

**SCHEME
OF
STUDIES & EXAMINATIONS**

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonapat)
SCHEME OF STUDIES & EXAMINATIONS
B. Tech. 1st Year (Semester - I) Civil Engineering - Weekend Programme
Credit Based Scheme w.e.f. 2010-11

S. No.	Course No.	Course Title	Teaching Schedule			Marks			Credits	Duration of Exam.
			L	P/D	Total	Class Work	Theory/ Practical	Total		
1	CE(W) - 101	Strength of Materials	3	0	3	50	100	150	4	3
2	CE(W) - 103	Surveying	3	0	3	50	100	150	4	3
3	MATH(W) -101	Math - III	3	0	3	50	100	150	5	3
4	ECE(W) - 102	Electronics Engineering	3	0	3	50	100	150	4	3
5	CE(W) - 105	Strength of Materials Lab	0	2	2	25	25	50	2	3
6	CE(W) - 107	Surveying Lab	0	2	2	25	25	50	2	3
7	ECE(W) - 104	Electronics Engineering Lab	0	2	2	25	25	50	2	3
	Grand Total		12	6	18	275	475	750	23	

Note: Students will be allowed to use Non-Programmable Scientific Calculator. However, sharing of calculator will not be permitted in the examination.

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonapat)
SCHEME OF STUDIES & EXAMINATIONS
B. Tech. 1st Year (Semester - II) Civil Engineering - Weekend Programme
Credit Based Scheme w.e.f. 2010-11

S. No	Course No.	Course Title	Teaching Schedule			Marks			Credits	Duration of Exam.
			L	P/D	Total	Class Work	Theory/ Practical	Total		
1	CE(W) - 102	Material Science and Engineering	3	0	3	50	100	150	4	3
2	CE(W) - 104	Engineering Geology	3	0	3	50	100	150	4	3
3	CE(W) - 106	Geomatic Engineering	3	0	3	50	100	150	4	3
4	HUM(W) - 101	Economics	3	0	3	50	100	150	4	3
5	CE(W) - 108	Material Science and Engineering Lab	0	2	2	25	25	50	2	3
6	CE(W) - 110	Engineering Geology Lab	0	2	2	25	25	50	2	3
7	CE(W) - 112	Geomatic Engineering Lab	0	2	2	25	25	50	2	3
8	GPCE (W) - 102	General Proficiency	-	-	-	50	0	50	2	-
	Grand Total		12	6	18	325	475	800	24	

Note:

Students will be allowed to use Non-Programmable Scientific Calculator. However, sharing of calculator will not be permitted in the examination.

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonapat)

SCHEME OF STUDIES & EXAMINATIONS

B. Tech. 2nd Year (Semester - III) Civil Engineering - Weekend Programme

Credit Based Scheme w.e.f. 2011-12

S. No.	Course No.	Course Title	Teaching Schedule			Marks			Credits	Duration of Exam.
			L	P/D	Total	Class Work	Theory/ Practical	Total		
1	CE(W) - 201	Fluid Mechanics	3	0	3	50	100	150	4	3
2	CE(W) - 203	Structural Analysis - I	3	0	3	50	100	150	4	3
3	CE(W) - 205	Geo-Mechanics	3	0	3	50	100	150	4	3
4	HUM(W) - 103	Fundamentals of Management	3	0	3	50	100	150	4	3
5	CE(W) - 207	Building Construction and Materials	2	2	4	50	100	150	4	3
6	CE(W) - 209	Fluid Mechanics Lab	0	2	2	25	25	50	2	3
7	CE(W) - 211	Structural Analysis - I Lab	0	2	2	25	25	50	2	3
9	CE(W) - 213	Geo-Mechanics Lab	0	2	2	25	25	50	2	3
	Grand Total		14	8	22	325	575	900	26	

Note:

Students will be allowed to use Non-Programmable Scientific Calculator. However, sharing of calculator will not be permitted in the examination.

