, PHI Learning Pvt. Ltd., 2009.
6. D.S. Prakash Rao, Design Principles and Detailing of Concrete Structures, .Tata Mcfiraw Hill Publishing Co. Ltd., 1995.
7. Nawy, E. G. *Prestressed Concrete: A Fundamental Approach*, Prentice Hall, NJ, (2003).

Note: All relevant latest IS codes necessary for this course may be referred (i.e. IS 456-2000

AICTE MODEL CURRICULUM
B.E. IV – SEMESTER, CIVIL ENGINEERING

PC 403CE *With effect from 2019-2020*

HYDRAULIC ENGINEERING

Instruction: 3 classes per week *Duration of Semester End Examination: 3 hours*
CIE: 30marks *SEE: 70 marks*
Credits: 3

Course Objectives:

1. Study the concept of the flow through channels and economical design of channels.
2. Understand the boundary layer theory, concept of drag, lift of streamlined bodies
3. Understand the basics of dimensional analysis and development of non dimensional equations
4. To understand the basic principles of the hydraulic turbines, pumps and their hydraulic design.

Course Outcomes:

1. Ability to solve open channel flow problems through the selection and use of appropriate Equations
2. Knowledge of Boundary layer thickness and applications of Drag and lift on some case studies
3. Ability to perform dimensional analysis for problems in fluid mechanics and develop model studies.
4. Understanding of basics of the hydro-machinery and the components, functions and use of different types of turbines and pumps.
5. Able to prepare the characteristic curves and Assimilation of turbine/pump laws and constants for the hydraulic design

Unit – I

Steady uniform flow through open channels: Descriptions and definitions, difference between pipe flow and channel flow, velocity and pressure distributions in a channel cross-section, energy and momentum correction coefficients, friction to flow in open channels, uniform flow, Manning and Chezy formulae, most efficient channel sections, specific energy, concept and applications of critical depth. Gradually varied flow: Significance of Froude number, dynamic equation of gradually varied flow, classification of gradually varied flow profiles

Unit – II

Boundary layer: Definition, laminar and turbulent boundary layers, boundary layer thickness, displacement thickness, momentum thickness, and energy thickness, hydro-dynamically smooth and rough boundaries, and boundary layer separation.
Drag and Lift: fundamental concepts of drag and lift forces, drag on a sphere, cylinder, flat plate, and aerofoil.

Unit – III

Dimension analysis and model studies: Dimensional analysis and a tool in experimental hydraulics, Buckingham's Pie theorem, applications, geometric, kinematic and dynamic similarity, similarity laws, significance of Reynolds, Froude and Mach similarity laws, different types of models and their scale ratios.

Unit – IV

Hydraulic turbines: Classification, specific speed, velocity triangles, power developed, efficiencies, principles of design of impulse and reaction turbines, turbine laws and constants, characteristic curves, selection of turbines.

Unit – V

Centrifugal pumps: Components, work done and efficiency, minimum starting speed, Euler head equation, specific speed and characteristic curves of centrifugal pump, pumps in series and parallel.

Suggested Reading:

1. K. Som, and Biswas, G, 'Fluid Mechanics and Fluid Machines', Tata McGraw-Hill Publishing Co., New Delhi, 1998
2. Yuan, S. W., 'Foundation of Fluid Mechanics', Prentice-Hall India Pvt. Ltd., New Delhi, 1976
3. C.S.P. Ojha, R.Berndtsson, P.N. Chandramouli, 'Fluid Mechanics and Machinery', Oxford University Press, New Delhi, 2010
4. A.K.Mohanty, 'Fluid Mechanics', Prentice-Hall India Pvt. Ltd., New Delhi,1994.
5. Subrahmanya , K, Fluid Mechanics and Hydraulic Machines Tata McGraw-Hill Publishing Co., New Delhi, 2001

AICTE MODEL CURRICULUM
B.E. IV – SEMESTER, CIVIL ENGINEERING

PC 404CE *With effect from 2019-2020*

HYDROLOGY AND WATER MANAGEMENT

Instruction: 3 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Course Objectives:

