Biju Patnaik University of Technology, Orissa

CIVIL ENGINEERING

3rd SEMESTER

	THEORY	Contact Hours	
Code	Subject	L-T-P	Credits
BSCM1205	Mathematics – III	3-0-0	4
HSSM3204	Engineering Economics & Costing	3-0-0	
	or		3
HSSM3205	Organisational Behaviour	3-0-0	
BECS2212	C++ & Object Oriented Programming	3-0-0	3
PCME4202	Mechanics of Solids	3-0-0	3
PCCE4203	Building Material & Building Construction	3-0-0	3
PCME4201	Fluid Mechanics and Hydraulic Machines	3-1-0	4
	Credits (Theory)		20

PRACTICALS/SESSIONALS

Code	Subject	L-T-P	Credits
BECS7212	C++ & Object Oriented Programming Lab	0-0-3	2
HSSM7203	Communication and Interpersonal Skills for Corporate Readiness	0-0-3	2
PCCE7207	Civil Engineering Drawing	0-0-3	2
	Credits (Practicals / Sessionals)		6
	TOTAL SEMESTER CREDITS		26

4th SEMESTER

	THEORY	Contact Hours	
Code	Subject	L-T-P	Credits
BSCM1210	Mathematics – IV	3-0-0	4
HSSM3205	Organisational Behaviour	3-0-0	
	or		3
HSSM3204	Engineering Economics & Costing	3-0-0	
PCCE4204	Structural Analysis-1	3-0-0	3
PCCE4205	Surveying -1	3-0-0	3
PCCE4206	Geo Technical Engineering	3-0-0	3
FEEC2216 FECS2208 FEEE2215	**Free Electives**(any one) Analog & Digital Electronics, Data Base Management Systems Energy Conversion Technique.	3-0-0	3
	Credits (Theory)		19

PRACTICALS/SESSIONALS

Code	Subject	L-T-P	Credits
PCCE7209	Material Testing Lab	0-0-3	2
PCCE7210	Hydraulics Laboratory	0-0-3	2
PCCE7205	Survey Field Work-I	0-0-3	2
	Credits (Practicals / Sessionals)		6
	TOTAL SEMESTER CREDITS		25

BSCM1205 **Mathematics - III**

Module-I   **(18 hours)**

Partial differential equation of first order, Linear partial differential equation, Non-linear partial differential equation, Homogenous and non-homogeneous partial differential equation with constant co-efficient, Cauchy type, Monge's method, Second order partial differential equation
The vibrating string, the wave equation and its solution, the heat equation and its solution, Two dimensional wave equation and its solution, Laplace equation in polar, cylindrical and spherical coordinates, potential.

Module-II   **(12 hours)**

Complex Analysis:
Analytic function, Cauchy-Riemann equations, Laplace equation, Conformal mapping,
Complex integration: Line integral in the complex plane, Cauchy's integral theorem, Cauchy's integral formula, Derivatives of analytic functions

Module –III   **(10 hours)**
Power Series, Taylor's series, Laurent's series, Singularities and zeros, Residue integration method, evaluation of real integrals.

Text books:
1. E. Kreyszig," Advanced Engineering Mathematics:, Eighth Edition, Wiley India
   Reading Chapters: 11,12(except 12.10),13,14,15
2. B.V. Ramana, " Higher Engineering Mathematics", McGraw Hill Education, 2008
   Reading chapter: 18

Reference books:

1. E.B. Saff, A.D.Snider, " Fundamental of Complex Analysis", Third Edition, Pearson Education, New Delhi
2. P. V. O'Neil, "Advanced Engineering Mathematics", CENGAGE Learning, New Delhi

HSSM3204 Engineering Economics & Costing

Module-I: **(12 hours)**

Engineering Economics – Nature and scope, General concepts on micro & macro economics. The Theory of demand, Demand function, Law of demand and its exceptions, Elasticity of demand, Law of supply and elasticity of supply. Determination of equilibrium price under perfect competition (Simple numerical problems to be solved). Theory of production, Law of variable proportion, Law of returns to scale.

Module-II: **(12 hours)**

Time value of money – Simple and compound interest, Cash flow diagram, Principle of economic equivalence. Evaluation of engineering projects – Present worth method, Future worth method, Annual worth method, internal rate of return method, Cost-benefit analysis in public projects. Depreciation policy, Depreciation of capital assets, Causes of depreciation, Straight line method and declining balance method.

Module-III: **(12 hours)**

Cost concepts, Elements of costs, Preparation of cost sheet, Segregation of costs into fixed and variable costs. Break-even analysis-Linear approach. (Simple numerical problems to be solved) Banking: Meaning and functions of commercial banks; functions of Reserve Bank of India. Overview of Indian Financial system.