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonapat)

SCHEME OF STUDIES & EXAMINATIONS

B. Tech. 2nd Year (Semester - IV) Civil Engineering - Weekend Programme

Credit Based Scheme w.e.f. 2011-12

S. No.	Course No.	Course Title	Teaching Schedule			Marks			Credits	Duration of Exam.
			L	P/D	Total	Class Work	Theory/ Practical	Total		
1	CE(W) - 202	Structural Analysis - II	3	0	3	50	100	150	4	3
2	CE(W) - 204	Reinforced Concrete Design -I	3	0	3	50	100	150	4	3
3	CE(W) - 206	Open Channel Flow	3	0	3	50	100	150	4	3
4	CE(W) - 208	Surface and Subsurface Hydrology	3	0	3	50	100	150	4	3
5	CE(W) - 210	Estimating and Costing	3	0	3	50	100	150	4	3
6	CE(W) - 212	Reinforced Concrete Design-I Lab	0	2	2	25	25	50	2	3
7	CE(W) - 214	Open Channel Flow Lab	0	2	2	25	25	50	2	3
8	GPCE (W) - 202	General Proficiency	-	-	-	50	0	50	2	-
	Grand Total		15	4	19	350	550	900	26	

Note: Students will be allowed to use Non-Programmable Scientific Calculator. However, sharing of calculator will not be permitted in the examination.

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonapat)

SCHEME OF STUDIES & EXAMINATIONS

B. Tech. 3rd Year (Semester - V) Civil Engineering - Weekend Programme

Credit Based Scheme w.e.f. 2012-13

S. No.	Course No.	Course Title	Teaching Schedule			Marks			Credits	Duration of Exam.
			L	P/D	Total	Class Work	Theory/Practical	Total		
1	CE(W) - 301	Design of Steel Structures - I	3	0	3	50	100	150	4	3
2	CE(W) - 303	Transportation Engineering - I	3	0	3	50	100	150	4	3
3	CE(W) - 305	Reinforced Concrete Design -II	3	0	3	50	100	150	4	3
4	CE(W) - 307	Foundation Engineering	3	0	3	50	100	150	4	3
5	CE(W) - 309	Transportation Engineering - I Lab	0	2	2	25	25	50	2	3
6	CE(W) - 311	Reinforced Concrete Design -II Lab	0	2	2	25	25	50	2	3
7	CE(W) - 313	Foundation Engineering Lab	0	2	2	25	25	50	2	3
	Grand Total		12	6	18	275	475	750	22	

Note: Students will be allowed to use Non-Programmable Scientific Calculator. However, sharing of calculator will not be permitted in the examination.

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonapat)

SCHEME OF STUDIES & EXAMINATIONS

B. Tech. 3rd Year (Semester - VI) Civil Engineering - Weekend Programme

Credit Based Scheme w.e.f. 2012-13

S. No.	Course No.	Course Title	Teaching Schedule			Marks			Credits	Duration of Exam.
			L	P/D	Total	Class Work	Theory/ Practical	Total		
1	CE(W) - 302	Environmental Engineering - I	3	0	3	50	100	150	4	3
2	CE(W) - 304	Design of Steel Structures - II	3	0	3	50	100	150	4	3
3	CE(W) - 306	Irrigation Engineering	3	0	3	50	100	150	4	3
4	CE(W) - 308	Transportation Engineering - II	3	0	3	50	100	150	4	3
5	CE(W) - 310	Environmental Engineering - I Lab	0	2	2	25	25	50	2	3
6	CE(W) - 312	Irrigation Engineering Lab	0	2	2	25	25	50	2	3
7	GPCE(W) - 302	General Proficiency	-	--	-	50	0	50	2	0
	Grand Total		12	4	16	300	450	750	22	

Note:

Students will be allowed to use Non-Programmable Scientific Calculator. However, sharing of calculator will not be permitted in the examination.