1. Understanding the importance of Hydrology and its applications
2. Introduction to Hydrological processes and estimation of Design flood
3. Basic concepts and assessment of groundwater flows
4. Applications of statistical models in Hydrology
5. Introduction and assessment of soil-water-plant relationship

Course Outcomes:

1. Estimation of Design flood for Water Resources structures
2. Computation of drawdown and yield in aquifers
3. Development of Rainfall – Runoff relationship
4. Determination of crop – water requirements

Unit – I
General: Definition, relation to engineering design, hydrological cycle, importance of hydrology and its application in engineering.
Rainfall: Definition, types of rainfall, measurement of rain fall, types of raingauges, network design, presentation of precipitation data, mean aerial rainfall; thiessen polygon, isohyetal methods., depth- area- duration curve, dependable rainfall.
Infiltration: Evaporation, transpiration-definitions and processes.

Unit – II
Runoff: Definition, runoff process, factors affecting runoff, determination of runoff, importance of stream gauging, runoff formulae and runoff tables, dependable yield of a basin.
Floods: Definition, causes, importance of flood studies, flood peak and flood hydrograph, methods of computing flood peak, empirical methods, rational formula, unit hydrograph method, flood frequency studies, Weibul's and Gumble's extreme value methods.

Unit – III
Ground water: Types of aquifers, aquifer parameters, specific yield, storage coefficient, coefficients of permeability and transmissivity, Darcy's law, types of well, steady radial flow to wells in confined and unconfined aquifers, yield of open wells, safe yield, constant level pumping test and recuperation test.

Unit – IV

Statistics in Hydrology: Introduction, Statistical parameters; central tendency parameters, dispersion characteristics, skewness., probability distribution; discrete and continuous distribution., frequency analysis; log pearson type III distribution., regression and correlation; standard forms of bivariate equations., multivariate linear regression and correlation., analysis of time series., selection of a design return period, determination of permissible risk.

Unit – V

Irrigation: Definition, necessity of irrigation, types of irrigation, advantages and ill-effects of irrigation.

Soil-water-plant relationship: Vertical distribution of soil moisture, soil moisture tension, soil moisture stress, soil moisture constants, plant water relationship, moisture stress and plant response, consumptive use, crop factor, duty, factors affecting duty, types of crops and their water requirements, crop rotation.

Suggested Reading:

1. K. Subramanya, *Engineering Hydrology*, Tata McGraw Hill Publishing Co.Ltd. 1996.
2. H.M. Raghunath, *Hydrology – Principles, Analysis and Design*, New Age International Publishers, 1996.
3. Michael, A.M, *Irrigation Theory & Practice*, Vikas Publishing House, New Delhi, 1978
4. Ray K.Linsley, Jr, Max A. Kohler, Joseph L.H.Paulhus, *Hydrology for Engineers*, McGraw-Hill Book Company, 1980
5. Ven Te Chow, Hand book of Applied Hydrology, McGraw-Hill Book Company, New York, 1964

AICTE MODEL CURRICULUM
B.E. IV – SEMESTER, CIVIL ENGINEERING

PC 405CE *With effect from 2019-2020*

CONSTRUCTION ENGINEERING AND MANAGEMENT

Instruction: 3 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Course Objectives:

1. Describe different techniques of construction management projects
2. Illustrate economics & resource allocation for construction projects
3. Understand the basic concepts of optimization
4. Study the Safety Engineering practices for construction management projects
5. Comprehend the preparation of contracts and construction equipments

Course Outcomes

1. Application of network analysis to construction projects
2. Ability in applying resource leveling and smoothing to various projects
3. Utilization of Optimization techniques for proper project management
4. Knowledge of accident rates and their estimation for various case studies
5. Acquaintance with types of contracts and application of construction equipments

Unit – I

Basics of Construction- Unique features of construction, Construction project planning- Stages of project planning, Sequence of events in general Civil Engineering construction projects, Construction Schedule, work break-down structure. Development of management techniques, Bar charts, Gantt charts, CPM and Network analysis examples.

Unit – II

PERT techniques, Introduction to cost analysis, Cost reduction in construction management. Cost time analysis, Crashing the Network, Resource Leveling and smoothing.

