Branch-Civil Engineering

First Year Engineering

First Semester									
		Theory				**Practical**			
Code	Course Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation	Hours/ Week L/T	Credit Practical	Marks	
BS	Mathematics-I	3-1	4	100	50	-	-	-	
BS	Chemistry/ Physics	3-0	3	100	50	2	1	50	
ES	Basics of Electronics / Basic Electrical Engineering	3-0	3	100	50	2	1	50	
ES	Mechanics/ Thermodynamics	3-0	3	100	50				
ES	Programming in 'c"	3-0	3	100	50	2	2	50	
HS	English Communication Skill	3-0	2	100	50	2	1	50	
ES	Engineering Workshop/ Engineering Drawing					4	2	100	
Total		16	18	600	300	18	7	300	
Total Marks: 1200									
Total Credits: 25									

Second Semester									
		Theory				**Practical**			
Code	Course Name	Hours/ week L/T	Credit Theory	University marks	Internal Evaluation	Hours/ Week L/T	Credit Practical	Marks	
BS	Mathematics-II	3-1	4	100	50	-	-	-	
BS	Chemistry/ Physics	3-0	3	100	50	2	1	50	
ES	Basics of Electronics / Basic Electrical Engineering	3-0	3	100	50	2	1	50	
ES	Mechanics/ Thermodynamics	3-1	3	100	50				
ES	Data Structure Using 'C"	3-0	3	100	50	2	2	50	
HS	Business communication	3-0	2	100	50	2	1	50	
ES	Engineering Workshop/ Engineering Drawing					4	2	100	
MC	NSS/NCC	-	-	-	-				
Total		17	18	600	300	14	7	300	
Total Marks: 1200									
Total Credits: 25									

Second Year Engineering

Third Semester

Code	Course Name	Theory				Practical		
		Hours/ week L/T	Credit Theory	University Marks	Internal Evaluation	Hours/ Week L/T	Credit Practical	Marks
PC	Mechanics of Solid	3-1	4	100	50			
PC	Fluid Mechanics & Hydraulics Machines	3-0	3	100	50	2	1	50
PC	Survey	3-0	3	100	50	2	1	50
PC	Geotechnical Engineering	3-0	3	100	50	2	1	50
PC	Construction Technology	3-0	3	100	50			
HS	Engineering Economics/ Organizational Behavior	2-1	3	100	50			
PC	Building Drawing					2	1	50
Total		19	19	600	300	8	4	200
Total Marks: 1100								
Total Credits: 23								
For Honours and Minor Specialization	4	4	100	50				

Fourth Semester

Code	Course Name	Theory				Practical		
		Hours/ week L/T	Credit Theory	University Marks	Internal Evaluation	Hours/ Week L/T	Credit Practical	Marks
HS	Purely Applied Mathematics for Specific Branch of Engineering	3-0	3	100	50			
PC	Structural Analysis-I	3-0	3	100	50			
PC	Advanced Mechanics of Solids	3-0	3	100	50	2	1	50
PC	Highway & Traffic Engineering	3-0	3	100	50	2	1	50
PC	Design of Concrete Structure	3-0	3	100	50	2	1	50
HS	Engineering Economics/ Organizational Behavior	2-1	3	100	50			
PC	Material Testing Lab					2	1	50
	*Skill Project and Hands on					6	3	100
Total		18	18	600	300	14	7	300
Total Marks: 1200								
Total Credits: 25								
For Honours and Minor Specialization	4	4	100	50				

- *College should conduct at least one NSDC program under this category.

Third Year Engineering

		Theory				Practical		
Fifth Semester								
Code	Course Name	Hours/week L/T	Credit Theory	University Marks	Internal Evaluation	Hours/week L/T	Credit Practical	Marks
PC	Structural Analysis-II	3-0	3	100	50	2	1	50
PC	Design of Steel Structures	3-0	3	100	50	2	1	50
PC	Water Supply & Sanitary Engg.	3-0	3	100	50	2	1	50
PE	Water Resource Engg./ Ground Water Hydrology/Open Channel Flow	3-1	4	100	50			
OE		3-1	4	100	50			
PC	Advance Lab-I(Structural Engg. Lab /Advanced Geotechnical Engineering Lab)					8	4	200
Total		17	17	500	250	14	7	350
Total Marks: 1100								
Total Credits: 24								
For Honours and Minor Specialization	4	4	100	50				

Code	Course Name	Theory				Practical		
		Hours/week L/T	Credit Theory	University Marks	Internal Evaluation	Hours/week L/T	Credit Practical	Marks
PC	Foundation Engg.	3-0	3	100	50	2	1	50
PC	Irrigation Engg.	3-0	3	100	50	2	1	50
PE	Advanced Transportation Engg./ Pavement Design / Mass Transit System	3-1	4	100	50			
PE	Structural Dynamics/ FEM/Prestressed Concrete	3-1	4	100	50			
MC & GS	Environmental Science & Engineering	3-0	3	100	50			
OE	Industrial Lecture #					3	1	50
HS	Presentation Skill & Skill for Interview ##	2-0	1		50	4	2	100
MC	Yoga					2	1	50
Total		19	18	500	300	13	6	300
Total Marks: 1100								
Total Credits: 24								
For Honours and Minor Specialization	4	4	100	50				

Sixth Semester

To be conducted by the Training & Placement department by inviting experts from the industry. No academician to be called. Record may be asked by the University for verification. Evaluation to be done by the TPO.

To be conducted by the Training & Placement department of the College.

Final Year Engineering

Seventh Semester								
		Theory				Practical		
Code	Course Name	Hours/week L/T	Credit Theory	University Marks	Internal Evaluation	Hours/week L/T	Credit Practical	Marks
GS	Nano Science & Bio Technology	3-1	4	100	50			
PE	Architecture & Town planning / Ground improvement Technique/ Soil Dynamics & Machine Foundation	3-1	4	100	50			
PE	Environmental Impact Assessment/ Industrial Waste Management & Disposal / Quantity Surveying & Estimating	3-1	4	100	50			
OE	Soft Computing */ Other subjects	3-1	4	100	50			
PC	Advance Lab-II/ Project					8	4	200
	Projects on Internet of Things					8	4	200
Total		16	16	400	200	16	8	400
Total Marks: 1000								
Total Credits: 24								
For Honours and Minor Specialization		4	4	100	50			

*Student can choose from any department but subject must be running in that semester.

Eighth Semester						
Training cum Project					**Evaluation Scheme**	
Code	**Course Name**	**Hours/week L/T**	**Credit Theory**	**Total Marks**		**Marks**
	Industrial Training cum Project/ Entrepreneurship Training cum Project / Stratup Training cum Project	30	20	1000	Evaluation by the Industry / Training Organisation	500
					Evaluation by the Institute (Report & Institute Viva)	500
Total		30	20	1000		1000
Total Marks:1000						
Total Credits:20						

Note- Minimum Pass Mark from Industry Evaluation is 300 (i.e. 60%).

Distribution of Credit Semester wise:

Semester	Credit
First	25
Second	25
Third	23
Fourth	25
Fifth	24
Sixth	24
Seventh	24
Eighth	20

Total	190

Internal Evaluation Scheme

Attendance & Class Interaction	05
Assignment	05
Surprise Test	05
Quiz	05
Class Test I & II	30
Total	50
Class Test Time(Hrs.): 1	

Pass Mark in Internal is 50% of total marks i.e. 25

External Evaluation Scheme

University Semester Examination of 3 Hours duration.
Pass mark will be 35% which means students have to score 35 out of 100.

Practical/Sessional Evaluation Scheme

Pass mark will be 50% which means students have to score 25 out of 50.
Evaluation Scheme

Attendance & Daily Performance   -10
Lab Record   - 10
Lab Quiz   - 05
Final Experiments & Viva   – 25

               Total=50

All Lab examinations are to be completed one week before the end semester examination and marks are to be displayed on the college notice board.

**III-VII SEMESTER DETAILED SYLLABUS
OF
B.TECH. DEGREE PROGRAMME**

FOR

ADMISSION BATCH 2015-16

BRANCH-CIVIL ENGINEERING

Code	Course Name	Hours/ week L/T	Credit Theory	University Marks	Internal Evaluation	Hours/ Week L/T	Credit Practical	Marks
	Second Year Engineering							
	Third Semester							
	Theory					**Practical**		
PC	Mechanics of Solid	3-1	4	100	50			
PC	Fluid Mechanics & Hydraulics Machines	3-0	3	100	50	2	1	50
PC	Survey	3-0	3	100	50	2	1	50
PC	Geotechnical Engineering	3-0	3	100	50	2	1	50
PC	Construction Technology	3-0	3	100	50			
HS	Engineering Economics/ Organizational Behavior	2-1	3	100	50			
PC	Building Drawing					2	1	50
Total		19	19	600	300	8	4	200
Total Marks: 1100								
Total Credits: 23								
Honours	Concrete Technology / Construction Planning Management	4	4	100	50			
Minor	Mechanics of Solid							

Semester : 3rd

1.	PCI3D001 Honours(O2)	Concrete Technology	4-0-0	4
2.	PCI3D002 Honours(O2)	Construction Planning Management	4-0-0	4
3.	PEK3E001 HS(O1)	Engineering Economics	3-0-0	3
4.	POB3E002 HS(O1)	Organizational Behavior	3-0-0	3
5.	PCI3G001 Minor(CP)	Mechanics of Solid	4-0-0	4
6.	PCI3I001 PC(CP)	Mechanics of Solid	4-0-0	4
7.	PCI3I002 PC(CP)	Construction Technology	3-0-0	3
8.	PCI3I101 PC(CP)	Fluid Mechanics & Hydraulics Machines	3-0-1	4
9.	PCI3I102 PC(CP)	Survey	3-0-1	4
10.	PCI3I103 PC(CP)	Geotechnical Engineering	3-0-1	4
11.	PCI3I201 PC(CP)	Building Drawing	0-0-1	1

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PCI3I001   MECHANICS OF SOLID
Theory L/T (Hours per week): 3/1, Credit: 4

Module-I (12 classes)
Simple Stress and Strain -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.
Compound Stress and strain- 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, Two dimensional state of strain, Mohr's circle for strain, Principal strains and principal axes of strain, strain measurements, Calculation of principal stresses from principal strains.
Module-II (10 classes)
Shear Force and Bending Moment for Determinate Beams - Types of load and Types of support. Support reactions,Shear force and bending moment, Relationship between bending moment and shear force, Point of inflection, Shear Force and Bending Moment diagrams for determinate beams.
Module-III (10 classes)
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.
Deflection of Beams - Differential equation of the elastic line, Slope and deflection of beams by integration method and area - moment method.
Module-IV (8 classes)
Theory of Columns - Eccentric loading of a short strut, Long columns, Euler's column formula, Lateral buckling, Critical Load, Slenderness ratio

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.
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 R.Subramaniam, Oxford University Press*
4. *Strength of Material by S. S. Ratan, McGraw Hill*

REFERENCE BOOKS
1. *Mechanics of Materials by Beer and Johnston, McGraw Hill*
2. *Mechanics of Materials by R.C.Hibbeler, Pearson Education*
1. *3.Engineering Mechanics of Solids by Egor P. Popov, Prentice Hall of India*

PCI3I101   FLUID MECHANICS & HYDRAULICS MACHINES

Theory L/T (Hours per week): 3/0, Credit: 3

Module-I (12 classes)

Introduction - 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 pressure 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.