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonapat)

SCHEME OF STUDIES & EXAMINATIONS

B. Tech. 4th Year (Semester - VII) Civil Engineering - Weekend Programme

Credit Based Scheme w.e.f. 2013-14

S. No.	Course No.	Course Title	Teaching Schedule			Marks			Credits	Duration of Exam.
			L	P/D	Total	Class Work	Theory/ Practical	Total		
1	CE(W) - 401	Environmental Engineering - II	3	0	3	50	100	150	4	3
2	CE(W) - 403	System Design Techniques	3	0	3	50	100	150	4	3
3	CE(W) ---	Deptt. Elective - I*	3	0	3	50	100	150	4	3
4	---	Open Elective#	3	0	3	50	100	150	4	3
5	CE(W) - 405	Environmental Engineering - II Lab	0	2	2	25	25	50	2	3
6	CE(W) - 407	System Design Techniques Lab	0	2	2	25	25	50	2	3
7	CE(W) - 409	Project	0	1	1	50	-	100	4	3
8	CE(W) - 411	Colloquium	0	2	2	25	25	50	2	3
Grand Total			12	07	19	325	475	800	26	

*** List of Departmental Elective - I**

1	CE(W) - 451	Bridge Engineering	5	CE(W) - 459	Rock Mechanics
2	CE(W) - 453	Pre-stressed Concretes	6	CE(W) - 461	Industrial Waste Management
3	CE(W) - 455	Construction Methods and Equipments	7	CE(W) - 463	Ground Water Engineering
4	CE(W) - 457	Soil Exploration and Testing			

List of Open Elective

1	HUM(W)-451	Language Skills for Engineers	8	CSE(W)-409	Artificial Intelligence & Expert Systems
2	HUM(W)-453	Human Resource Management	9	CSE(W)-301	Principles of operating systems
3	HUM(W)-455	Entrepreneurship	10	EE(W)-455	Intelligent Instrumentation for Engineers
4	HUM(W)-457	Business Communication	11	ECE(W)-403	Embedded Systems Design
5	PHY(W)-451	Nano-technology	12	CH(W)-453	Pollution & Control
6	PHY(W)-453	Laser Technology	13	CSE(W)-411	Management Information System
7	ME(W)-451	Mechatronics Systems	14	CSE(W)-308	Multimedia Technologies

Note:

1. Students will be allowed to use Non-Programmable Scientific Calculator. However, sharing of calculator will not be permitted in the examination.
2. Students will be permitted to opt for any one open elective run by the other department and any one departmental elective. However, the department shall offer those electives for which they have expertise. The choice of the students for any elective shall not be binding for the department to offer, if the department does not have expertise.
3. Project coordinator will be assigned the project load of, maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her. Project will commence in 7th semester where the student will identify the project problem, complete design, procure the material, start the fabrication, complete the survey etc. depending upon the nature of problem. Project will continue in next semester.

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SCHEME OF STUDIES & EXAMINATIONS

B. Tech. 4th Year (Semester - VIII) Civil Engineering - Weekend Programme

Credit Based Scheme w.e.f. 2013-14

S. No.	Course No.	Course Title	Teaching Schedule			Marks			Credits	Duration of Exam.
			L	P/D	Total	Class Work	Theory/ Practical	Total		
1	CE(W) - 402	Elements of Earth Quake Engineering	3	0	3	50	100	150	4	3
2	CE(W) - 404	Project Planning and Management	3	0	3	50	100	150	4	3
3	MGT(W) - 402	Human Values, Ethics and IPR	3	0	3	50	100	150	4	3
4	CE(W) --	Departmental Elective - II*	3	0	3	50	100	150	4	3
5	CE(W) ---	Departmental Elective - III#	3	0	3	50	100	150	4	3
6	CE(W) - 407	Project	0	1	1	50	100	150	8	3
7	GFCE(W) - 402	General Fitness for Profession	0	2	2	-	100	100	4	3
Grand Total			15	3	18	300	700	1000	32	

*** List of Departmental Elective - II**

List of Departmental Elective - III

1	CE(W) 452	Docks and Harbour Engineering	1	CE(W) 482	Finite Element Methods
2	CE(W) 454	Road Safety and Environment	2	CE(W) 484	Rural water Supply and Sanitation
3	CE(W) 456	Construction Management	3	CE(W) 486	Disaster Management
4	CE(W) 458	Soil Dynamics	4	CE(W) 488	Waste Management
5	CE(W) 460	Ground Improvement	5	CE(W) 490	Mass Rapid Transport Systems
6	CE(W) 462	Energy Efficient Buildings	6	CE(W) 492	Water Resources Planning & Management
7	CE(W) 464	Water Power Engineering	7	CE(W) 494	Design of Masonry