Unit – III

Development of Operations Research (OR), Quantitative Analysis and Decision Making, need for linear programming, standard form of Linear programming, Graphical Method. An algebraic overview of Simplex Method, solving minimization and maximization problems, Dual method, case studies.

Unit – IV

Safety Engineering, Safety program, Direct and Indirect loss due to accident, Classification of Construction accidents and causes, Location hazards and their elimination, Safety in demolition of buildings, Safety in storage and handling of materials and equipments

Unit – V

Contracts Management – Basics, Importance of contracts; Types of Contracts, parties to a contract; Construction Equipment basics: Conventional construction methods Vs Mechanized methods and advantages of latter; Equipment for Earthmoving, Dewatering; Concrete mixing, transporting & placing; Cranes, Hoists and other equipment for lifting; Equipment for transportation of materials.

Suggested Reading:

1. Robert L. Peurifoy and William B. Ledbetter, Construction Planning, equipment, and methods, McGraw-Hili International Editions, New Delhi, 1985
2. FrankHarris and Ronald Mc.Caffer,modern construction Management.Blookwell science L1d,2001.
3. Mahesh Varma, Construction Equipment and its Planning and Application, Metropolitan Book Company Pvt Ltd., New Delhi, 1994.
4. Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications, 2016.
5. H.N.Ahuja, Construction performance control by networks, John willey & sons, New York, 1976.

AICTE MODEL CURRICULUM
B.E. IV – SEMESTER, CIVIL ENGINEERING

PC 401BS *With effect from 2019-2020*

ENGINEERING GEOLOGY

Instruction: 2 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 2

Course Objectives:

1. Understanding the engineering characteristics of different types of rocks for their suitability to Civil Engineering applications
2. Assessing the geological features like faults, folds, joints etc.
3. Concepts of weathering and its Engineering classification, process of formation of soil and their Engineering properties.
4. Conceptualization of the site investigation methods to know the ground condition for dam sites, tunnels and other structures.

Course Outcomes:

1. Differentiates between a rock and a mineral
2. Knowledge of the earth's interior and exterior processes
3. Application of principles of geology to Civil Engineering problems

Unit – I

Rocks: Distinguishing features of igneous, sedimentary and metamorphic rocks Geological description and Indian occurrence of Granite, Basalt, Dolerite, Gabbro, Laterite, Sandstone Shale, Limestone Slate, Gneiss, Quartzite, Marble, Khondalite and chamockite.

Geological Structures: Folds, Fractures joints and faults - Fundamental types, mechanism origin and classifications of structures; Field identification and Engineering analysis of structures

Unit – II

Rock Weathering: Processes and end - products of weathering; susceptibility of rocks tc weathering, Assessment of the degree of weathering and its classification.

Geology of Soils: Formation, geological classification, description and Engineering use of soils Types of Indian soils.

Hydrogeology: Hydrologic cycle, water table, aquifers, occurrence of ground water in various lithological formations, ground water movement, springs, ground water exploration and ground water provinces of India.

Unit – III

Geomorphology: Evolution, characteristics features and Engineering, considerations of fluviatile, Aeolian, glacial and marine land forms.

Rock Mechanics: Engineering properties- of rocks Stress - Strain behaviour of rocks under uniaxial compression.

Site Investigation: Aerial Photographs, Electrical: Resistivity and Seismic refraction methods.

Unit – IV

Rock as a Construction Material: Geological considerations III the selection of Concrete aggregate, Highway and Runway aggregates, building stones, Decorative stones, Roofing and facing stones. Building stones of India.

Geology of Dams and Reservoirs: Types of Dams, Problems associated with Dam foundations and reservoirs, Engineering Geological investigations for a masonry dam site, Analysis of dam failure; Engineering Geology of major Dam sites of India.

Unit – V

Tunnels: Stand - up time of different rocks, Engineering Geological investigations of tunnels in rock, problems in tunneling, pay line and over break, logging of tunnels and geology of some well known Indian tunnels.

Geological Hazards: Geological aspects of Earthquakes, Tsunamis and Landslides; Disaster prevention, mitigation and management.