Text Books:

1. Riggs, Bedworth and Randhwa, "Engineering Economics", McGraw Hill Education India.
2. D.M. Mithani, Principles of Economics. Himalaya Publishing House

Reference Books :
1. Sasmita Mishra, "Engineering Economics & Costing ", PHI
2. Sullivan and Wicks, " Engineering Economy", Pearson
3. R.Paneer Seelvan, " Engineering Economics", PHI
4. Gupta, " Managerial Economics", TMH
5. Lal and Srivastav, " Cost Accounting", TMH

HSSM 3205 **Organizational Behaviour**

Module I :

The study of Organizational Behaviour : Definition and Meaning, Why Study OB
Learning – Nature of Learning, How Learning occurs, Learning and OB.
Foundations of Individual Behaviour : Personality – Meaning and Definition, Determinants of Personality, Personality Traits, Personality and OB.
Perception – Meaning and Definition, Perceptual Process, Importance of Perception in OB. Motivation – Nature and Importance, Herzberg's Two Factor Theory, Maslow's Need Hierarchy Theory, Alderfer's ERG Theory, Evaluations.

Module II :

Organizational Behaviour Process : Communication – Importance, Types, Gateways and Barriers to Communication, Communication as a tool for improving Interpersonal Effectiveness, Groups in Organizations – Nature, Types, Why do people join groups, Group Cohesiveness and Group Decision-making Managerial Implications, Effective Team Building. Leadership-Leadership & Management, Theories of Leadership-Trait theory, Leader Behaviour theory, Contingency Theory, Leadership and Follower ship, How to be an effective Leader, Conflict-Nature of Conflict and Conflict Resolution. An Introduction to Transactional Analysis (TA).

Module-III :

Organization : Organizational Culture – Meaning and Definition, Culture and Organizational Effectiveness. Introduction to Human Resource Management-Selection, Orientation, Training and Development, Performance Appraisal, Incentives Organizational Change – Importance of Change, Planned Change and OB techniques. International Organisational Behaviour – Trends in International Business, Cultural Differences and Similarities, Individual and Interpersonal Behaviour in Global Perspective.

Text Books :

1. Keith Davis, Organisational Behaviour, McGraw-Hill.
2. K.Aswathappa, Organisational Behaviour, Himalaya Publishing House.

Reference Books :
1. Stephen P. Robbins, Organisational Behaviour, Prentice Hall of India
2. Pradip N. Khandelwal, Organizational Behaviour, McGraw-Hill, New Delhi.
3. Uma Sekaran, "Organizational Behaviour", TATA McGraw-Hill, New Delhi.
4. Steven L McShane, Mary Ann Von Glinow, Radha R Sharma" Organizational Behaviour" , TATA McGraw- Hill.
5. D.K. Bhattachayya, "Organizational Behaviour", Oxford University Press
6. K.B.L.Srivastava & A.K.Samantaray, "Organizational Behaviour" India Tech
7. Kavita Singh, "Organizational Behaviour", Pearson

BECS2212 **C++ & Object Oriented Programming**

Module I **(08 hrs)**
Introduction to object oriented programming, user defined types, structures, unions, polymorphism, encapsulation. Getting started with C++ syntax, data-type, variables, strings, functions, default values in functions, recursion, namespaces, operators, flow control, arrays and pointers.

Module II **(16 hrs)**

Abstraction mechanism: Classes, private, public, constructors, destructors, member data, member functions, inline function, friend functions, static members, and references.
Inheritance: Class hierarchy, derived classes, single inheritance, multiple, multilevel, hybrid inheritance, role of virtual base class, constructor and destructor execution, base initialization using derived class constructors.
Polymorphism: Binding, Static binding, Dynamic binding, Static polymorphism: Function Overloading, Ambiguity in function overloading, Dynamic polymorphism: Base class pointer, object slicing, late binding, method overriding with virtual functions, pure virtual functions, abstract classes.
Operator Overloading: This pointer, applications of this pointer, Operator function, member and non member operator function, operator overloading, I/O operators.
Exception handling: Try, throw, and catch, exceptions and derived classes, function exception declaration.

Module III **(08 hrs)**

Dynamic memory management, new and delete operators, object copying, copy constructor, assignment operator, virtual destructor.
Template: template classes, template functions.
Namespaces: user defined namespaces, namespaces provided by library.