Note:

1. Students will be allowed to use the non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.
2. Project coordinator will be assigned the project load of, maximum of 2 hrs. per week including his own guiding load of one hour. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her. Project involving design, fabrication, testing, computer simulation, case studies etc., which has been commenced by students in VII semester, will be completed in VIII Semester.
3. The evaluation of the student for his/her Personality Development & Professional Aptitude shall be carried out by a team consisting of Dean of faculty, Chairperson of the department and external examiner appointed by the University.

SYLLABUS

CE(W) - 101: STRENGTH OF MATERIALS

B. Tech. 1st Year (Semester – I)

L	T	P	Credits
3	1	--	4

Class Work	: 50 Marks
Examination	: 100Marks
Total	: 150 Marks
Duration of Examination	: 3 Hours

-
1. **Introduction:** Concept of Equilibrium General Equilibrium equations, concept of free body diagrams, types of supports, analysis of plane trusses.
 2. **Axial stress and strain:** Concept of stress and strain, generalized Hooke's law, Stress-strain diagram of ductile and brittle material, statically determinate and indeterminate problems, compound and composite bars, thermal stresses, Theories of elastic failure, graphical comparison of theories of failure.
 3. **Torsion of Circular shafts:** Basic assumptions, torsion formula, power transmitted by shafts, design of solid and Hollow shafts based on strength and stiffness.
 4. **Shear force and Bending moment diagrams:** Types of load on beam and frames, classification of beams, shear force and bending moment diagrams: simply supported, overhung and cantilever beams subjected to any combination of point loads, uniformly distributed and varying load and moment, relationship between load, shear force and bending moment.
 5. **Theory of pure bending:** Centroid of simple and built up section, second moment of area, derivation of flexural formula for straight beams, bending stress calculation for beams of simple and built up section, RCC beams.
 6. **Shear Stresses in Beams:** Shear stress formula for beams, shear stress distribution in beams.
 7. **Stability of Columns:** Crippling load of an axially loaded columns under different end conditions, Euler's and Rankine's formula.
 8. **Slope and Deflection of Beams:** Governing differential equation for deflection of straight beams having constant flexural rigidity, double integration and Macaulay's methods for slopes and deflection Analysis of Plane stress and Strains Transformation equations for plane stress and plane strain, Mohr's stress circle, Relation between elastic constants, strain measurements, strain rosettes.

Text Books:

1. Elementary Structural Analysis, Norris & Wilbur, McGraw Hill Publisher,
2. Basic Structural Analysis, C.S. Reddy, Tata McGraw Hill Publication.
3. Strength of Materials Part I, S Timosenko, affiliated East- West Press, New Delhi
4. Elementary Structural Analysis, A K Jain, Nem Chand & Bros.

Reference Books:

1. Strength of Materials by G H Ryder, ELBS publishers
2. Structural Analysis (A unified approach), D.S. Parkash Rao, University Press.
3. Theory of structures, Punmia and Jain, Luxmi Publications