Suggested Reading:

1. F.G. Bell, Engineering Geology, Elsivier - 2007.
2. Dimitri P. Krynine and William R. Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distributors, First Edition, 1998.
3. B.P.Attewel and I.W. Fanner, Principles of Engineering Geology, Chapman and Hall 1976.
4. Officers of the Geological Survey of India, "Engineering Geology Case Histories" Miscellaneous Pub. No. 29, 1975.

AICTE MODEL CURRICULUM
B.E. IV – SEMESTER, CIVIL ENGINEERING

PC 451CE *With effect from 2019-2020*

MATERIAL TESTING LABORATORY

Instruction: 2 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits: 1

Course Objectives:

1. Understand the experiments on various materials to assess their behavior and limitations
2. Learn the brittle and ductile material failure patterns
3. Understand the shear force, bending moment and deflection for different types of beams
4. Know the rigidity modulus by conducting spring and torsion test

Course Outcomes:

1. Evaluate Young's modulus, rigidity modulus, hardness number, flexural rigidity and impact strength of given specimens
2. Find the cracking stress and compressive strength of bricks
3. Determine the stiffness of close coiled helical springs
4. Find the deflection of a beam

Cycle - I

1. Tension –I Uni-Axial tension test on a specimen of ductile material
2. Tension II Stress-Strain characteristics of a ductile material
3. Brinell's hardness test
4. Compressive strength test on bricks
5. Bending test on simply supported beam of timber

Cycle - II

6. Torsion test on a specimen of ductile material
7. Compression test on close coiled helical spring
8. Bending test on simply supported beam of steel
9. Bending test on fixed beam of steel
10. Izod impact test

AICTE MODEL CURRICULUM
B.E. IV – SEMESTER, CIVIL ENGINEERING

PC 452CE *With effect from 2019-2020*

FLUID MACHANICS-II LABORATORY

Instruction: 2 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits: 1

Course Objectives:

1. Practical applications of open and curved channels
2. Application of force concepts on jets and hydraulic machines
3. Determination of characteristic curves of turbines and pumps

Course Outcomes

1. Competence in understanding floe phenomenon in open channels
2. Ability to analyze the force acting due to jets concept and it's application in hydraulic machines.
3. Competence in working principles of hydraulic pumps and turbines

List of Experiments

1. Determination of roughness coefficient in an open channel
2. Determination of a vane coefficient
3. Study of universal characteristic curves of a Pelton wheel
4. Study of universal characteristic curves of a Francis turbine
5. Determination of super elevation in an open channel
6. Determination of basic characteristics of a hydraulic jump
7. Verification of Froude's Model law in an open channel
8. Determination of critical slope of an open channel
9. Study of main characteristic curves of a Centrifugal pump
10. Study of universal characteristic curves of a Kaplan turbine

AICTE MODEL CURRICULUM
B.E. IV – SEMESTER, CIVIL ENGINEERING

PC 453CE *With effect from 2019-2020*

ENGINEERING GEOLOGY LABORATORY

Instruction: 2 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits: 1

Course Objectives:

1. Identify and describe the physical and engineering characteristics of different types of rocks.
2. Establish the ground conditions with different site investigation methods i.e. aerial photographic study and VES.
3. Study the geological, geotechnical, *geomorphological* and hydro geological maps of India.
4. Study the foundation geological maps of the case histories (major dams and tunnels) of the India.

Course Outcomes: The students will be able to

1. Identify and classify various types of rocks
2. Identify the structural form of rocks
3. Determine unconfined compressive strengths of rocks

1. Identification and description of physical properties of Minerals
2. Identification and description of geological and geotechnical characteristics of rocks; IS Code: 1123 (1975) .
3. Determination of apparent specific gravity, porosity and water absorption of different rocks; IS Code: 1124 (1974) ,
4. a) Study of structural models (folds, faults and unconformities) and
   b) Measurement of strike and dip of planar features by clinometers compass.
5. Vertical electrical sounding (VES) - a field experiment to determine depth to water table and bedrock.
6. Seismic refraction survey to determine depth to bedrock (demonstration only).
7. a) Determination of unconfined compressive strength of intact rocks.
   b) Study of topographic maps.
8. Stereoscopic examination of aerial photographs pertaining to landforms, vegetation and water bodies.
9. Study of geological maps of Andhra Pradesh, Teleangana and India with reference to occurrence of building stones.
10. Study of (a) Geotechnical Map of India and (b) Geomorphological Map of India.
11. Study of Hydro geological Maps of Andhra Pradesh and India.
12. Study of Foundation Geological Maps and sections pertaining to the major dam sites of India.