Module-II (10 classes)

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-III (8 classes)

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-IV (10 classes)

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 cavitationCentrifugal 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, P. N. Modi&S.M Seth, STANDARD BOOK HOUSE*
2. *A Text Book of Fluid Mechanics and Hydraulic Machines, R.K.Bansal, Laxmi Publications*

3. *Fluid Mechanics and Machinery, CSP Ojha and P.N. Chandramouli, Oxford University Press*
4. *Engineering Fluid Mechanics & Hydraulic Machines, K. C. Patra, Narosa Publishing House, Standard Book House*

REFERENCE BOOKS

1. *Fluid Mechanics , J. F. Douglas, J. M. Gasiorek, J. A. Swaffield, , Pearson Education,*
2. *Fluid Mechanics, F. M. White, McGraw-Hill*
3. *Fluid Mechanics Foundations and Application of Mechanics, C.S.Jog, Cambridge University Press*
4. *Fluid Mechanics and Fluid Machines, Som&Biswas, McGraw Hill*
5. *Problems in Fluid Mechanics, Subramanyam, McGraw Hill*

FLUID MECHANICS & HYDRAULICS MACHINES LAB

1. *Determination of Metacentric Height*
2. *Proof of Bernoulli's Theory*
3. *Determination of Coefficient of Discharge for V-notch*
4. *Determination of Coefficient of Discharge for Orifice meter*
5. *Determination of Coefficient of Discharge for Venturimeter*
6. *Determination of Reynold'sNumber*
7. *Friction Flow through Pipes*
8. *Determination of losses due to bends, fittings and elbows in pipes*
9. *Impact of Jets*
10. *Efficiency of Francis Turbine*
11. *Characteristics of Pelton wheel turbine*
12. *Discharge through Centrifugal Pump.*

PCI3I102   SURVEY
Theory L/T (Hours per week): 3/0, Credit: 3

Module I (10 classes)

Linear measurement and chain survey: Use of chains and tapes for 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

Module II (8 classes)

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, Automatic and Electronic or Digital levels

Module III (10 classes)

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

Module IV (8 classes)

Modern Surveying Instruments – Electromagnetic Spectrum, Radar, Electronic Distance Measurement, EDM Equipment, Corrections to measurement, Digital Theodolite, Total Stations, Introduction to Remote Sensing and GIS

Text Books

1. *Surveying   &Levelling.   Vol-I   by   T.P.Kanethar&S.V.Kulkarni,   Pune VidyarthiGrihaPrakashan*
2. *Surveying and Leveling by R. Subramanian, Oxford University Press*
3. *Surveying- Vol.I, by B.C. Punmia, Laxmi Publications*

Reference Books

1. *Surveying Vol-1 by R Agor, Khanna Publishers*
2. *A Textbook of Surveying, C. Venkatramaiah, Universities Press*
3. *Surveying AndLevelling, N.N. Basak, McGraw-Hill Education*
4.

SURVEY – I LAB

1. *Testing of chain and measurement of correct length of the line and chain traversing.*
2. *Traversing by Compass*
3. *Horizontal and vertical angle by theodolite*
4. *Traversing by theodolite*
5. *Use of dumpy level and automatic level for fly levelling.*
6. *Contouring*
7. *Measurement of distance, horizontal and vertical angle by Total Station*
8. *Contouring by Total Station*

PCI3I103   GEOTECHNICAL ENGINEERING
Theory L/T (Hours per week): 3/0, Credit: 3

Module-I (10classes)
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.

Module-II (10 classes)
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.
Soil Compaction: mechanism and principles, Standard and Modified Proctor Test, factors affecting compaction, effect of compaction on soil properties, field compaction techniques.

Module-III (10 classes)
Consolidation of soils: Consolidation and compaction, primary and secondary consolidation, Terzhaghi's theory of one dimensional consolidation, consolidation test, determination of coefficient of consolidation.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.

Module-IV (10 classes)
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.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.

TEXT BOOKS
1. *Principles of Geotechnical Engineering by Braja M. Das, Cengage Learning*
2. *Soil Mechanics and Foundation Engineering by B. C Punmia et al., Laxmi Publications Pvt Ltd*
3. *Soil Mechanics and Foundation Engineering, by K.R. Arora, Stanard Publishers*
4. *Soil Mechanics and Foundation Engineering by B.N.D. NarasingaRao, Wiley India Pvt. Ltd*

REFERENCE BOOKS
1. *Basic and applied soil mechanics, New Age International Publishers*
2. *Geotechnical Engineering by T.N. Ramamurthy & T.G. Sitharam,S. Chand & Co.*
3. *Geotechnical Engineering, S.K.Gulati and M. Datta, McGrow Hill*

GEOTECHNICAL ENGINEERING LAB

1. *Determination of specific gravity of soil grains*
2. *Determination of grain size distribution of soil*
   (a)Sieve test (b) Hydrometer/ pipette test
3. *Determination of Atterberg limits of soil*
   Liquid limit (b) plastic limit (c) shrinkage limit
4. *Measurement of soil compaction in the field*
   Core cutter method (b) Sand replacement method
5. *Determination of Density – Water content relationship of soil.*
   Proctor compaction test (ii) Modified Proctor compaction test (c) Use of Proctor penetration needle
6. *Determination of relative density of granular soil*
7. *Determination of shear strength parameters of soil*
   (a)Shear Box test (b) Tri-axial compression test (c) Unconfined compression test (d) Vane shear test
8. *Determination of consolidation characteristics of soil using fixed ring Oedometer*
9. *Determination of California Bearing Ratio (CBR) of soaked and un-soaked soil specimens*
10. *Determination of coefficient of permeability of soil*
    (a)Constant head permeameter (b) Falling head permeameter

PCI3I002   CONSTRUCTION TECHNOLOGY
Theory L/T (Hours per week): 3/0, Credit: 3

Module I(10 classes)

Introduction of various Civil Engineeringstructures, Functions of various components ofbuilding and other structures

Fundamentals of Construction Technology: Introduction, Construction activities, construction process, construction workers, construction estimating, construction estimate, construction schedule, productivity and mechanized construction, Quality and safety

Preparatory Work and Implementation: Site layout, Infrastructure development, construction methods, construction materials, deployment of construction equipment, prefabrication in construction, falsework and temporary work,

Module II (10 classes)

Earthwork: Introduction, Classification of soil, project site development, setting out, mechanized excavation, ground water control. Piling: classification of piles, pile driving methods, load test and quality control

Concrete and Concreting: Introduction, Important properties of concrete, Use of admixtures, formwork, shotcrete, lightweight and heavyweight concrete, ready-mix concrete, high performance concrete, self-compacting concrete, extreme weather concreting, prestressed concrete, under water concreting, curing of concrete, non-destructive testing of hardened concrete

Roof and roofing: Introduction, cast-in-situ reinforced concrete roofs, precast reinforced concrete roofs, roofs covered with sheets, water proofing over roofs

Finishing Work: Introduction, plastering, pointing, facing, glazing, flooring, painting,Construction joints-need and materialsused, Plumbing and electrification- various typesof fittings and laying procedure,

Module III (10 classes)

Mechanized Construction: Introduction, general consideration, plants for earthwork-tractor, bulldozer, ripper, scraper, face shovel, backhoe, dragline, clamshell etc., roller, plants for transportation, movement and handling- derrick, crane, hoist, concrete mixers and pumps, scaffoldingBuilding items: Plastering & pointing- its purpose,various types, construction procedures,advantages and disadvantages, suitabilityofeach, Damp proof course (DPC), Anti-termite measures and treatment, Construction joints-need and materialsused, Plumbing and electrification- various typesof fittings and laying procedure,

Module IV (6 classes)

Building Maintenance and Safety Measures: Purpose, need, importance, methods, Causes and types of defects in buildings, Preparation of report on maintenance work, Remedial measures and executionprocedure of any one type of buildingmaintenance work, Importance of various Laws / Norms / Regulations / Acts for safety, Precautions and precautionary Measures, Post-accident procedures.

Text Books

1. *Construction Technology, SubirSarkar and SubhajitSaraswati, Oxford University Press*
2. *Construction Planning and Management, U.K. Srivastava, Galgotia Publications Pvt Ltd*
3. *Construction Engineering and Man agent, S. Seetharaman, Umesh Publications*

Reference Books
1. *Concrete Technology, Santha Kumar, Oxford University Press*
2. *Construction Technology Analysis and Choice, Tony Bryan, Wiley*
3. *Building Construction, B.C.Punmia, Laxmi Publication*
4. *Building Construction, Sushil Kumar, Standard Publisher*
5. *Building Construction, Rangwala, Charotar Pub House*

PEK3E001   ENGINEERING ECONOMICS
Theory L/T (Hours per week):2/1, Credit: 3

Module I (12 hours)
Engineering Economics- Nature, Scope, Basic problems of an economy, Micro Economics and Macro Economics.

Demand- Meaning of demand, Demand function, Law of Demand and its exceptions, Determinants of demand, Elasticity of demand & its measurement (Simple numerical problems to be solved), Supply-Meaning of supply, Law of supply and its exception, Determinants of supply, Elasticity of supply, Determination of market equilibrium (Simple numerical problems to be solved).

Production-Production function, Laws of returns: Law of variable proportion, Law of returns to scale

Module II (12 hours)
Cost and revenue concepts, Basic understanding of different market structures, Determination of equilibrium price under perfect competition (Simple numerical problems to be solved), Break Even Analysis-linear approach (Simple numerical problems to be solved).

Banking -Commercial bank, Functions of commercial bank, Central bank, Functions of Central Bank.

Inflation-Meaning of inflation, types, causes, measures to control inflation.

National Income-Definition, Concepts of national income, Method of measuring national income.

Module III (12 hours)
Time value of money- Interest - Simple and compound, nominal and effective rate of interest, Cash flow diagrams, Principles of economic equivalence.

Evaluation of engineering projects-Present worth method, Future worth method, Annual worth method, Internal rate of return method, Cost benefit analysis for public projects .

Depreciation- Depreciation of capital assert, Causes of depreciation, Methods of calculating depreciation (Straight line method, Declining balance method), After tax comparison of project.

Text Books

1. *Riggs, Bedworth and Randhwa, "Engineering Economics", McGraw Hill Education India*
2. *Principles of Economics, Deviga Vengedasalam; Karunagaran Madhavan, Oxford University Press.*
3. *Engineering Economy by William G.Sullivan, Elin M.Wicks, C. Patric Koelling, Pearson*

4. *R.Paneer Seelvan, " Engineering Economics", PHI*
5. *Ahuja,H.L., "Principles of Micro Economics" , S.Chand & Company Ltd*
6. *Jhingan,M.L., "Macro Economic Theory"*
7. *Macro Economics by S.P.Gupta, TMH*

POB3E002   ORGANIZATIONAL BEHAVIOUR
Credit- 3   Class Hours - 40

Objectives:

1. To develop an understanding of the behavior of individuals and groups inside organizations
2. To enhance skills in understanding and appreciating individuals, interpersonal, and group process for increased effectiveness both within and outside of organizations.
3. To develop theoretical and practical insights and problem-solving capabilities for effectively managing the organizational processes.