Text Books:
1. Object Oriented Programming with C++ - E. Balagurusamy, McGraw-Hill Education (India)
2. ANSI and Turbo C++ - Ashoke N. Kamthane, Pearson Education

Reference Books:

1. Big C++ - Wiley India
2. C++: The Complete Reference- Schildt, McGraw-Hill Education (India)
3. "C++ and Object Oriented Programming" – Jana, PHI Learning.
4. "Object Oriented Programming with C++ "- Rajiv Sahay, Oxford
5. Mastering C++ - Venugopal, McGraw-Hill Education (India)
6. "Object Oriented Programming with C++", David Parsons, Cengage Learning.

PCME4202 **Mechanics of Solids**

MODULE - I (14 Lectures)

1. Load, Stress, Principle of St.Venant, Principle of Superposition, Strain, Hooke's law, Modulus of Elasticity, Stress-Strain Diagrams, Working Stress, Factor of safety, Strain energy in tension and compression, Resilience, Impact loads,
Analysis of Axially Loaded Members : Composite bars in tension and compression - temperature stresses in composite rods, Statically indeterminate problems.
Shear stress, Complimentary shear stress, Shear strain, Modulus of rigidity, Poisson's ratio, Bulk Modulus, Relationship between elastic constants.

2. Members in Biaxial State of Stress :

   Stresses in thin cylinders, thin spherical shells under internal pressure - wire winding of thin cylinders. Analysis of Biaxial Stress. Plane stress, Principal stress, Principal plane, Mohr's Circle for Biaxial Stress.

3. Strain Deformation :

   Two dimensional state of strain, Mohr's circle for strain, Principal strains and principal axes of strain measurements, Calculation of principal stresses from principal strains.

MODULE - II (13 Lectures)

4. Shear Force and Bending Moment for Simple Beams :
Shear force and bending moment. Types of load and Types of support. Support reactions, Relationship between bending moment and shear force, Point of inflection. Shear Force and Bending Moment diagrams.

5. Simple Bending of Beams :
Theory of simple bending of initially straight beams, Bending stresses, Shear stresses in bending, Distribution of normal and shear stress, beams of two materials, Composite beams.

6. Deflection of Beams :
Differential equation of the elastic line, Slope and deflection of beams by integration method and area - moment method.

MODULE - III (12 Lectures)

7. Theory of Columns:
Eccentric loading of a short strut, Long columns, Euler's column formula, Lateral buckling, Critical Load, Slenderness ratio

8. Torsion in solid and hollow circular shafts, Twisting moment, Strain energy in shear and torsion, strength of solid and hollow circular shafts. Stresses due to combined bending and torsion, Strength of shafts in combined bending and twisting.

9. Close - coiled helical springs.

TEXT BOOKS

1. Elements of Strength of Materials by S.P.Timoshenko and D.H.Young, Affiliated East-West Press
2. Strength of Materials by G. H. Ryder, Macmillan Press
3. Strength of Materials by James M. Gere and Barry J. Goodno, Cengage Learning

REFERENCE BOOKS

1. Mechanics of Materials by Beer and Johnston, Tata McGraw Hill
2. Mechanics of Materials by R.C.Hibbeler, Pearson Education
3. Mechanics of Materials by William F.Riley, Leroy D.Sturges and Don H.Morris, Wiley
   Student Edition
4. Mechanics of Materials by James M. Gere, Thomson Learning
5. Engineering Machanics of Solids by Egor P. Popov, Prentice Hall of India
6. Strength of Materials by S.S.Rattan, Tata Mc Graw Hill
7. Strength of Materials by R.Subramaniam, Oxford University Press
8. Strength of Materials by Sadhu Singh, Khanna Publishers

PCCE4203 Building Materials and Building Constructions

Module I

Bricks: Brick as a construction material and its importance, materials suitable for manufacture of bricks, methods of brick manufacture, types of bricks, qualities of a good brick, testing of bricks, uses of bricks.

Stone: Introduction, classification, composition and characteristics, useful Indian stone, method of quarrying and dressing

Cement: Classification, chemical composition, Manufacturing of cement, hydration, tests for cement, uses of cement, types of cement, *Mortar:* Definition, composition and uses of mortar.

Concrete: Quality of mixing water, Workability, Factors affecting workability, Measurement of workability, Segregation, Bleeding, Uniformity of mixing, Mixing time, vibration of concrete, concrete mix design, admixtures, Grade and strength of Concrete.

Module II :

Foundation: Types of foundation, spread foundations, pile foundations, pier foundations, excavation of foundation

Brick Masonry: Terminology used, Materials used, Causes of failure of brick masonry, Types of bonds, Brick laying, Joints in brickwork, Reinforced brickwork, Joint between old and new masonry, Maintenance of brick work.