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 103: SURVEYING
B. Tech. 1st Year (Semester - I)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- 1. Introduction to Surveying:** Definition, importance, classification of surveys, Principle, distorted or shrunk scales, precision in surveying. Surveying Equipments: chains, tapes, levels, compass, theodolites, tachometer, EDM, total stations and other instruments. Measurements of distance, angle and directions, Errors.
 - 2. Plane Table Surveying:** Introduction to plane table surveying, principle, instruments, working operations, setting up the plane table, centering, leveling, Orientation, methods of plane table survey, two and three point problems, danger circle, Lehmann's Rules, errors.
 - 3. Leveling:** definitions of terms used in leveling, different types of levels, parallax, staves, adjustments, bench marks, classification of leveling, booking and reducing the levels, rise and fall method, line of collimation method, errors in leveling, permanent adjustments, corrections to curvature and refraction, setting out grades, longitudinal leveling.
 - 4. Trigonometric Leveling:** Definitions & terms, curvature & refraction Methods: direct & reciprocal, eye and object correction, coefficient of refraction. **Tachometry:** Definitions and terms used in tachometry, angular tachometry with staff vertical and staff inclined, Analytic lens theory, Tachometric field work, tangential method of tachometry, subtense method of tachometry, direct reading tachometer, different types of staves.
 - 5. Contours:** Definition, representation of reliefs, horizontal equivalent, contour interval, characteristics of contours, methods of contouring, contour gradient, uses of contour maps.
 - 6. Theodolite Traversing:** types of theodolities, measurement of angles, temporary and permanent adjustments, closed & open traverse, omitted measurements, consecutive and independent co-ordinates, advantages and disadvantages of traversing closing error, Bowditch & Transit Rules.
 - 7. Triangulation:** Triangulation systems, classification, strength of figure, selection of triangulation stations, grade of triangulation, field work of triangulation, triangulation computations, Introduction to EDM, Total Station and its working, survey adjustment and treatment of observation, adjustment of triangulation figures by method of least squares.
 - 8. Curves:** Definition, elements of a simple curve, different methods of setting out a simple circular curve, elements of a compound curve, reverse curves, transition curves, their characteristics and setting out, vertical curves, setting out vertical curves, sight distances.

Text Books

1. Surveying by Prof. N. Singh, Tata McGraw Hill, New Delhi.
2. Surveying Vol. I & II by T.P. Kanetkar, Pune Vidhyarthi Griha Prakashan, Pune.

Reference Books:

1. Surveying Vol. I and II by B.C. Punmia, Luxmi Publications, New Delhi
2. Surveying by R. Agor, Khanna Publishers, New Delhi
3. A Text Book of Surveying by C.Venkataramiah, Universities Press, Hyderabad

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

MATH(W) - 101: MATHEMATICS - III

B. Tech. 1st Year (Semester - I)

L	T	P	Credits	Class Work	: 50 Marks
3	0	--	3	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

Part - A

Fourier Series and Fourier Transforms : Euler's formulae, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and cosine series.

Fourier integrals, Fourier transforms, Shifting theorem (both on time and frequency axes), Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem, Fourier transform of Dirac-delta function.

Part - B

Functions of Complex Variable : Definition, Exponential function, Trigonometric and Hyperbolic functions, Logarithmic functions. Limit and Continuity of a function, Differentiability and Analyticity.

Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations. Harmonic functions, application to flow problems. Integration of complex functions. Cauchy - Integral theorem and formula.

Power series, radius and circle of convergence, Taylor's Maclaurin's and Laurent's series. Zeros and singularities of complex functions, Residues. Evaluation of real integrals using residues (around unit and semi circle only).

Part - C

Probability Distributions and Hypothesis Testing : Conditional probability, Bayes theorem and its applications, expected value of a random variable. Properties and application of Binomial, Poisson and Normal distributions.

Testing of a hypothesis, tests of significance for large samples, Student's t-distribution (applications only), Chi-square test of goodness of fit.

Linear Programming : Linear programming problems formulation, Solving linear programming problems using (i) Graphical method (ii) Simplex method (iii) Dual simplex method.

Text Books:

1. Advanced Engg. Mathematics: F Kreyszig.
2. Higher Engg. Mathematics: B.S. Grewal.

Reference Books:

1. Advance Engg. Mathematics: R.K. Jain, S.R.K. Iyenger.
2. Advanced Engg. Mathematics: Michael D. Greenberg.
3. Operation Research: H.A. Taha.
4. Probability and statistics for Engineers: Johnson. PHI.

Note: Examiner will set eight questions, taking two from Part-A, three from Part-B and three from Part-C. Students will be required to attempt five question taking atleast one from each part.