Note: At least 10 experiments are to be conducted

AICTE MODEL CURRICULUM
B.E. IV – SEMESTER, CIVIL ENGINEERING

ES 461CE *With effect from 2019-2020*

Instruction: 0 periods per week *Duration of Semester End Examination: NA*
CIE: 50 marks *SEE: 0 marks*
Credits: 1

SURVEY CAMP

Course Objectives:

1. Know the importance of Theodolite, Total station and their practical applications
2. Analyze the horizontal and vertical curves for survey work related to Buildings
3. Study the various applications of GPS, GIS and remote sensing for field work.

Course Outcomes:

1. Understand use Total station to calculate linear measurements of structures
2. Apply corrections to the measured values
3. Ability to Computation of omitted measurements and areas

The students will be given basic training of handling various survey instruments including the Total stations. The students are given certain tasks on all the instruments and equipments to solve the real practical problems in the vicinity of campus which enables them to learn and apply to the real life survey problems.

SERVICE COURSE IN

IV – SEMESTER

(CSE, ECE &EEE)

AICTE MODEL CURRICULUM
B.E. III – SEMESTER, CIVIL ENGINEERING

ENVIRONMENTAL SCIENCES

MC 302CE With Effect from 2019 – 2020

Instruction: 3 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 0

Course Objectives:

- Comprehend the need of environmental science, ethics and issues
- Illustrate the characteristics and functions of ecosystem
- Understand the concepts of Biodiversity and its conservation needs
- Study various environmental pollution effects, prevention and control acts

Course Outcomes:

- Application of awareness on environmental Issues for sustainable society
- Acquaintance with utilization of various natural resources and ecosystems
- Ability in conserving and protecting the biodiversity
- Knowledge of social and environment related issues and their preventive measures

Unit – I

Multidisciplinary nature of Environmental studies: Definition, scope and importance, Need for public awareness. Environmental ethics: issues and possible solutions. Population growth. Sustainable development and SDGs.

Current Environmental Issues: global warming and Climate change, acid rain, ozone layer depletion. Environment protection Acts. Environment and human health

Unit – II

Natural Resources: Renewable and nonrenewable resources: Natural resources and associated problems Forest resources, Water resources, Mineral Resources, Water conservation, Food Resources Energy Resources.

Land Resources: Land as a resource, land degradation, soil erosion, and desertification Role of individual in conservation of natural resources, Equitable use of resources for sustainable life styles.

Unit – III

Ecosystems: Concept of an ecosystem Structure and function of an ecosystem, Producers, consumers, decomposers. Energy flow in the eco systems. Ecological succession, Food chains, food webs and ecological pyramids,

Introduction, types, characteristic features, structure and functions: Terrestrial ecosystem, Forest ecosystem, Grass land ecosystem, Desert ecosystem. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit – IV

Biodiversity and its Conservation: Introduction-Definition: genetics, species and ecosystem diversity. Biogeographically classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, national and local level. India as a mega diversity nation.

Hot-spots of biodiversity, Threats to biodiversity: habitats loss, poaching of wild life, man wildlife conflicts. Endangered and endemic spaces of India, Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity, Wildlife conservation and protection act, Forest conservation and protection act

Unit – V

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

Air (prevention and control of pollution) Act, Water (prevention and control of pollution) Act Solid waste Management: Causes, effects and control measures of urban and industrial wastes Role of an individual's, communities and NGOs in prevention of pollution

Suggested Reading:

1. Gilbert, M. Masters Introduction to Environmental Engineering and Science, Prentice-Hall of India Pvt. Ltd., New Delhi, 1995.
2. Textbook of Environmental studies, Erach Bharucha, UGC.
3. Hammer. M J. and Hammer. MJ. Jr., Water and Wastewater Technology.
4. Prentice-Hall of India Pvt. Ltd., New Delhi. 1998
5. Fundamental concepts in Environmental Studies, D D Mishra, S Chand & Co Ltd.
6. Sasi Kumar, K. and Sanoop Gopi Krishna., Solid waste Management, Prentice-Hall of India Pvt. Ltd., New Delhi, 2009