Unit	Contents	Class Hours
01	**Fundamentals of OB**: Definition, scope and importance of OB, Relationship between OB and the individual, Evolution of OB, Theoretical framework (cognitive), behavioristic and social cognitive), Limitations of OB.	6
02	**Attitude:** Importance of attitude in an organization, Right Attitude, Components of attitude, Relationship between behavior and attitude, Developing Emotional intelligence at the workplace, Job attitude, Barriers to changing attitudes.	10
	Personality and values: Definition and importance of Personality for performance, The Myers-Briggs Type Indicator and The Big Five personality model, Significant personality traits suitable to the workplace (personality and job – fit theory), Personality Tests and their practical applications. **Perception:** Meaning and concept of perception, Factors influencing perception, Selective perception, Attribution theory, Perceptual process, Social perception (stereotyping and halo effect). **Motivation:** Definition & Concept of Motive & Motivation, The Content Theories of Motivation (Maslow's Need Hierarchy & Herzberg's Two Factor model Theory), The Process Theories (Vroom's expectancy Theory & Porter Lawler model), Contemporary Theories – Equity Theory of Work Motivation.	
04	**Organizational Culture** : Meaning & Definition of Organizational Culture, creating & Sustaining Organizational Culture, Types of Culture (Strong vs. Weak Culture, Soft Vs. Hard Culture & Formal vs. Informal Culture), Creating Positive Organizational Culture, Concept of Workplace Spirituality.	8
05	**Organizational Change:** Meaning, Definition & Nature of Organizational	7

Change, Types of Organizational Change, Forces that acts as stimulants to change.

Implementing Organizational Change : How to overcome the Resistance to Change, Approaches to managing Organizational Change, Kurt Lewin's-Three step model, Seven Stage model of Change & Kotter's Eight-Step plan for Implementing Change, Leading the Change Process, Facilitating Change, Dealing with Individual & Group Resistance, Intervention Strategies for Facilitating Organizational Change, Methods of Implementing Organizational Change, Developing a Learning Organization.

Reference Books

1. *Understanding Organizational Behaviour, Parek, Oxford*
2. *Organizational Behaviour, Robbins, Judge, Sanghi, Pearson.*
3. *Organizational Behaviour, K. Awathappa,HPH.*
4. *Organizational Behaviour, VSP Rao, Excel*
5. *Introduction to Organizational Behaviour, Moorhead, Griffin, Cengage.*
6. *Organizational Behaviour, Hitt, Miller, Colella, Wiley.*

BUILDING DRAWING LAB (0-0-2)

1. *The drawing is to be drawn using AutoCAD.*
2. *Plan, elevation, side view of residential/office building*
3. *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*
4. *Detailing of doors/windows*
5. *Drawing of several types of footing, bricks work, floor, staircases, masonry, arches and lintels*
6. *Types of steel roof trusses*
7. *Project on establishments like Bank building/ Post office/ Hostel/ Library/ Hospital/ Auditorium etc*

HONOURS SUBJECT

PCI3D001   CONCRETE TECHNOLOGY

Module I (10 classes)

Cement:Portland cement- chemical composition, Hydration, Setting of cement, Structure of hydrate cement, Test on physical properties, Different grades of cement.

Admixtures: Types of admixtures - mineral and chemical admixtures -properties - dosages - effects - usage.

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

Module II(8 classes)

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

Hardened concrete: Water Cement ratio , Abram's Law, Nature of strength of concrete, Maturity concept , Strength in tension & compression, Factors affecting strength, Relation between compression & tensile strength, Curing.

Module III(10classes)

Testing of hardened concrete:Compression tests, tension tests, factors affecting strength , flexure tests , splitting tests , pull-out rest, non-destructive testing methods - codal provisions for NDT.

Elasticity, creep & shrinkage : modulus of elasticity, dynamic modulus of elasticity, posisson's ratio, creep of concrete, factors influencing creep, relation between creep & time , nature of creep, effects of creep , shrinkage , types of shrinkage.

Module IV (8 classes)

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

Special concretes: Light weight aggregates - Light weight aggregate concrete - Cellular concrete - **No-fipes concrete** - High density concrete -Fibre reinforced concrete - Polymer concrete - Types of Polymer concrete - High performance concrete - Self compacting concrete.

Text Books

1. *Concrete Technology - Gambhir, M.L., , McGraw Hill*
2. *Properties of Concrete by A.M.Neville*
3. *Concrete Technology by M.S.Shetty. - S.Chand& Co.*
4. *Concrete Technology by Santakumar A.R, Oxford University Press*

CONSTRUCTION PLANNING AND MANAGEMENT

OBJECTIVES:
- ➢ To study and understand the concept of planning, scheduling, cost and quality control, safety during construction, organization and use of project information necessary for construction project.
- ➢ To learn the fundamental concepts of construction management principles in the field of construction engineering and management.

UNIT I
Basic Concepts in the Development of Construction Plans – Choice of Technology and Construction Method – Defining Work Tasks – Defining Precedence Relationships among Activities – Estimating Activity Durations – Estimating Resource Requirements for Work Activities – Coding Systems.

UNIT II
Scheduling procedures and techniques, cost control, monitoring and accounting, quality control and safety during construction, organization and use of project information.
Introduction to Construction Management - Project Organization – Construction Economics - Economic Decision Making - Time value of money - cash flow diagrams - Evaluation Alternatives - Effect of Inflation on cash flow - Evaluation of Public Projects.
Construction contract – contract document - classification of engineering contract - bidding process - CPWD contract conditions - FIDIC form contract agreement – subcontracting - earnest money deposit - security deposit - arbitration.

UNIT III
Basic concepts of resource management-class of labour - labour productivity - Classification construction equipment - selection of construction equipment - methods of calculating depreciation - replacement model - material management functions - inventory management -project cost management.

UNIT IV
Construction quality - inspection,quality control and quality assurance - total quality management - quality gurus and their teachings - cost of quality - ISO standards - conquas - audit - evaluation of safety - accident causation theories - foundation of a major injury - health and safety act and regulations - cost of 143 CE-Engg&Tech-SRM-2013 accidents - role of safety personnel - causes of accidents -principles of safety - safety and health management system.

OUTCOME:
- ➢ On completion of this course the students will know the development of construction planning, scheduling procedure and controls, and also managing a project.

REFERENCES:
1. Calin M. Popescu, Chotchai Charoenngam, Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications, Wiley, New York, 1995.
2. Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, McGrawHill Publishing Company, New Delhi, 1998.
3. Chris Hendrickson and Tung Au, Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall, Pittsburgh, 2000.
4. Halpin, D. W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, 1985.
5. Willis, E. M., Scheduling Construction Projects, John Wiley& Sons, 1986.

MINOR SUBJECT

PCI3G001   MECHANICS OF SOLID

Theory L/T (Hours per week): 3/1, Credit: 4

Module-I (12 classes)
Simple Stress and Strain -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.
Compound Stress and strain- 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, Two dimensional state of strain, Mohr's circle for strain, Principal strains and principal axes of strain, strain measurements, Calculation of principal stresses from principal strains.

Module-II (10 classes)
Shear Force and Bending Moment for Determinate Beams - Types of load and Types of support. Support reactions,Shear force and bending moment, Relationship between bending moment and shear force, Point of inflection, Shear Force and Bending Moment diagrams for determinate beams

Module-III (10 classes)
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.
Deflection of Beams - Differential equation of the elastic line, Slope and deflection of beams by integration method and area - moment method.

Module-IV (8 classes)
Theory of Columns - Eccentric loading of a short strut, Long columns, Euler's column formula, Lateral buckling, Critical Load, Slenderness ratio
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.

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 R.Subramaniam, Oxford University Press*
4. *Strength of Material by S. S. Ratan, McGraw Hill*

REFERENCE BOOKS

1. *Mechanics of Materials by Beer and Johnston, McGraw Hill*
2. *Mechanics of Materials by R.C.Hibbeler, Pearson Education*
2. *3.Engineering Mechanics of Solids by Egor P. Popov, Prentice Hall of India*

		Theory				Practical		
						Fourth Semester		
Code	Course Name	Hours/ week L/T	Credit Theory	University Marks	Internal Evaluation	Hours/ Week L/T	Credit Practical	Marks
HS	Applied Mathematics - III	3-0	3	100	50			
PC	Structural Analysis-I	3-0	3	100	50			
PC	Advanced Mechanics of Solids	3-0	3	100	50	2	1	50
PC	Highway & Traffic Engineering	3-0	3	100	50	2	1	50
PC	Design of Concrete Structure	3-0	3	100	50	2	1	50
HS	Engineering Economics/ Organizational Behaviour	2-1	3	100	50			
PC	Material Testing Lab					2	1	50
	*Skill Project and Hands on					6	3	100
Total		18	18	600	300	14	7	300
Total Marks: 1200								
Total Credits: 25								
Honours	Advance Surveying /Environmental Pollution and Management / Optimization in Civil Engineering	4	4	100	50			
Minor	Highway & Traffic Engineering							

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Semester: 4th

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 1.  PCI4D001 Honours(O2)  Advance Surveying                    4-0-0    4

 2.  PCI4D002 Honours(O2)  Environmental Pollution and Management  4-0-0    4

 3.  PCI4D003 Honours(O2)  Optimization in Civil Engineering     4-0-0    4

 4.  PCI4E001 HS(CP)       Purely Applied Mathematics for Specific  3-0-0    3

                           Branch of Engineering

 5.  PEK4E002 HS(O1)       Engineering Economics                3-0-0    3

 6.  POB4E003 HS(O1)       Organizational Behavior              3-0-0    3

 7.  PCI4G001 Minor(CP)    Highway  & Traffic Engineering        4-0-0    4

 8.  PCI4I001 PC(CP)       Structural Analysis - I              3-0-0    3

 9.  PCI4I101 PC(CP)       Advanced Mechanics of Solids         3-0-1    4

10.  PCI4I102 PC(CP)       Highway  & Traffic Engineering        3-0-1    4

11.  PCI4I103 PC(CP)       Design of Concrete Structures        3-0-1    4

12.  PCI4I201 PC(CP)       Material Testing Lab                 0-0-1    1

13.  PCI4I202 PC(CP)       Skill Project and Hands on           0-0-3    3

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PCI4E001 APPLIED MATHEMATICS - III

Module-I
Complex Analysis:
Analytic function, Cauchy-Riemann equations, Complex integration: Line integral in the complex plane, Cauchy's integral theorem, Cauchy's integral formula, Derivatives of analytic functions, Taylor's series, Maclaurin's series, Laurent's series, Singularities and zeros.

Module-II
Complex Analysis:
Residue integration method, evaluation of real integrals
Numerical Methods:
Errors of numerical results, error propagation,., Lagrange Interpolation, Newton divided difference interpolation, Newton's forward and backward interpolation, Spline interpolation.