Stone Masonry: Terminology used, Materials used, Cutting and dressing of stones, Types of stone masonry-Rubble and Ashlar, General principles of construction, Joints of stone, Stone lining, maintenance of stone work, Artificial stones.

Cavity walls: Purpose and method of construction.

Module III :

Damp Proofing: Causes and effects, materials used for damp proofing, methods of preventing dampness, Damp Proof Course.

Stairs: Terms used, types of stairs, essential requirements, wooden stairs, concrete stairs, metal stairs.

Flooring: Types of flooring and their construction- brick, stone, concrete, tile, mosaic, terrazzo, asphalt

Plastering: Definition. Materials used for plastering, types of plastering, methods of plastering, defects and remedial measures in plastering.

Maintenance of Buildings: Causes and prevention of cracks in building, special repair of buildings, annual maintenance.

Text Books:

1. "Material of Construction ", D.N.Ghose, TMH Publishing Company Ltd.

2. "Engineering Materials" by S. C. Rangwala et al., Charotar Publishing House

3. A text book of Building Construction by S K Sharma and B.K Kaul, S Chand & Company Limited.

4." Building Construction", Sushil Kumar, Standard Publishers Distributors, New Delhi

Reference Books:

1. "Properties of concrete" by A M Neville, Low Price Edition

2. "Building Construction" by S P Arora.

3. "Building Materials" by S.K.Duggal, TMH Publication.

PCME4201 Fluid Mechanics and Hydraulic Machines

Module I   **(13 Lectures)**
Introduction : Scope of fluid mechanics and its development as a science
Physical property of Fluid: Density, specific gravity, specific weight, specific volume, surface tension and capillarity, viscosity, compressibility and bulk modulus, Fluid classification.
Fluid statics: Pressure, Pascal's Law, Pressure variation for incompressible fluid, atmospheric pressure, absolute pressure, gauge pressure and vacuum pressure, manometer.

Hydrostatic process on submerged surface, force on a horizontal submerged plane surface, force on a vertical submerged plane surface.

Buoyancy and floatation, Archimedes' principle, stability of immersed and floating bodies, determination of metacentric height.

Fluid kinematics : Introduction, description of fluid flow, classification of fluid flow. Reynold's number, Acceleration of fluid particles, flow rate and continuity equation, differential equation of continuity,
Mathematical definitions of irrotational and rotational motion. Circulation, potential function and stream function. Flow net

Module II   **(12 Lectures)**

Fluid dynamics : Introduction, Euler's equation along a streamline, energy equation, Bernoulli's equation and its application to siphon, venturimeter, orificemeter, pitot tube.

Flow in pipes and ducts: Loss due to friction, Minor energy losses in pipes Hydraulic Gradient Line (HGL), Total Energy Line (TEL), Power transmission in the fluid flow in pipes, fluid flow in pipes in series and parallel. Flow through nozzles.

Module III   **(15 Lectures)**
Hydraulic turbine: Classification, Impulse and Reaction turbine; Tangential, Radial and axial turbine.
Impulse turbine, Pelton wheel, bucket dimensions, number of buckets in pelton wheel, efficiency and performance curves.
Reaction Turbines: Francis turbine and Kaplan turbine, velocity triangle and efficiencies, performance curve. Function of draft tube and casing cavitation
Centrifugal Pump: constructional features, vane shape, velocity triangles, Efficiencies, Multi stage centrifugal pumps, Pump Characteristic, NPSH and Cavitation.

Positive displacement pumps: Reciprocating Pump, Working principle, Discharge, work done and power requirement, Slip, Indicator diagram

Text Books
1.   Fluid Mechanics and Hydraulic Machines, Modi & Seth
2.   Introduction to Fluid Mechanics and Fluid Machines by S.K. Som and G. Biswas, TMH
3.   Fluid Mechanics, A.K.Jain, Khanna Publishers

Reference Books:

1.   Fluid Mechanics by A.K. Mohanty, PHI
2.   Introduction to Fluid Mechanics by Fox, McDonald, Willey Publications
3.   Fluid Mechanics by Kundu, Elsevier
4.   An Introduction to Fluid Dynamics by G.K.Batchelor, Cambridge University Press
5.   Engineering Fluid Mechanics by Garde et. al., Scitech
6.   First course in Fluid Mechanics by Narasimhan, University press
7.   Fluid Mechanics by J.F.Douglas, J.M.Gasiorek, J.A.Swaffield and L.B.Jack, Pearson Education

BECS7212 C++ & Object Oriented Programming Lab

1. Programs on concept of classes and objects.(1 class)
2. Programs using inheritance.(1 class)
3. Programs using static polymorphism.(1 class)
4. Programs on dynamic polymorphism.(1 class)
5. Programs on operator overloading.(1 class)
6. Programs on dynamic memory management using new, delete operators.(1 class)
7. Programs on copy constructor and usage of assignment operator.(1 class)
8. Programs on exception handling .(1 class)
9. Programs on generic programming using template function & template class.(1 class)
10. Programs on file handling.(1 class)

HSSM7203 Communication & Interpersonal skills for Corporate Readiness Lab.