ECE(W) - 102: ELECTRONICS ENGINEERING

B. Tech. 1st Year (Semester - I)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- UNIT - I:** **DIODES:** P-N junction, P-N junction as a rectifier, V-I characteristics, Breakdown diodes, Light emitting diodes, Load - Line concept, Clipping, Clamping, Rectifiers.
- UNIT - II:** **TRANSISTORS:** Operation and Characteristics of a Transistor, Common Emitter, Common Collector and Common Base Configurations of a transistor, Biasing Techniques, Transistor as an amplifier and oscillator.
- UNIT - III:** **OP-AMPS:** Basic Characteristics of an OP-AMP, Applications of OP-AMP (Inverter, Non-Inverter, Integrator, Differentiator, Logarithmic amplifier, Square wave generator).
- UNIT - IV:** **POWER AMPLIFIERS:** Class A, Class B and Class C Amplifiers.
- UNIT - V:** **STABILISED POWER SUPPLIES:** Regulated power supply, series voltage regulator, shunt voltage regulator.
- UNIT - VI:** **DIGITAL GATES:** Binary numbers, OR, AND, NAND, NOR, NOT, EX-OR Gates, their realization and Boolean algebra.

Text Books:

1. Integrated Electronics Milman & Halkias (MGH).

Reference Books:

1. Digital Electronics by R.P.Jain (MGH).
2. Microelectronics - Ramana (MGH).
3. Electronics Principles Malvino, TMH.

Note: Eight questions are to be set atleast one question from each unit and the students will have to attempt five questions in all.

CE(W) - 105: STRENGTH OF MATERIALS LAB

B. Tech. 1st Year (Semester – I)

L	T	P	Credits	Class Work	: 25 Marks
--	--	2	2	Examination	: 25 Marks
				Total	: 50 Marks
				Duration of Examination	: 3 Hours

List of Experiments:

1. To determine Rockwell hardness number of the specimen of steel/soft metal.
2. To determine Brinnel hardness number of the specimen of steel/soft metal.
3. To determine Vickers hardness number of the specimen of steel/soft metal.
4. To determine the modulus of rigidity of M.S./C.I. bar on torsion testing machine (destructive test).
5. To determine the modulus of rigidity of brass bar on torsion testing machine (non-destructive).
6. To determine the impact strength of M.S./C.I. specimen on Izod impact testing machine.
7. To determine the impact strength of M.S./C.I. specimen on Charpy impact testing machine.
8. To determine the young's modulus of the material of a beam simply supported at the ends and carrying a concentrated load at the center.
9. To determine the young's modulus of the M.S./Al strip on tensile testing machine.
10. To study the behavior of the material on Universal Testing machine.
11. To determine the young's modulus of the cantilever beam material using strain gauge test rig.

Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

CE(W) - 107: SURVEYING LAB

B. Tech. 1st Year (Semester - I)

L	T	P	Credits	Class Work	: 25 Marks
--	--	2	2	Examination	: 25 Marks
				Total	: 50 Marks
				Duration of Examination	: 3 Hours

List of Experiments

1. Unfolding / Opening and folding of chain / Measurement of distances / offsets.
2. Chain Survey of an area.
3. Leveling Exercises.
4. Measurement of vertical and horizontal angles with Theodolite.
5. Tachometric Survey
6. Tachometric Constants.
7. Plane table survey of an area.
8. Two point / three point problem.
9. Setting out a simple circular curve by different methods.
10. Setting out transition curve.
11. Measurement with Total Station.

Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

ECE(W) - 104: ELECTRONICS ENGINEERING LAB

B. Tech. 1st Year (Semester – I)

L	T	P	Credits	Class Work	: 25 Marks
--	--	2	2	Examination	: 25 Marks
				Total	: 50 Marks
				Duration of Examination	: 3 Hours

List of Experiments:

1. Study of V-I Characteristics of Diode.
2. Study of a Clipping and Clamping circuits.
3. Study of a Half wave rectifier.
4. Study of a Full wave rectifier.
5. Study and Analysis of a Transistor in Common Emitter Configuration.
6. Study of OP-AMP as Inverter and Comparator.
7. Study of OP-AMP as Differentiator.
8. Study of OP-AMP as Integrator.
9. Study of OP-AMP as Square wave generator.
10. Realization of Truth Tables of AND, OR, NOT Gates.
11. Realization of Truth Tables of NAND, NOR and EX-OR Gates.

Note: At least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the department as per the scope of the syllabus.