Module-III
Numerical Methods:
Numerical integration: The trapezoidal rule, The Simpson's rules, Gauss Integration formulas.
Solution of ordinary differential equation: Euler's method, Improvement of Euler's method, Runge-Kutta methods, multi step methods, Methods for system and higher order ordinary differential equations.

Module-IV
Probability Theory and Its Applications: Probability, Random variables, Probability distributions, Mean and variance; Features of Probability Distribution: Binomial, Poisson, Uniform and Normal distribution, Distribution of several random variables.

Statistical Techniques and Its Applications: Scope of Statistics, Random sampling, Sampling Distribution,Correlation analysis, Regression Analysis,Fitting Straight Lines, Estimation of Parameters, Statistical Hypothesis.

Text books:
1. E. Kreyszig," Advanced Engineering Mathematics:,Tenth Edition, Wiley India
2. S.Pal and S.C. Bhunia, "Engineering Mathematics" Oxford University Press
3.Jay L. Devore, "Probability and Statistics for Engineering and Sciences", Seventh Edition, Thomson/CENGAGE Learning India Pvt. Ltd

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

PCI4I001 STRUCTURAL ANALYSIS-I (3-0-0)

Module I

Concept of determinate and indeterminate structures, determination of degree of static and kinematic indeterminacy in plane frame and continuous structures.

Methods of Analysis: Equilibrium equations, compatibility requirements, Introduction to force and displacement methods.

Analysis of propped cantilever by consistent deformation method, Analysis of fixed and continuous beams by Moment-Area method, Conjugate beam method and theorem of three moments.

Module II

Energy theorems and its application, 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.

Module III

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

Module IV

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

Text Books:

1. Theory and Problems in Structural Analysis by L Negi, Mc Graw Hill
2. Structural Analysis by T.S. Thandamoorthy, Oxford University Press
3. Basic Structural Analysis by C S Reddy, McGraw Hill

Reference Books:
1. Elementary Structural Analysis by Norris and Wilber, McGraw Hill
2. Structural Analysis by Aslam Kassimali, Cengage Learing
3. Structural Analysis by R.C. Hibbeler, Pearson Education

PCI4I101 ADVANCED MECHANICS OF SOLIDS (3-0-1)

Module I
Theories of failure: Maximum principal stress theory, maximum shear stress theory, maximum strain theory, total strain energy theory, maximum distortion theory, octahedral shear stress theory graphical representation and comparison of theories of failure.

Thick cylinders subjected to internal and external pressures, compound cylinders, computer application in analyzing stresses in thick cylinders.

Module II
Unsymmetrical bending: Properties of beam cross selection, slope of neutral axis, stresses and deflection in unsymmetrical bending, shear centre.

Curved Beam: Bending of beam with large initial curvature, Stress distribution in beam with rectangular, circular and trapezoidal cross section, stresses in crane hooks, ring and chain links.

Module III
Elementary concept of theory of elasticity, stresses in three dimensional, equations of equilibrium and compatibility, plane stress, computer analysis of two dimensional state of stress or strain at a point.

Module IV
Advanced topics in strength of materials: Repeated stresses and fatigue in metals, concept of stress Concentration, notch and stress concentration factors.
Experimental stress analysis: Resistance strain gauges, strain Rosettes, Two dimensional photoelastic methods of stress analysis, stress optic law, light and dark field in a polariscope, Isoclinic and Isochromatic fringe patterns, Computer Analysis of strain from strain rosette measurement.

Text Books:
1 Advanced Mechanics of Solids, L.S. Srinath, Mc Graw Hill.
2. Advanced Mechanics of Materials, Kumar & Ghai, Khanna Publisher.
3. Strength of Materials by R. Subramaniam, Oxford University Press
4. Strength of Material by S. S. Ratan, McGraw Hill

Reference Books:
1. Advanced Mechanics of Materials: Seely and Smith, John Willey, New York.
2. Mechanics of Materials by Gere & Timoshenko, CBS.

PCI4I102 HIGHWAY & TRAFFIC ENGINEERING (3-0-1)

Module-I
Modes of transportation, importance of highway transportation, history of road construction. Principle of highway planning, road development plans, highway alignments requirements, engineering surveys for highway location.

Geometric design- Design controls, highway cross section elements, cross slope or camber, road width, road margins, typical cross sections of roads, design speed, sight distance, design of horizontal and vertical alignments, horizontal and vertical curves.

Module-II
Highway Materials:- Properties of subgrade , sub-base , base course and surface course materials , test on subgrade soil, aggregates and bituminous materials.

Traffic Engineering:- definition , fundamentals of traffic flow , traffic management, prevention of road accidents , elements of transport planning , highway drainage

Module-III

Design of Highway Pavements: Flexible pavements and their design, review of old methods, CBR method, IRC:37-2012, equivalent single wheel load factor, rigid pavements, stress in rigid pavement, IRC design method (IRC:58-2011).

Module-IV
Highway Construction: Construction of various layers, earthwork, WBM, GSB, WMM, various types of bituminous layers, joints in rigid pavements, Hot Mix Plants, Construction of Rigid Pavements
Highway Maintenance: Various type of failures of flexible and rigid pavements.

Text Books:
1. Highway Engineering, by S.K.Khanna and CEG Justo, Nem Chand & Bros.
2. Transportation Engineering-Highway Engineering by C Venkatramaiah, Universities Press.
3. A course in Highway Engineering by Dr. S.P. Bindra, Dhanpat Rai Publications.

Reference Books:
1. Principles of Highway Engineering and Traffic Analysis by Mannering Fred L., Washburn Scott S. and Kilaresk Walter P., Wiley India Pvt. Ltd
2. Traffic Engineering and Transportation Planning by Kadiyali, L.R.,Khanna Publishers
3. Transportation Engineering and Planning by Papacostas, C.S. and Prevedouros, P.D.,Prentice Hall.

PCI4I103 DESIGN OF CONCRETE STRUCTURES (3-0-1)

Module I
Properties of concrete and reinforcing steel, philosophy, concept and methods of reinforced concrete design, introduction to limit state method, limit state of collapse and limit state of serviceability, application of limit state method to rectangular beams for flexure, shear, bond and torsion

Module II
Design of doubly reinforced beams, design of T and L beams, design of one way and two way slabs, design of staircases.

Module III
Design of short and long columns with axial and eccentric loadings, Design of isolated and combined column footings

Module IV
Retaining walls, various forces acting on retaining wall, stability requirement, design of cantilever and counterfort retaining walls,
Design of water tanks, design requirements, design of tanks on ground, under ground and elevated water tanks.

Text Books:
1. Design of Reinforced Concrete Structue by N. Subramanian, Oxford University Press
2. Limit State Design by A.K.Jain, Neemchand & Bros
3. Reinforced Concrete Design by S U Pillai & D. Menon, McGraw Hill

Reference Books:
1. Design of concrete structures by J.N.Bandyopadhyay, PHI
2. Limit State Design of Reinforced Concrete -P.C Verghese
3. Reinforced Concrete Design by S.N.Sinha, McGraw Hill
4. RCC Design-B.C.Punmia, A.K.Jain and A.K.Jain-Laxmi Publications

PCI4I201 MATERIAL TESTING LAB (0-0-1)

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) Tensile strength of steel

      (b) Compression test of cast iron

      (b) Rigidity modulus of cast iron

      (c) Fatigue test of steel (cyclic loading)

      (d) Strain measurement using strain gauge and strain rosette

PCI4D001 ADVANCED SURVEYING

Module-I
Tacheometry: General principles of stadia system, determination of tacheometric constants, analytic lens, fixed and movable hair methods, inclined sights with staff vertical, inclined sight with staff normal to the line of sight, tangential system, errors in tacheometer. **Curves:** Types of curves, elements of curve, different methods of setting out simple circular curves, compound curves, reverse curves, transition curves, types of transition curves, super elevation, vertical curves.

Module-II
Triangulation: Classification of triangulation system, operation in triangulation survey, reconnaissance, selection of site for base line, its measurement and extension, correction to base line measurement using EDM and Total station, selection of stations, triangulation figures, scaffolds and signals, marking of stations, inter visibility, strength of figures, reduction to centre.
Theory of Errors: Definitions, law of weight, probable errors, most probable value, distribution of error, normal equations, method of least square.

Module-III
Photogrammetric Surveying – Principle, Scale, Number of Photographs, Deduction of distance &height, Elements of Astronomical survey, Solution of problems dealing with celestial triangle.

Module-IV
Setting out of work: Laying out of buildings and sewer lines.
Remote Sensing & GIS-Principles of Remote Sensing & Geographic Information System, Application to Civil Engineering.

Text Books:
1. Surveying &Levelling. Vol-II by T.P.Kanethar&S.V.Kulkarni, Pune VidyarthiGrihaPrakashan
2. Surveying and Leveling by R. Subramanian, Oxford University Press
3. Surveying- Vol.II, by B.C. Punmia, Laxmi Publications
Reference Books:
1. Surveying Vol-1 by R Agor, Khanna Publishers
2. A Textbook of Surveying, C. Venkatramaiah, Universities Press
3. Surveying and Levelling, N.N. Basak, McGraw-Hill Education
4. Remote Sensing and GIS, Basudeb Bhatta, Oxford University Press

PCI4D002 ENVIRONMENTAL POLLUTION AND MANAGEMENT

Module-I

Man and environment, Their inter relationships. Types of environmental pollutants, their sources and effects.

Water Pollution and Control, water quality in surface water, BOD and COD, nitrification, eutrophication and its effects, bacterial contamination of water, toxins and heavy metals,

Ground water pollution, principal sources of ground water pollution

Marine pollution, toxic ocean pollutants, sewage disposal in ocean, cleanup of marine pollution

Module-II

Air pollution, Classification of air pollutants and their emission sources, air quality standards, transport and removal of air pollutants, indoor air pollution

Module-III

Noise pollution and control, Measurement of Noise Pollution, Assessment and measurement of sound, Sources of noise from automobiles and industrial operation and control measures

Module-IV

Industrial wastes and their treatment. Solid wastes, generation, collection, processing and disposal.

Environmental impact assessment and auditing. Introduction to Environmental standards, laws and policies. Global issues on environment, Waste minimization, Building environment services.

Text Books:

1.   Introduction to Environmental Science by Y Anjaneyulu, BS Publications.
2.   Environmental Engineering by G Kiely, McGraw Hill

Reference Books:

1. Environmental Studies from Crisis to Cure by R. Rajagopalan, Oxford University Press
2. Sewage Disposal and Air Pollution Engineering by S.K. Garg, Khanna Publication.
3. Principles of Environmental Science by Cunningham W.P. and Cunningham M.A. McGraw-Hill.
4. Basic Environmental Technology by J.A Nathanson, Prentice Hall of India, New Delhi.
5. Introduction to Environmental Engineering and Science by G.M. Masters and W.P Ela, Pearson Education.

PCI4D003 OPTIMIZATION IN CIVIL ENGINEERING

Module-I

Idea of Engineering optimization problems, Classification of optimization algorithms, Modeling of problems and principle of modeling. Linear programming: Formulation of LPP, Graphical solution, Simplex method, Big-M method, Revised simplex method, Duality theory and its application, Dual simplex method , Sensitivity analysis in linear programming.Transportation problems: Northwest Corner rule, Least Cost rule, Vogel's approximation method, Degeneracy, Optimality test. Stepping stone method. Assignment problems: Hungarian method.Integer Programming: Branch and Bound algorithm.