Lab   **30 hours**

This course will focus on communication in professional (work-related) situations of the kind that BPUT graduates may expect to encounter on entering the professional domain.

Some typical forms of work-related communication, oral or written, are listed below. Practice activities for all four skills can be designed around these or similar situations.

1.   Gaining entry into an organization

   i.   Preparing job-applications and CVs

   ii.   Facing an interview

   iii.   Participating in group discussion (as part of the recruitment process)

2   In-house communication

a.   Superior/ Senior ➔ subordinate / junior (individual ➔ individual / group)
   i.   Welcoming new entrants to the organization, introducing the workplace culture etc.
   ii.   Briefing subordinates / juniors : explaining duties and responsibilities etc.
   ii.   Motivating subordinates / juniors ('pep talk')
   iii. Instructing/ directing subordinates/ juniors
   iv.   Expressing / recording appreciation, praising / rewarding a subordinate or junior
   v   Reprimanding / correcting / disciplining a subordinate/junior (for a lapse) ; asking for an explanation etc.

b.   Subordinate / Junior ➔ Superior / Senior
   i.   Responding to the above
   ii.   Reporting problems / difficulties / deficiencies
   iii.   Offering suggestions

PCCE7207 **Civil Engineering Drawing**

Plan, elevation, side view of residential/office building

Drawing of 2 bed room/3 bed room houses (single and two storeyed), ground and first floor plans, elevation and section for load bearing and framed structures

Detailing of doors/windows

Drawing of several types of footing, bricks work, floor, staircases, masonry, arches and lintels

Types of steel roof trusses

Detailing of floor and wall joints,

Project on establishments like Bank building/ Post office/ Hostel/ Library/ Hospital/ Auditorium etc

<u>References</u>

1. Civil Engineering Drawing and Design by D.N.Ghose CBS Publisher
2. Civil Engineering Drawing by

BSCM1210 **Mathematics – IV**

Module-I   **(20 hours)**

Numerical methods:
Approximation and round of errors, Truncation error and Taylor's series
Roots of equation: The bisection method, the false-position method, fixed point iteration, the Newton-Raphson method, Muller's method
Linear algebraic equation: LU decomposition, the matrix inverse, Gauss-Seidel method
Interpolation: Newton divided difference interpolation, Lagrange Interpolation, Newton's forward and backward interpolation.
Numerical integration: The trapezoidal rule, The Simpson's rules, Gauss quadrature
Ordinary differential equation: Euler's method, Improvement of Euler's method, Runge-Kutta methods

Module-II   **(10 Hours)**

Probability:
Probability, Random variables, Probability distributions, Mean and variance of distribution, Binomial, Poisson and Hypergeometric distributions, Normal distribution, Distribution of several random variables.

Module-III   **(10 Hours)**

Mathematical Statistics:
Random sampling, Estimation of Parameters, Confidence Intervals, Testing of hypothesis, Acceptance sampling, Chi square test for goodness of fit , Regression Analysis, Fitting Straight Lines, Correlation analysis.

Text books:

1. S. C. Chapra and R. P. Canale, " _Numerical methods for Engineers_", Fifth Edition, McGraw Hill Education
    Reading Chapters : 2, 3(3.1, 3.2), 4(4.2, 4.3), 5(5.1, 5.2, 5.3), 6(6.4), 9(9.1, 9.2), 10(10.2), 13(13.1,13.2,13.5), 16(16.1, 16.2), 17(17.3), 20(20.1, 20.2, 20.3)

2. E. Kreyszig," Advanced Engineering Mathematics:, Eighth Edition, Wiley India
    Reading Chapters: 22, 23(except 23.5 and 23.8)

Reference books:

1. Jay L. Devore, "Probability and Statistics for Engineering and Sciences", Seventh Edition, Thomson/CENGAGE Learning India Pvt. Ltd
2. P. V.O'Neil, "Advanced Engineering Mathematics", CENGAGE Learning, New Delhi

PCCE4204 **Structural Analysis - I**

Module I

Introduction to statically indeterminate structures with reference to two and three dimensional structures. Determination of static and kinematic indeterminacy in beams and frames

Three moment theorem, Continuous beams and propped cantilevers by consistent deformation method, Fixed beams

Module II

Rolling loads and influence lines for simply supported beams, ILD for reaction, shear force and bending moment at a section, ILD for wheel loads, point loads and udl, maximum bending moment envelope

Analysis of three hinged arches, Suspension cable with three hinged stiffening girders subjected to dead and live loads, ILD for Bending Moment, Shear Force, normal thrust and radial shear for three hinged arches

Module III

Energy theorems and its application (Displacement calculation):

Strain energy method, Virtual work method, unit load method, Betti's and Maxwell's laws, Castigliano's theorem, concept of minimum potential energy. Analysis of redundant plane trusses.