SERVICE COURSE IN

IV – SEMESTER (BME)

AICTE MODEL CURRICULUM
B.E. IV – SEMESTER, CIVIL ENGINEERING

PC 406CE With Effect from 2019 – 2020

APPLIED MECHANICS
(For Bio- Medical Engineering)

Instruction: 3+1 periods per week* *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 3

PART A: SOLID MECHANICS

Course Objectives:

1. Learn the concept of center of gravity and mass moment of inertia
2. Understand the concept of stress, strain and elastic behavior of materials
3. Know the shear force, bending moment and the bending stress distribution
4. Understand the concept of fluid flow in statics, Kinematic, dynamics conditions
5. Evaluate the flow properties in static and dynamic compressible and incompressible flow.

Course Outcomes:

1. Determine the center of gravity and mass moment of inertia of a solid
2. Apply the fundamental concepts of stress and strain
3. Analyze the structural members subjected to tension, compression, bending

UNIT – I
Center of Gravity and Mass Moment of Inertia: Pappu's theorems and its applications, center of gravity and mass moment of inertia of solids and composite bodies, radius of gyration.

UNIT – II
Simple Stresses and Strains: Types of stresses and strains, stress-strain curve for ductile material, deformation of prismatic bars under axial loads. Poisson's ratio, volumetric strain, elastic constants, compound bars and temperature stresses.

UNIT – III
Shear force and Bending Moment: Concepts of shear force and bending moment, shear force and bending moment diagram for cantilever, simply supported and overhanging beams subjected to concentrated and uniformly distributed loads, simple bending theory, bending stresses.

Suggested Reading:

1. D.S. Prakash Rao, *Strength of Materials - A Practical Approach*, University Press, 1999.
2. S.B. Iunarker, and R.I. Shah, *Applied Mechanics*, Charaotar Publishers, 2001.
3. G.H. Ryder, *Strength of Materials*, Macmill India Limited, Third Edition, 2002.
4. A. Pytel and F. I. Singer, *Strength of Materials*, Harper and RC, Fourth Edition, 1987.

e-Resources:

1. http://nptel.ac.in/
2. http://mhrd.gov.in/e-contents
3. http://spoken-tutorial.org/

PART B: FLUID MECHANICS

Course Objectives:

1. Understand the basic properties of fluid flows
2. Description of measurement techniques
3. Illustrate the application of basic principles of fluids.

Course Outcomes:

1. Knowledge of fluid properties and types of flows.
2. Ability to apply Pressure – flow relationship for Non- Newtonian fluids
3. Capacity to apply the basic principles in the field of Bio-medical Engineering

Unit – I

Fluid Properties: Density, Viscosity, compressibility, and surface tension, conservation of mass and momentum, Bernoulli's Equation, measurement of pressure, stream lines, path lines, streak lines.

Flow stability and related characteristics (steady laminar flow, turbulent flow, flow development, viscous and turbulent shear stress), Boundary layer separation.

Unit – II

Rheology of blood, capillary viscometer using Poiseuille's law, Rotating cylinder Viscometer (coaxial cylinder viscometer). Pressure – flow relationship for Non-Newtonian fluids, power law fluid, Bingham plastic, Casson's fluid

Unit – III

Hydrostatics in circulation, Application of Bernoulli's equation (Total v/s Hydrostatic pressure measurement, Arterial Stenoses and Aneurysms, Cardia Valve Stenoses), Estimation of entrance length and its effect on flow development in arteries.

Suggested Reading:

1. Krishan B. Chandran , Ajit P. Yoganathan, and Stanley E. Rittgers,'*Bio-fluid Mechanics: The Human Circulation*', CRC Press, Taylor & Francis Group, New York, 2007
2. LeeWaite and Jerry Fine, '*Applied Bio-fluid Mechanics*', McGraw-Hill Publishing Co., New York, 2007
3. Clement Kleinstreuer, '*Bio-fluid Dynamics: Principles and Selected Applications*', CRC Press, Taylor & Francis Group, New York, 2006