Module-II

Dynamic Programming: Sequential optimization; Representation of multistage decision process; Recursive equations – Forward and backward recursions; Computational procedure in dynamic programming (DP); Discrete versus continuous dynamic programming; Multiple state variables; Problem formulation and applications for Design of continuous beam, Optimal geometric layout of a truss, Water allocation as a sequential process, Capacity expansion, Reservoir operation etc.

Module-III

Non-linear programming,Unconstraint optimization, Fibonacci and Golden Section Search method. Constrained optimization with equality constraint: Lagrange multiplier, Projected gradient method, Constrained optimization with inequality constraint: Kuhn-Tucker conditions, Quadratic programming.

Module-IV

Introduction to Genetic algorithm (GA), Difference and similarities between GA and traditional methods.Basic operations of GA: reproduction, crossover, mutation and elitism. Applicationof Optimization techniques: Water resource planning management, Structural Optimization, Transportation planningand Management, Slope stability and optimal dimensioning of foundations multi-objective optimization models

Text Books

1. Introduction to Optimum Design, J. S. Arora, Elsevier, 2nd Edition, 2004.

2. Optimization for Engg. Design: Algorithms & Examples, K. Deb,Prentice Hall India, 2006.

Reference Books

1. Engineering Optimization: Theory & Practice, S. S. Rao, New Age International (P) Ltd, 3rd Edition, 1996, Reprint : June, 2008

2. Multi-Objective Optimization Using Evolutionary Algorithms, K. Deb, John Wiley, 2003

3.Operations Research, F.S.Hiller, G.J.Lieberman, Eighth Edition, McDraw Hill

4. Operations Research by Pravakar Pai, Oxford University Press.

PCI4G001 HIGHWAY & TRAFFIC ENGINEERING (3-0-1)

Module-I

Modes of transportation, importance of highway transportation, history of road construction. Principle of highway planning, road development plans, highway alignments requirements, engineering surveys for highway location.

Geometric design- Design controls, highway cross section elements, cross slope or camber, road width, road margins, typical cross sections of roads, design speed, sight distance, design of horizontal and vertical alignments, horizontal and vertical curves.

Module-II

Highway Materials:- Properties of subgrade , sub-base , base course and surface course materials , test on subgrade soil, aggregates and bituminous materials.

Traffic Engineering:- definition , fundamentals of traffic flow , traffic management, prevention of road accidents , elements of transport planning , highway drainage

Module-III

Design of Highway Pavements: Flexible pavements and their design, review of old methods, CBR method, IRC:37-2012, equivalent single wheel load factor, rigid pavements, stress in rigid pavement, IRC design method (IRC:58-2011).

Module-IV

Highway Construction: Construction of various layers, earthwork, WBM, GSB, WMM, various types of bituminous layers, joints in rigid pavements, Hot Mix Plants, Construction of Rigid Pavements
Highway Maintenance: Various type of failures of flexible and rigid pavements.

Text Books:
4. Highway Engineering, by S.K.Khanna and CEG Justo, Nem Chand & Bros.
5. Transportation Engineering-Highway Engineering by C Venkatramaiah, Universities Press.
6. A course in Highway Engineering by Dr. S.P. Bindra, Dhanpat Rai Publications.

Reference Books:
4. Principles of Highway Engineering and Traffic Analysis by Mannering Fred L., Washburn Scott S. and Kilaresk Walter P., Wiley India Pvt. Ltd
5. Traffic Engineering and Transportation Planning by Kadiyali, L.R.,Khanna Publishers
6. Transportation Engineering and Planning by Papacostas, C.S. and Prevedouros, P.D.,Prentice Hall.

		Theory				Practical		
		Fifth Semester						
Code	Course Name	Hours/week L/T	Credit Theory	University Marks	Internal Evaluation	Hours/week L/T	Credit Practical	Marks
PC	Structural Analysis-II	3-0	3	100	50	2	1	50
PC	Design of Steel Structures	3-0	3	100	50	2	1	50
PC	Water Supply & Sanitary Engg.	3-0	3	100	50	2	1	50
PE	Water Resource Engg./ Ground Water Hydrology/Open Channel Flow	3-1	4	100	50			
OE	Human Resources Management /Marketing Management/ C++ & Object Oriented Programming/ Internet & Web Technology	3-1	4	100	50			
PC	Advance Lab-I (Structural Engg. Lab /Advanced Geotechnical Engineering Lab)					8	4	200
Total		17	17	500	250	14	7	350
Total Marks: 1100								
Total Credits: 24								
Honours	GIS and Remote Sensing / Quantity Surveying & Estimating	4	4	100	50			
Minor	Water Supply & Sanitary Engineering							

Semester : 5th

1.	PCI5D001 Honours(O4)	GIS and Remote Sensing	4-0-0	4
2.	PCI5D002 Honours(O4)	Quantity Surveying & Estimating	4-0-0	4
3.	PCI5G001 Minor(CP)	Water Supply & Sanitary Engineering	4-0-0	4
4.	PCI5H001 OE(CP)		4-0-0	4
5.	PCI5I101 PC(CP)	Structural Analysis - II	3-0-1	4
6.	PCI5I102 PC(CP)	Design of Steel Structures	3-0-1	4
7.	PCI5I103 PC(CP)	Water Supply & Sanitary Engineering	3-0-1	4
8.	PCI5I201 PC(O1)	Advance Lab - I (Structural Engineering Lab)	0-0-4	4
9.	PCI5I202 PC(O1)	Advanced Geotechnical Engineering Lab	0-0-4	4
10.	PCI5J001 PE(O3)	Water Resource Engineering	4-0-0	4
11.	PCI5J002 PE(O3)	Ground Water Hydrology	4-0-0	4
12.	PCI5J003 PE(O3)	Open Channel Flow	4-0-0	4

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PCI5I101 STRUCTURAL ANALYSIS-II (3-0-1)

Module - I

Analysis of continuous beams and plane frames by slope deflection method and moment distribution method, analysis of continuous beam and simple portals by Kani's method

Module – II

Analysis of two hinged and fixed arches for dead and live loads, Suspension cables with two hinged stiffening girders

Module - III

Matrix methods of analysis: flexibility and stiffness methods; Application to simple trusses and beams

Module - IV

Plastic Analysis: Plastic modulus, shear factor, plastic moment of resistance, Load factor, Plastic analysis of continuous beam and simple rectangular portals, Application of upper bound and lower bound theorems

Text Books:

1. Structural analysis by C.S. Reddy Mc Graw Hill
2. Structural Analysis by T.S. Thandamoorthy, Oxford University Press
3. Structural analysis a matrix approach by Pandit & Gupta, Mc Graw Hill.
4. Limit Analysis of Structures: Monikaselvam, Dhanpat Ray Publication

Reference Books

1. Indeterminate Structures: J.S.Kinney
2. Indeterminate Structural Analysis: C.K.Wang ,Mc Graw Hill
3. Structural Analysis by D.S.Prakash Rao, Universities Press
4. Matrix Analysis of Structures by P.K.Singh, Cengage Learing

STRUCTURAL ANALYSIS II LAB

1. To verify strain in an externally loaded beam with the help of a strain gaugeindicator and to verify theoretically.

2. To study behavior of columns with different types of end conditions and find Euler's buckling load foreach case.

3. To find the value of flexural rigidity (EI) for a given beam and compare it with theoretical value.

4. To determine the deflection of a pin connected truss analytically & graphically and verify the same experimentally.

5. To verify Maxwell's reciprocal theorem.

6. To verify the moment area theorem regarding the slopes and deflections of the beam.

7. To determine the horizontal thrust in a threehinged arch for a given system of loadsexperimentally and verify the same withcalculated values.

8. To study two hinged arch for the horizontal displacement of the roller end fora given system of loading and to compare the same with those obtainedanalytically

9. To study the behavior of a portal frame under different end conditions.

10. To determine the moment required to produce a given rotation (rotational stiffness) at one end of the beamwhen the other end is pinned.

PCI5I102 DESIGN OF STEEL STRUCTURE (3-0-1)

Module I
Introduction, advantages/disadvantages of steel, structural steel, rolled steel section, various types of loads, design philosophy.
Limit state design method, limit states of strength and serviceability, probabilistic basis for design
Riveted, bolted and pinned connections,
Welded connections-assumptions, types, design of fillet welds, intermittent fillet weld, plug and slot weld, failure of welded joints, welded joints vs bolted and riveted joints

Module II
Tension members, types, net cross-sectional area, types of failure, slenderness ratio, design of tension members, gusset plate.
Compression members, effective length, slenderness ratio, types of cross-section, classification of cross-section, design of axially loaded compression members, lacing, battening, design of column bases, and foundation bolts.

Module III
Design of beams, types of c/s, lateral stability of beams, lateral torsional buckling, bending and shear strength, web buckling and web crippling, deflection, design procedure.

Module IV
Plate girders- various elements and design of components Eccentric and moment connections, roof trusses

Text Books:
1. Design of Steel Structures- Limit State Method by N. Subramanian, Oxford University Press
2. Limit State Design of Steel structures by S.K. Duggal, Mc-Graw Hill

Reference Books:
1. Design of steel structures by S.S.Bhavikatti, I.K. International Publishing house.
2. Design of Steel Structures by K. S. Sairam, Pearson
3. Steel Design by William T. Segui, Cengage Learning
4. Fundamentals of Structural Steel Design by M.L.Gambhir, Mc Graw Hill
5. Steel Structures-Design and Practice by N. Subramanian, Oxford University Press

DESIGN OF STEEL STRUCTURE LAB

1. Design and detailing of steel roof trusses/ industrial buildings
2. Design of columns(with lacing and battening) and column bases
3. Design of plate girders and gantry girder
4. Detailing of structural steel connections, seated and framed connections

PCI5I103 WATER SUPPLY AND SANITARY ENGINEERING (3-0-1)

Module – I

General requirement for water supply, sources, quality of water, intake, pumping and transportation of water. Physical, chemical and biological characteristics of water and their significance, water quality criteria, water borne diseases, natural purification of water sources.

Module – II

Engineered systems for water treatment : aeration, sedimentation, softening coagulation, filtration, adsorption, ion exchange, and disinfection. Design of water distribution system.

Module – III

Generation and collection of waste water, sanitary, storm and combined sewerage systems, quantities of sanitary waste and storm water, design of sewerage system

Primary, secondary and tertiary treatment of wastewater. Waste water disposal standards,

Module – IV

Basic of microbiology. Biological wastewater treatment system : Aerobic processes activated sludge process and its modifications, trickling filter, RBC, Anaerobic Processes conventional anaerobic digester, High rate and hybrid anaerobic reactors, Sludge digestion and handling, Disposal of effluent and sludge, Design problems on water distribution, sewerage, water treatment units, wastewater treatment units and sludge digestion.