Deflection of pin jointed plane trusses. Analytical method and Williot –Mohr diagram. Introduction to space truss

Text Books:
1. Theory and Problems in Structural Analysis by L Negi, Tata Mc Graw Hill
2. Structural Analysis by Norris and Wilber

Refernce Books:
3. Structural Analysis by V. S. Prasad, Galgotia Publications Private Limited
4. Analysis of Structure by R C Hibller

PCCE4205 **Surveying - I**

Module I

Linear measurement and chain survey: Use of various types of chains and tapes, measurement of correct length of lines, direct and indirect ranging, chaining along sloping ground. Obstacle in chaining, errors and their elimination.

Compass surveying: Use of prismatic compass, temporary adjustment, bearing of a line, local attractions, correction of bearing

Plane table surveying: Methods of plane tabling, radiations, intersection, traversing and resection, two point and three point problem. Adjustment and common error in plane table survey.

Module II

Levelling: Use of dumpy level and levelling staff. Temporary and Permanent adjustment of dumpy level, Reduction of levels by height of instrument and rise and fall method. Curvature and refraction error, sensitiveness of level tube, reciprocal levelling, levelling difficulties and common errors

Module III

Contouring: Contour interval and horizontal equivalent, characteristics of contours, methods of contouring- different and indirect method, contour gradient

Theodolite Survey: Use of theodolite, temporary adjustment, measuring horizontal and vertical angles, theodolite traversing

Text Books:
1. "A Text Book of Surveying-I", S.K.Duggal, TMH Publisher
2. Surveying- Vol-1, B.C. Punmia

Reference Books:
3. Surveying and Levelling Vol-1, T. P. Kanetkar and S. V. Kulkarni
4. Surveying Vol-1 by R Agor

PCCE4206 **Geotechnical Engineering**

Module 1:

Origin of Soil and Grain Size**:** Rock Cycle and the origin of soil, soil particle size, clay minerals, mechanical analysis of soil, grain size distribution curve, particle shape, weight volume relationships, specific gravity, unit weight, void ratio, moisture content, and relationships, relative density, Consistency of soil: Atterberg limits - liquid limit, plastic limit, shrinkage limit. Liquidity index and consistency index, activity, soil structure. Engineering classification of soil: IS, USCS, HRB and ASTM.   (8 Hours)

Soil Hydraulics: Modes of occurrence of water in soil. Stress conditions in soil- total, effective and neutral stresses and relationships. Permeability - Bernaulli's equation, Darcy's Law, hydraulic conductivity, laboratory determination of hydraulic conductivity, equivalent hydraulic conductivity in stratified soil. Seepage- Laplace equation of continuity, flow nets, seepage calculation from a flow net, flow nets in anisotropic soils, seepage through earth dam, critical hydraulic gradient and quick sand condition.   (6 Hours)

Module II:

Soil Compaction: mechanism and principles, Standard and Modified Proctor Test, factors affecting compaction, effect of compaction on soil properties, field compaction techniques.   (4 Hours)

Consolidation of soils: Consolidation and compaction, primary and secondary consolidation, Terzhaghi's theory of one dimensional consolidation, consolidation test, determination of coefficient of consolidation.   (4 Hours)

Stresses in Soil: Normal and shear stresses on a plane, Boussinesq's solution for a point load, line load, strip load, uniformly loaded circular and rectangular areas, Isobar and pressure bulb concept, stress distribution on horizontal and vertical planes, Newmark's chart and its application, contact pressure.   (6 Hours)

Module III

Shear Strength: Mohr-Coulomb failure criterion, shear strength parameters and determination: direct and tri-axial shear test, unconfined compression test, vane shear test. Other methods of determining the un-drained shear strength of soil, sensitivity and thixotropy of clay.   (7 Hours)

Stability of Slopes: Terminology, stability of finite and infinite slopes, Swedish slip circle method and friction circle method of analysis of slopes, Taylor stability Number and stability curves, Bishops Method.   (7 Hours)

Text Books:

    (1) Principles of Geotechnical Engineering by Braja M. Das, Thomson/ Brooks Cole

    (2) Geotechnical Engineering by T.N. Ramamurthy & T.G. Sitharam,S. Chand & Co.

Reference Books:

    (3) Geotechnical Engineering by Donald P. Coduto, Pearson Education, Prentice Hall

    (4) Soil Mechanics and Foundation Engineering by B. C Punmia et al., Laxmi Publications Pvt Ltd

BEEC2216 Analog and Digital Electronics

MODULE – I (9 Hours)

1. **Diode Circuits:** Zener Diode Voltage Regulator, Diode Circuits with Time-Varying Sources, Switching Characteristics of a Diode, Special Purpose Diodes , Rectifiers and Filters. (4 Hours)

2. **Small Signal Amplifier:** Transistor Hybrid Model, Transistor Biasing, Bias Design, AC Gain, Input and Output Impedances, Some Special Circuits, Darlington Pairs and Feedback Pairs, Frequency Response of Single Stage RC Coupled Amplifiers and Multistage Transistor Amplifiers. (5 Hours)

MODULE – II (12 Hours)

3. **Large Signal Amplifiers:** Classification, Class-A and Class-B Power Amplifiers Complimentary and Symmetry Amplifiers, Class-C Amplifiers. . (4 Hours)
4. **Feed Back Amplifiers and Oscillators:** Feedback Concepts, Types of Feedback Circuits, Effects of Negative Feedback Circuits, Unijunction Oscillator and PLL. (4 Hours)
5. **Operational Amplifier:** Basic Operational Amplifier, Differential Amplifier, Basic Operational Amplifier Circuits, Application of OPAMPs, Linear Application of OPAMPs, OPAMP Filters.
(4 Hours)

MODULE – III (13 Hours)

6. **Conditional Circuits:** Introduction to Digital Electronics Circuits, K-maps and their Simplification, Adder, Subtractors, Digital Comparator Circuits, Parity Checkers/Generators, Multiplexers and Decoders, Demultiplexers/Decoders, Programmable Logic Arrays. (5 Hours)
7. **Sequential Circuits and Systems:** Introduction, Memory Cells and Flip-Flops, Resistors, Counters, Asynchronous Counters, State Diagrams, Memories, ROM and RAM, Digital to Analog and Analog to Digital Converters (DAC and ADC). (5 Hours)
8. **Multivibrators and Switching Regulators:** Multivibrators, Analog Multivibrators, 555 Timer, Power Supply and Regulators (3 Hours)

Text Books:

1. Electronics: Analog and Digital, I.J. Nagrath (Selected portions of Chapter 1, 3, 4, 5, 6, 7, 9, 10, 11), PHI Learning Pvt. Ltd., New Delhi.

Reference Books:

1. Millman's Electronic Devices and Circuits, 2nd Edition, J. Millman, C. Halkias, and S. Jit, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
2. Electronic Devices and Circuit Theory, 9th/10th Edition, R.L. Boylestad and L. Nashelsky, Pearson Education, New Delhi.
3. Digital Fundamentals, 5th Edition, T.L. Floyd and R.P. Jain, Pearson Education, New Delhi.
4. Fundamentals of Digital Circuits, 2nd Edition, A. Anand Kumar, PHI Learning Pvt. Ltd., New Delhi.

BECS2208 **Database Management System**

Module I : (10 hours)

Database System Architecture - Data Abstraction, Data Independence, Data Definitions and Data Manipulation Languages. Data models - Entity Relationship(ER), Mapping ER Model to Relational Model, Network .Relational and Object Oriented Data Models, Integrity Constraints and Data Manipulation Operations.

Module II : (12 hours)

Relation Query Languages, Relational Algebra and Relational Calculus, SQL.

Relational Database Design: Domain and Data dependency, Armstrong's Axioms, Normal Forms, Dependency Preservation, Lossless design.

Query Processing Strategy.

Module III: (10 hours)

Transaction processing: Recovery and Concurrency Control. Locking and Timestamp based Schedulers.
Database Recovery System: Types of Data Base failure & Types of Database Recovery, Recovery techniques

<u>Text Books:</u>
(1) Database System Concepts by Sudarshan, Korth (McGraw-Hill Education)
(2) Fundamentals of Database System By Elmasari & Navathe- Pearson Education
<u>References Books:</u>
(1) An introduction to Database System – Bipin Desai, Galgotia Publications
(2) Database System: concept, Design & Application by S.K.Singh (Pearson Education)
(3) Database management system by leon &leon (Vikas publishing House).
(4) Fundamentals of Database Management System – Gillenson, Wiley India
(5) Database Modeling and Design: Logical Design by Toby J. Teorey, Sam S. Lightstone, and Tom Nadeau, "", 4th Edition, 2005, Elsevier India Publications, New Delhi

BEEE2215 **Energy Conversion Techniques**

MODULE- I   (10 Hrs)

1. <u>DC GENERATORS</u>: Constructional features and operating principles, EMF equation, No Load Characteristics for Separately Excited DC Generator and DC Shunt Generator, Conditions for Self Excitation, Critical Resistance and Critical Speed, Losses and Efficiency.