Text Books:
1. Water Supply Engineering-Environmental Engineering v.1 by S.K.Garg, Khanna Publishers
2. Sewage Disposal and Air Pollution Engineering - Environmental Engineering v.2 by S.K.Garg, Khanna Publishers
3. Water Supply and Sanitary Engineering by B.S.Birdi Dhanpat Rai Publishing Company

Reference Books:
1. Water Supply Engineering by B. C. Punmia and A.K.Jain, Laxmi Publications
2. Water and Wastewater Technology by M.J.Hammer, PHI

WATER SUPPLY AND SANITARY ENGINEERING LAB

LIST OFEXPERIMENTS:

1. *Analysis of water Quality Parameter*

   a) Measurement of pH, Electrical conductivity
   b) Determination of Turbidity of water samples.
   c) Determination of Chlorides in water.
   d) Determination of Iron and Fluoride in water.
   e) Determination of Acidity and Alkalinity of water.
   f) Determination of Sulphate in water.
   g) Determination of Hardness of water.
   h) Determination of Residual Chlorine of water.
   i) Determination of Total Dissolved Solids.
   j) Determination of optimum coagulant dosage.
   k) Microbiological culture analysis of bacterial samples
   l) MPN Test
   .

2. *Analysis of Waste Water Characteristics*

   a) Determination of Total Solids, Settlable Solids, Dissolved Solids, Suspended Solids and Volatile Solids.
   b) Determination of Dissolved Oxygen, COD and BOD.
   c) Determination of Ammonia–nitrogen and Nitrates.

PCI5J001 WATER RESOURCE ENGINEERING (3-1-0)

Module-I
Precipitation, its Measurement and Analysis: Hydrologic cycle, catchment area and watershed, Rainfall and its characteristics, Rain gauges, Non-Recording and Recording type, Average rainfall over a catchment, Evapo-transpiration, Pan evaporation, Pan coefficient, Infiltration, W-Index and -Index.

Module-II
Discharge Measurement: Stream gauging, Flow rating curve, Use of current meters for velocity measurement, Dye-dilution method of discharge measurement, Estimation of discharge.

Module-III
Hydrograph: Characteristics of a Run off hydrograph, Unit hydrograph, S-hydrograph, Instantaneous Unit hydrograph, Synthetic Unit hydrograph, Duration Curve, Mass flow hydrograph.
Flood Control: Flood flows, Frequency studies, Statistical analysis for flood prediction, Method of flood control, Flood routing, Reservoir routing and Channel routing, River training works.

Module-IV
Open Channel Flow: Definition, Uniform flow, Chezy's Kutter's equation, Most economical section, specific energy, critical, subcritical, supercritical flow, Non-uniform flow, Gradual varied flow, Hydraulic jump,

Text Books:
1. Engg. Hydrology by K. Subramanian, McGraw-Hill
2. Hydrology and Water Resources Engineering by K. C. Patra, Narosa Publishing House, New Delhi

Reference Books:
1. Engineering Hydrology by C.S.P. Ojha, Oxford University Press
2. Hydrology by H.M. Raghunath, New age Int. Publication, New Delhi
3. Hydrology by P.J.R. Reddy, University Science Press, New Delhi

PCI5J002 GROUND WATER HYDROLOGY (3-1-0)

Module I

Hydrologic cycle, Water balance, Occurrence of ground water: Origin, geological formations as aquifers, type of aquifers, groundwater basins, springs. Darcy's Law, validity of Darcy's Law permeability, laboratory and field measurement of permeability, groundwater Flow lines. Steady flow to a well, steady radial flow to a well in confined aquifer and unconfined aquifer, Unsteady radial flow into a confined aquifer, Non equilibrium Theis equation, Theis method of solution, multiple well system.

Module II

Methods of constructions of deep and shallow wells: The percussion (or cable tool) method of drilling, Direct circulation hydraulic rotary method, Down the hole hammer method, well logs-receptivity logging, testing of wells for yield, Effect of irrigation, stream flow, rainfall on groundwater fluctuations, seasonal and secular variations, fluctuation due to miscellaneous causes.

Surface and Subsurface investigations of groundwater: Geophysical exploration, Electrical resistivity method, aerial photo interpretation, remote sensing applications to ground water exploration, test drilling, Artificial recharge by water spreading, through pits and shaft, recharge through other methods;

Module III

Ground water pollution: Municipal sources, liquid wastes from domestic uses, solid wastes, Industrial sources, tank and pipeline leakage, Mining activity, agricultural sources, septic tank and cesspools, saline water intrusion in coastal aquifers, methods to control saline water intrusion ;

Module IV

Groundwater management: Concepts of Basin management, Equation of hydrologic equilibrium, groundwater basin investigations, conjunctive use of surface and groundwater.

Reference Books:

1. Groundwater Hydrology, D. K. Todd, John Wiley and Sons.
2. Ground Water, H. M. Raghunath,.
3. Groundwater and Tube Wells, S. P. Garg, Oxford and IBH Publishing Co., New Delhi.

PCI5J003 OPEN CHANNEL FLOW (3-1-0)

Module I
Basic Fluid flow concepts: Classification of open channels, classification of flow, basic equations, velocity distribution, pressure distribution, energy and momentum coefficients.
Uniform flow in rigid boundary channels: Shear stress on the boundary, flow over scattered roughness elements, Chezy's equation, Manning's equation, effect of channel shape on resistance equation, section factor curves for rectangular and trapezoidal channels, flow in a circular channel, relation between conveyance and depth.

Module II
Uniform flow in mobile boundary channels: Incipient motion condition, regimes of flow, resistance to flow in alluvial streams. Design of channels: Rigid boundary channels, non-scouring erodible boundary channels, alluvial channels. Specific energy: Specific energy, specific force, critical depth computations, control section, application of specific energy and critical depth concepts.

Module III
Gradually varied flow: Types of non uniform flow, governing equations, characteristics of surface curves, classification of water surface profiles, sketching of water surface profiles, discharge from reservoir, profiles in compound channels, computation of gradually varied flow in prismatic channels, gradually varied flow in non prismatic channels.

Module IV
Rapidly varied flow: Application of conservation laws, channel transitions, supercritical flow past weirs, spillways, hydraulic jumps
Unsteady flow: Waves and their classification, celerity of a wave, surges, equation of motion, method of characteristics, dam break problem.

Text Books
1. Flow through open channels, Rajesh Srivastava, Oxford University Press
2. Flow through open channels - K. G. Ranga Raju

Reference Books:
1. Open channel flow - M. Hanif Chaudhry
2. Open Channel Hydraulics - V. T. Chow
3. Flow in open channels - K. Subramanya

HONOUR SUBJECT
PCI5D001 GIS AND REMOTE SENSING (4-0-0)

MODULE-I

Remote sensing- introduction, physics of remote sensing- electromagnetic radiations and their characteristics, thermal emissions, multi-concept in remote sensing, remote sensing satellites and their data products, sensors and orbital characteristics, spectral reflectance curves for earth surface features, methods of remotely sensed data interpretation- visual interpretation, concept of fcc, digital image processing- digital image and its characteristics, satellite data formats, image rectification and restoration, image enhancement- contrast manipulation, spatial feature manipulation, multi-image manipulation

MODULE-II

Fundamentals of GIS: introduction, definition of GIS, evolution of GIS, roots of GIS, definition, GIS architecture, models of GIS, framework for GIS, GIS categories, map as a model, spatial referencing system, map projections, commonly used map projections, grid systems, cartographic symbolization, types of maps, typography, map design, map productions, map applications,

MODULE-III

 data management, models and quality issues: conceptual models, geographical data models, data primitives, data types - raster and vector approach, digital terrain modeling , approaches to digital terrain data modeling , acquisition of digital terrain data, data modeling and spatial analysis, sources of geographical data, data collectors and providers, creating digital data sets, data presentation, data updating, data storage

MODULE-IV

GIS data processing, analysis and visualization: raster based GIS data processing, vector based GIS data processing, human computer interaction and GIS, visualization of geographic information, principles of cartographic design in GIS, generation of information product, image classification and GIS, visual image interpretation, types of pictorial data products, image interpretation strategy, image interpretation process,

Text Books:
1. Remote Sensing and GIS, Basudeb Bhatta, Oxford University Press
2. Remote Sensing And GIS, M.A. Reddy, B.S. Publication, Hyderabad

Reference Books:
1. Fundamental of Remote Sensing by G. Joseph, Universities Press
2. Introduction Of GIS, Kang-Tsung Chang, Mcgraw-Hill
3. GIS, N. Panigrahi, Universities Press

HONOUR SUBJECT
PCI5D002 QUANTITY SURVEYING AND ESTIMATING (4-0-0)

Module – I
Quality estimation:
Principles of estimation, methods and units, Estimation of materials in buildings, Culverts and bridges.

Module II
Principles of general and detailed specification for various types building works.
Analysis of rates, description, Prime cost, Schedule rates, Analysis of rates for various types of works. Estimate of R.C.C and Steel works, Scheduling, Slab, beam, column

Module – III
Estimation of Road – earthwork fully in banking, cutting,partly cutting & partly filling. Detailed estimate for WBM, Bituminous road.
Valuation, rent fixation, tenders, contracts, accounting procedure, measurement book, stores, cost & quality control ,PWD & CPWD practice, Software Applications for Estimation of Buildings.

Module – III
Network techniques, Introduction to CPM/ PERT methods and their use in project planning construction schedules for jobs, materials equipments, labour and finance.

Reference Books:
1. Estimating and Costing in Civil Engineering Theory & Practice, B.N. Dutta, UBS Publishers
2. PERT and CPM, L.S. Sreenath, East West Press
3. Civil engineering contracts and estimates by B.S. Patil, University Press.

MINOR SUBJECT

PCI5G001 WATER SUPPLY AND SANITARY ENGINEERING (3-0-1)

Module – I
General requirement for water supply, sources, quality of water, intake, pumping and transportation of water. Physical, chemical and biological characteristics of water and their significance, water quality criteria, water borne diseases, natural purification of water sources.

Module – II
Engineered systems for water treatment : aeration, sedimentation, softening coagulation, filtration, adsorption, ion exchange, and disinfection. Design of water distribution system.

Module – III
Generation and collection of waste water, sanitary, storm and combined sewerage systems, quantities of sanitary waste and storm water, design of sewerage system
Primary, secondary and tertiary treatment of wastewater. Waste water disposal standards,

Module – IV
Basic of microbiology. Biological wastewater treatment system : Aerobic processes activated sludge process and its modifications, trickling filter, RBC, Anaerobic Processes conventional anaerobic digester, High rate and hybrid anaerobic reactors, Sludge digestion and handling, Disposal of effluent and sludge, Design problems on water distribution, sewerage, water treatment units, wastewater treatment units and sludge digestion.

Text Books:
4. Water Supply Engineering-Environmental Engineering v.1 by S.K.Garg, Khanna Publishers
5. Sewage Disposal and Air Pollution Engineering - Environmental Engineering v.2 by S.K.Garg, Khanna Publishers
6. Water Supply and Sanitary Engineering by B.S.Birdi Dhanpat Rai Publishing Company

Reference Books:
3. Water Supply Engineering by B. C. Punmia and A.K.Jain, Laxmi Publications
4. Water and Wastewater Technology by M.J.Hammer, PHI

OTHER ELECTIVE

PME5H002 HUMAN RESOURCE MANAGEMENT

Module I:
Concept scope and objectives of HRM. Relationship between HRM and HRD. The challenges for HRM – Environmental, organizational and Individual. Role and functions of HR managers in the changing business scenario. Human Resources Planning – overview, Recruitment – concept, objectives, legal framework regulating recruitment in India, Selection – Objectives and methods, Test and interviews, Induction and orientation, validity and reliability of Tests and interviews.

Module II:
Career Planning – concept, objectives. Different stages of career and its implications, Methods of career planning and development, Promotion – types and process, Transfer – types. Separations including lay off and retrenchment. Performance Management – concept and objectives. Performance Appraisal – concept objectives and methods – management by objectives (MBO), Assessment centre, 360 degree feedback. Appraisal errors. Competency mapping – concept, objectives and the process.

Module III:
Compensation Management – objectives and principles. wage & salary. Wage concept – minimum wage, Fair wage, living wage. nominal wage and real wage. Components of wages, methods of wage determination, job evaluation – methods wage differentials and its functions. Training and Development – Training need Assessment, Types of Training Programs – on the job and off the job training programs, Evaluation of effectiveness of training programs.

Books Recommended
1. Personnel & HRM – P. subha Rao, Himalaya Publishing House.
2. HRM - Text and cases – Aswathappa, THM
3. Managing Human Resources – Gomez, Belkin &Cardy, PHI.   HRM – Snell, Bohlander, Vohra – Cengage Publication

PME5H002 MARKETING MANAGEMENT

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)
Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)
Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)
Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:
1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference
1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

PME5H004 C++ AND 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) "Object Oriented Programming with C++", David Parsons, Cengage Learning.

PME5H005 INTERNET AND WEB TECHNOLOGY

Module –I (Lecture Hour 12)
The Internet and WWW
Understanding the WWW and the Internet, Emergence of Web, Web Servers, Web Browsers, Protocols, Building Web Sites
HTML
Planning for designing Web pages, Model and structure for a Website, Developing Websites, Basic HTML using images links, Lists, Tables and Forms, Frames for designing a good interactive website

Module –II (Lecture Hour 12)
JAVA Script
Programming Fundamentals, Statements, Expressions, Operators, Popup Boxes, Control Statements, Try…. Catch Statement, Throw Statement, Objects of Javascript: Date object, array object, Boolean object, math object
CSS
External Style Sheets, Internal Style Sheets, Inline Style, The class selector, div & span tag
DOM
HTML DOM, inner HTML, Dynamic HTML (DHTML), DHTML form, XML DOM

Module –III (Lecture Hour 11)
CGI/PERL
Introduction to CGI, Testing & Debugging Perl CGI Script, Using Scalar variables and operators in Perl
Java Applet
Introduction to Java, Writing Java Applets, Life cycle of applet

Textbooks
1. Web Warrior Guide to Web Design Technologies, Don Gosselin, Joel Sklar& others, Cengage Learning

Reference Books
1. Web Programming: Building Internet Applications, Chris Bates, Wiley Dreamtech
2. Programming the World Wide Web, Robert W Sebesta, Pearson
3. Web Technologies, Uttam K Roy, Oxford
4. Web Technology: A developer perspective, Gopalan&Akilandeswari, PHI

ADVANCE LAB-I

ADVANCED GEOTECHNICAL ENGINEERING LAB

1. Demonstration of Augur Boring and Wash Boring
2. Demonstration of Methods of Soil Sampling, disturbed samples and undisturbed samples
3. In-situ Testing (i) Standard Penetration test (ii) Cone Penetration Test (iii) Vane Shear Test (iv) Pressure Meter Test (v) Plate Load Test (vi) Dilatometer Test
4. Cyclic Triaxial test
5. Free Swell and Swell Potential
6. Swelling Pressure Test

STRUCTURAL ENGINEERING LABORATORY

1. Fabrication, casting and testing of simply supported reinforced concrete beam for strength and deflection behaviour.
2. Testing of simply supported steel beam for strength and deflection behaviour.
3. Determination of in-situ strength and quality of concrete using
   i)   Rebound Hammer and
   ii)   Ultrasonic Pulse Velocity Tester.

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Semester : 6th
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 1.  PCI6D001 Honours(O3) Applications of Matrix Method in    4-0-0    4
                          Structural Analysis
 2.  PCI6D002 Honours(O3) Earthquake Engineering              4-0-0    4
 3.  PCI6D003 Honours(O3) Town Planning                       4-0-0    4
 4.  PCI6D004 Honours(O3) High rise Structures                4-0-0    4
 5.  PCI6E101 HS(CP)      Business Communication & Skill for  1-0-2    3
                          Interview
 6.  PCI6G001 Minor(CP)   Irrigation Engineering              4-0-0    4
 7.  PCI6H301 OE(CP)      Industrial Lecture  #               0-0-1    1
 8.  PCI6I101 PC(CP)      Foundation Engineering              3-0-1    4
 9.  PCI6I102 PC(CP)      Irrigation Engineering              3-0-1    4
10.  PCI6J001 PE(O1)      Advanced Transportation Engineering 4-0-0    4
11.  PCI6J002 PE(O1)      Pavement Design                     4-0-0    4
12.  PCI6J003 PE(O1)      Mass Transit System                 4-0-0    4
13.  PCI6J004 PE(O2)      Structural Dynamics                 4-0-0    4
14.  PCI6J005 PE(O2)      FEM                                 4-0-0    4
15.  PCI6J006 PE(O2)      Prestressed Concrete                4-0-0    4
16.  PCI6L101 ^SE(CP)                                         3-0-1    4
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6th Semester
Foundation Engineering (3-0-1)

Module:I

Lateral Earth Pressure and Retaining Structures: Concept of earth pressure, Earth pressure at rest, active and passive earth pressure for both cohesionless and cohesive soils, Earth pressure theories: Rankine's theory, Coumb's Wedge theory, Graphical methods: Rebhan's and Culmann's graphical solutions, Stability conditions for retaining walls.

Module: II

Bearing Capacity: Definitions, Rankine's analysis, Types of failures: General and local shear failure, Terzaghi's Analysis, Brinch-Hansen analysis, Meyerhof's analysis, Vesics's bearing capacity equation, Effect of water table on bearing capacity, IS code method for computing bearing capacity, Field Methods: Plate load test and its limitations, Standard penetration test.

Shallow Foundations: Types of foundations: Spread footing, combined and strap footing, mat or raft footing, Settlement of footings.

Module: III

Deep Foundations: Difference between shallow and deep foundations, Types of deep foundations. Pile Foundations: Types of piles, pile driving, load carrying capacity of piles-static and dynamic formulae, Pile load test and its limitations, correlation with penetration tests, Group action in piles-settlement and efficiency of pile groups in clay, negative skin friction, Under reamed pile foundation. Basics of well foundation - types, component parts and ideas about the forces acting on a well foundation.

Module: IV

Subsoil Exploration: Necessity and planning for subsoil exploration, Methods - direct (test pits and trenches), indirect (sounding, penetration tests and geophysical methods).

Soil sampling – types of samples, standard penetration test, static and dynamic cone penetration test, in-situ vane shear test, Rock coring, soil exploration report.

Rock Mechanics: Introduction, problems, defects in rock mass, joints, faults, folds, methods of geophysical prospecting, seismic and electrical method.

Text Books:
1. Principles of Foundation Engineering by B. M. Das, Cenage Learning
2. Foundation Analysis and Design by Joseph E. Bowles, Mc Graw Hill
3. Soil Mechanics And Foundation Engineering by K.R.Arora, STANDARD PUBLISHER DIST.

Reference Books:
1. Geotechnical Engineering by S. K. Gulati & Monoj Gupta, Mc Graw Hill
2. Soil Mechanics and Foundations by Dr B. C. Punmia et al., Laxmi Publications
3. Soil Mechanics & Foundation Engineering by B.N.D. Narasinga Rao, WILEY
4. Geotechnical Engineering by C. Venkatramiah, New Age International Publishers
5. Basic and Applied Soil Mechanics by Gopal Ranjan and A. S. R. Rao, New Age International Publishers

Irrigation Engineering (3-0-1)

MODULE-I

Introduction: Necessity of Irrigation in India, Advantages and disadvantages of Irrigation, Techniques of water distribution in firms, Quality of irrigation water.

Water requirements of Crops: Crops and crop season, Duty and Delta, Consumptive use, Irrigation requirements, Estimation of consumptive use of water by climatic approaches, Irrigation efficiencies, Soil moisture-irrigation relationship.

MODULE-II

Canal Irrigation: Classification of canals, Canal losses, Alignment of canals, Design of stable channels using Kennedy's and Lacey's theory, Garret's diagram, Cross section of irrigation canals

Lining of Irrigation Canals: Advantages and economics of lining, Various types of lining, Design of lined canals.

MODULE-III

Reclamation of Water Logged and Saline Soils: Causes and control of water logging. Reclamation of saline and alkaline land, Surface and Sub-surface drainage.

Types of Cross-Drainage Works: Types of CD works, Selection of a suitable type to suite a particular condition, Design consideration for CD works.

Diversion Head works: Weirs and Barrages, Types of weirs and barrages, Layout of a diversion head works, Introduction to different components of a diversion head works.

Design of weirs and barrages: Bligh's creep theory, Design of weir using Bligh's theory, Lane's weighted creep theory, Khosla's theory, Khosla's method of independent variables, Exit gradient.

Canal Falls: Necessity, Proper location, Types, Design and detailing of one type of fall.

MODULE-IV

Gravity Dams: Typical cross section, Various forces acting on gravity dam, Combination of forces for design, Modes of failure and criteria for structural stability, High and low gravity dam, Design of high dam, Typical section of low gravity dam.

Earth Dams: Types, Causes of failure, Preliminary section of an earth dam, Seepage control in earth dams

Spillways: Descriptive study of various types of spillways.

Text Books:

1. Irrigation Engineering and Hydraulic Structures by S. K. Garg, Khanna Publication, New Delhi
2. Irrigation Engg. By B.C. Punmia and Pande, Laxmi Publication, New Delhi

Reference Books:

1. Irrigation Engg. By Birdie and Das, Dhanpat Rai, New Delhi
2. Irrigation Engg. By Sharma and Sharma, S. Chanda and Company, New Delhi

Advanced Transportation Engineering (3-1-0)

MODULE-I

History of Indian railways, component parts of railway track, problems of multi gauge system, coning of wheels, alignments and survey, permanent way track components , Type of rail sections ,creep of rails, wear and failure in rails , Ballast requirements, sleeper requirements, types of sleepers, various train resistances

MODULE-II

Geometric design: Gradients and grade compensation, various speeds on a railway track, super-elevation, horizontal and vertical curves, Points and crossings, Design of simple turn-out, Signalling and interlocking,

MODULE-III

Airport site selection, Air craft characteristics, various surface of an airport, Wind rose diagram, Geometric elements of run way and taxiway , holding apron, parking configuration , terminal building , visual aids, air traffic control, airport marking and lighting.

MODULE-IV

Harbour Engineering: Classification of Harbour basin, general layout of harbours, Docks, Different components of docks.