2. <u>DC MOTORS</u>: Speed~Armature Current, Torque~Armature Current and Speed~Torque Characteristic for (i) Separately Excited DC Motor, (ii) DC Shunt Motor, (iii) DC Series Motor, Starting, Speed control and application of DC motor.

MODULE- II   (10 Hrs)

3. <u>SINGLE PHASE TRANSFORMERS</u>: Constructional Features, EMF Equation, Turns Ratio, Open Circuit Test and Short Circuit Test, Losses and Efficiency, Introduction to Three Phase Transformers: Three Single Phase Transformers Connected as a Bank of Three Phase Transformer.

4. <u>INDUCTION MOTORS</u>: (a) Three Phase Induction Motors: Constructional Features of Squirrel Cage Rotor type and Slip Ring/Wound Rotor type of Induction Motors, Principle of Operation, Concept of Slip, Slip~Torque Characteristics, Starting of Squirrel Cage Rotor type and Slip Ring/Wound Rotor type of Induction Motors, Speed Control of Induction Motors.

    (b) Introduction to Single Phase Induction Motors: Construction, Principle of Operation and Application.

MODULE- III   (10 Hrs)

5. <u>THREE PHASE SYNCHRONOUS GENERATORS</u>: Constructional Features, Principle of operation as Alternator, Synchronous reactance, Equivalent circuit of alternator, Power-Angle curve, Synchronization of alternators.

6. <u>THREE PHASE SYNCHRONOUS MOTORS</u>: Constructional Features, Principle of Operation, Torque Expression and Phasor Diagram for Synchronous Motor, Electrical Power and Mechanical Power, Starting and application of Synchronous Motor.

Text Book :

1.   Electric Machines – D P Kothari & I J Nagrath – Tata McGraw Hill.

Reference Book(s):

2.   The Performance and Design of DC Machines – A E Clayton.

3.   Theory and Performance of AC Machines – M G Say

4.   Electrical Machinery – P S Bimbhra – Khanna Publishers.

5.   Electrical Machines – P K Mukherjee and S Chakravorti – Dhanpat Rai Publications.

6.   Electric Machinery – Fitzgerald, Charles Kingsley Jr., S. D. Umans – Tata Mc Graw Hill.

7.   Electric Machinery And Transformers – Guru & Hiziroglu – Oxford University Press.
8.   Electric Machines – Charles Hubert – Pearson Education

PCCE7209 Material Testing Lab

Brick: (a) Shape and size test for brick
                (b) Water absorption test for brick
                (c) Compressive strength of brick

Cement: (a) Fineness of cement
                (b) Soundness of cement by Lechattelier test
                (c) Specific gravity of cement
                (d) Fineness of cement by air permeability
                (e) Standard consistency of a given sample by Vicat test
                (f) Initial and final setting time of cement
                (g) Fineness modulus of fine and coarse aggregate
                (h) Aggregate crushing value of coarse aggregate
                (i) Compressive strength of cement mortar
                (j) Tensile strength of cement mortar

Steel: (a) Compression test of cast iron
                (b) Rigidity modulus of cast iron
                (c) Fatigue test of steel (cyclic loading)
                (d) Tensile strength of steel

PCCE7210 Hydraulic Machines Lab

Group-I
1. Proof of Bernoulli's Theory
2. Friction Flow through Pipes
3. Determination of Reynold's Number.
4. Determination of Metacentric Height

Group-II
1. Determination of Coefficient of Discharge for V-notch
2. Determination of Coefficient of Discharge for Venturimeter
3. Impact of Jets
4. Flow through orifice

Gropup-III
1. Proof of Stoke's law
2. Work done by Pelton Wheel Turbine
3. Efficiency of Francis Turbine.
4. Discharge through Centrifugal Pump.

PCCE7205 **Survey Field Work**

1. Testing of chain measurement of correct length of the line
2. Traversing by chain survey
3. Traversing by compass survey
4. Intersection method of plane table survey
5. Traversing by plane table
6. Use of dumpy level and fly leveling
7. Longitudinal Section and Cross Section of Road
8. Contouring
9. Measurement of horizontal and vertical angle by theodolite
10. Traversing by the odolite