Reference Books:

1. A text book of railway engineering , By S.C.Saxena and M.G.Arora
2. Railway Engineering by Satish Chandra & MM Agrawal, Oxford University Press.
3. Transportation Engineering, Volume-II- Railways, Airports, Docks and Harbours, Bridges and Tunnels by C. venkatramaih, Universities Press
4. Air-port Engineering by S.K.Khanna and M.G.Arora

Pavement Design (3-1-0)

Module – I

Introduction: Classification of pavements, Difference between highway and runway pavements, Factors affecting structural design, Characteristics of traffic loading, Concept of VDF and Computation of design traffic.

Module – II

Principles of pavement design: Concepts of structural and functional failures, Performance criteria; Analysis of pavements: ESWL, Analysis of flexible and concrete pavements.

Module – III

Design of pavements: IRC, AASHTO and other important methods of design of bituminous and concrete pavements.

Module – IV

Pavement evaluation techniques: Benkelman beam, Falling weight deflectometer and other equipments, Concepts of pavement maintenance management.

Reference Books:

1. Principles of Pavement Design, E. J. Yoder & M.W. Witzack, John Wiley
2. Pavement Design by R Srinivasa Kumar, Universities Press
3. Principles of Transportation Engineering, P. Chakroborty & A. Das, PHI Publication
4. Pavement Analysis and Design, Y. H. Huang, Prentice Hall

Mass Transit System
(Uploading Soon)
Structural Dynamics (3-1-0)

Module I:

Single degree of freedom system: Equation of motion, Damped and undamped free vibration, Response to harmonic, periodic, impulse load and general dynamic load, Duhamel's integral;

Module II:

Multi-degrees of freedom system: Equation of motion, Free vibration analysis, Dynamic response and modal analysis.

Module III:

Free and Forced vibration of distributed mass system: Longitudinal, flexural and torsional vibration of rods, transeverse vibration of beams. Raleigh's principle.

Module IV:

Analysis of structural response to Earthquakes: Seismological background, Deterministic analysis of Earthquake.

Reference Books:

1. Dynamics of Structures: Theory and Applications to Earthquake Engineering, A K Chropra , Prentice Hall of India
2. Theory of Vibration with application, W. T. Thomson.
3. Structural Dynamics, M Mukhopadhyay: Ane Books Pvt Ltd, New Delhi
4. Structural Dynamics - Theory and Computation, M. Paz, Van Nostrand, 1985.
5. Dynamics of structures, W. Clough and J Penzien, McGraw-Hill, Inc,

Finite Element Method (3-1-0)

Module I:
Introduction: The Continuum, Equations of Equilibrium, Boundary Conditions, Strain displacement relations, Stress strain Relations, Plane stress and plane Strain problems, Different methods of structural analysis including numerical methods. Basics of finite element method (FEM), different steps involved in FEM, Different approaches of FEM, Direct method, Energy approach, Weighted residual Method.

Module II:
One and Two Dimensional Problems: Detail formulation including shape functions. stress strain relations, strain displacement relations and derivation of stiffness matrices using energy approach, Assembling of element matrices, application of displacement boundary conditions, Numerical solution of one dimensional problems using bar, truss, beam elements and frames. Derivation of shape function using Lagrange's interpolation, Pascal's triangle, Convergence criteria.

Module III:
Finite Element modeling of two dimensional problems using Constant strain Triangle(CST) elements, Stress strain relations for isotropic and orthotropic materials, Four nodded rectangular elements, axisymmetric solids subjected to axisymmetric loading.
Isoparametric Elements: Natural coordinates, isoparametric elements, four node, eight node elements. Numerical integration, order of integration.

Module IV:
Plate Bending: Bending of plates, rectangular elements, triangular elements and quadrilateral elements, Concept of 3D modeling.

Text Books:
1. C. S. Krishnamoorthy, Finite Element analysis-Theory and Programming, TMH
2. Finite Element Method, R. Dhanraj and K. P. Nair, Oxford University Press
3. Finite Element Methods for Engineers by U.S. Dixit, Cegage Learning

Reference Books:
1. R. D. Cook., Concepts and Applications of Finite Element Analysis , Wiley.
2. M. Mukhopadhyay-Matrix and Finite Element Analysis of Structures
3. O. C Zienkiewicz .and R. L. Taylor, Finite Element Method, Mc Graw Hill
4. Introduction to Finite Elements in Engineering, T.P. Chandrupatla and A.D. Belegundu
5. Finite Element Analysis in Engineering Design, S. Rajasekharan.

Prestressed Concrete (3-1-0)

Module I

Prestressing system, materials and codes: Basic concept, Losses of prestress, analysis of prestress and bending stresses. Need for high strength steel and concrete. Advantages and applications. Pre-tensioning and post tensioning systems.

Module – II

Design of beams : Analysis and design of section for bending and shear, pressure line, concept of load balancing, cracking moment, bending of cables, limit state analysis and design, anchorage zone stresses, design of end block, Application to bridges.

Module –III

Selection of prestress concrete members, short term and long term deflections of uncracked members.

Module –IV

Flexural strength of prestresed concrete sections

Continuous beams, Design concept concordancy of cables, Secondary design consideration. Design pre-tensioned and post tensioned beam

Reference Books:

1. Prestressed Concrete, Raju,N.K., Tata McGraw Hill

2. Prestressed Concrete, T. Y. Lin

Application of Matrix Method in Structural Analysis (4-0-0)

Module I

Introduction to Flexibility Matrices and Stiffness Matrices, Static and kinematic indeterminacy - properties of stiffness and flexibility matrices, concept of co-ordinates,s olution of simple problems.

Module II

Analysis of Beams: Flexibility and stiffness matrices for beams, solution of problems, bending moment diagram

Analysis of Plane Truss: Flexibility and stiffness matrices for plane truss, solution of problems, internal forces due to thermal expansion, lack of fit.

Module III

Analysis of Plane Frame: Flexibility and stiffness matrices for plane frame, solution of problems, bending moment diagram.

Module IV

Use of Software Packages

Analysis of beam, plane truss & plane frame by STAAD-PRO.

Reference Books

1. Mukkopadhyay M and Sheikh A.H (2004) Matrix and Finite element analyses of structures, First edition, Ane Books Pvt. Ltd.

2. Pandit G.S., & Gupta S.P. (1998), Structural Analysis (A matrix approach), Tata McGraw Hill Publishing Ltd.

Earthquake Engineering (4-0-0)

Module I
Elements of Earthquake origin & Propagation: Elements of Seismology, Earthquakes, Structure of the Earth, History of the Earth, Earthquake Mechanism, Propagation of Seismic Waves , Earthquake Phenomena, Earthquake Measurements, Definitions of magnitude, intensity, epicenter etc; Plate tectonics, seismographs, liquefaction, Types, effects and controlling factors

Module II
Theory of Vibration Effects: Dynamic Loads. D'Alembert's Principle and inertia forces, Stiffness and flexibility of elastic structures, Theory of Vibrations, Free vibrations of single and multiple degree freedom systems, computations of dynamic response to time dependent forces, mass and stiffness matrices, natural frequencies, Plate Tectonics Theory.

Module III
Earthquake Resistant Design: Principles of Earthquake Resistant Design, Response spectrum theory. Time – Acceleration method, Application of response spectrum theory to seismic design of structures.

Module IV
Earthquake Damages: Earthquake Damages to Various Civil Engineering Structures, Case Histories Earthquake, Earthquake response of structures, Soft storey collapse, Slender structures, unsymmetrical structures

Methods of disaster prevention: Earthquake resistant building Regulations, specification, guidelines for construction – Materials selection.

Reference Books
1. A K. Chopra (2003), Dynamics of Structures-Theory and Applications to Earthquake Engineering, Second Edition, Printice-Hall India Pvt Ltd.
2. Pauley & Priestly (1995), Seismic design of reinforced concrete and masonry buildings, John Wiley & Sons.
3. Stratta.J.L. (2000), Manual of Seismic Design, Prentice-Hall India Pvt Ltd.
4. Kramer.S.L. (2000), Geotechnical Earthquake Engineering, Prentice-Hall India Pvt Ltd.
5. Agarwal & Shrinkhardo (2006), Earthquake Resistant design of a structures, Prentice-Hall India.
6. Earthquake Resistant Design of Structures, S.K.Duggal, Oxford University Press

Town Planning (4-0-0)

Module – I

Principles of architectural design –primary elements, form, space, organization, circulation, proportion and scale, ordering principles.

Functional planning of buildings: Planning, designing and construction, General building requirements, Permit and Inspection (as per the National building Code)

Module – II

Town Planning ; Evolution of towns : History and trends in town planning:-origin and growth, Historical development of town planning in ancient valley civilizations; Objects and necessary of town planning; Surveys and analysis of a town

Module – III

New Concepts in town planning : Garden city movement, Linear city and Satellite city concepts, Neighborhood Planning.

Module – IV

Planning Principles, Practice and Techniques: Elements of City plan, Estimating future needs, Planning standards, Zoning:- its definition, procedure and districts, height and bulk zoning, F.A.R., Master Plan; Concepts of urban planning , design and landscaping.

Reference Books:

1. B. Gallion and S. Eisner, The Urban Pattern: City planning and Design - C B S publishers.
2. D. K. Francis Ching, Architectures: Form, Space and Order, John Wiley.
3. S. Eisner, A. B. Gallion and S. Eisner, The Urban Pattern: City planning and Design, JohnWiley

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Semester : 7th
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 1.   PCI7C001 GS(CP)      Nano & Bioscience                     4-0-0      4

 2.   PCI7D001 Honours(O5) Water Resources System and Management 4-0-0      4

 3.   PCI7D002 Honours(O5) Advanced Design of Reinforced Concrete 4-0-0     4
                           Structures

 4.   PCI7D003 Honours(O5) Computational Fluid Dynamics          4-0-0      4

 5.   PCI7G001 Minor(CP)   Design of Concrete Structures         4-0-0      4

 6.   PCI7H001 OE(O4)      Soft Computing                        4-0-0      4

 7.   PCI7H002 OE(O4)      Other subjects                        4-0-0      4

 8.   PCI7H201 FE(CP)      Projects on Internet of Things        0-0-4      4

 9.   PCI7I201 PC(O3)      Advance Lab - II                      0-0-4      4

10.   PCI7I202 PC(O3)      Project                               0-0-4      4

11.   PCI7J001 PE(O1)      Architecture & Town planning          4-0-0      4

12.   PCI7J002 PE(O1)      Ground improvement Technique          4-0-0      4

13.   PCI7J003 PE(O1)      Soil Dynamics & Machine Foundation    4-0-0      4

14.   PCI7J004 PE(O2)      Environmental Impact Assessment       4-0-0      4

15.   PCI7J005 PE(O2)      Industrial Waste Management & Disposal 4-0-0     4

16.   PCI7J006 PE(O2)      Quantity Surveying & Estimating       4-0-0      4
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Semester : 8th
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 1.   PCI8I201 PC(O1)      Entrepreneurship Training cum Project 0-0-20     20

 2.   PCI8I202 PC(O1)      Startup Training cum Project           0-0-20     20

 3.   PCI8I301 PC(O1)      Industrial Training cum Project        0-0-20     20
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