CE(W) - 102: MATERIAL SCIENCE AND ENGINEERING

B. Tech. 1st Year (Semester - II)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- Crystal structure and chemical bonding:** Materials and their classification, mechanical, chemical, electrical properties, Structure-property relationship in engineering materials, crystalline, non-crystalline materials, liquid crystals, quasi crystals Millar Indices, crystal planes and directions. Determination of crystal structure using X-rays, chemical Bonding in solids, primary & secondary bonds.
 - Crystal Imperfections and Diffusion:** Point defects, line defects, surface defects, movement of dislocation, dislocation energy, Laws of diffusion, Temperature dependence of diffusion coefficient, determination of activation energy.
 - Mechanical Properties of Materials:** Elastic, inelastic and visco-elastic behavior, plastic behavior of solids, critical shear stress, twinning and slipping phenomenon, super mechanical properties, Hardness, Creep, Fatigue and fracture, Wear properties.
 - Equilibrium Diagram:** Solids solutions and alloys, Gibbs phase rule, Different types of phase diagrams and their construction, lever arm rule. Application of phase diagram
 - Corrosion Process:** Corrosion, Cause of corrosion, types of corrosion, protection against corrosion.
 - Conducting and resister materials:** Conducting and resister materials, coefficient of thermal expansion, Matthiessen's and Nordheims rule for alloys and their engineering application, ionic, super ionic and superconducting materials, Semiconducting materials, element and compound semiconductors, their properties and applications. Purification of semiconductors by zone refining.
 - Magnetic and Dielectric Materials:** Magnetic materials, Soft and hard magnetic materials, their properties and applications, magnetic memories, Dielectric materials, polarization, dielectric loss and dielectric breakdown, non-linear dielectrics ferroelectric, piezoelectric and pyroelectric materials, their properties and applications.
 - Biomaterials & Modern Materials:** Biomaterials with reference to biopolymer and bio-ceramics, biodegradable polymers, Introduction and application to Nano-materials, smart materials, shape memory alloys, optical materials.

Text Book:

- Solid State Physics, A.J. Dekkar, Mac Millan Student Ed. , 1986.
- Introduction to Solid State Physics, S.O. Pillai,Wiley Eastern & Sons - 2005.
- Introductory Solid State Physics, H.P. Mayers, Viva Book Publishers, New Delhi-1998.
- Electronic Engineering Materials and Devices, J. Allison, Tata Mc Graw Hill, 1985,

Reference Books:

- Materials Science, J.C. Anderson & KDB Lever, ELBS fifth Edn., 2004.
- Modern Materials Science, J. Granct, Printice Hall, 1980.
- Electrical Engineering Materials, A. J. Dekker, Prentice Hall, 1983.
- Physical Properties of Materials, M.C. Lovell etal, ELBS, 1984.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 104: ENGINEERING GEOLOGY

B. Tech. 1st Year (Semester - II)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- 1. Introduction:** Divisions of Geology, Importance of Engineering Geology, Geology applied to civil engineering practices.
 - 2. Weathering:** Agents and effects, Geological works of rivers, wind, glaciers and oceans as agents of erosion, transportation and deposition, resulting features and engineering importance.
 - 3. Rocks and Minerals:** Igneous, sedimentary and metamorphic rocks, their formation and structures.
Classification of rocks for engineering purposes, Rock Quality Designation (RQD). Structural Geology: Stratification, dip and strike, Identification and physical properties of minerals.
 - 4. Unconformities - Folds, Faults and Joints:** Causes and types of unconformities, Folds: Definition, parts of a fold, classification, causes, relation to engineering operations. Faults: Definition, parts of a fault, classification, causes, relation to engineering purposes. Joints: Definition, attitude, joint set, joint systems, classification, relation to engineering operations.
 - 5. Geological considerations in the Engineering projects:** Tunnels, highways, foundations, dams, reservoirs. Under ground water in engineering Projects, aquifers, aquicludes, artesian wells.
 - 6. Methods of geological explorations:** gravity, electrical and seismic methods, remote sensing techniques, Geology of India. Introduction to GIS, components, database structure,, software packages.
 - 7. Earthquakes:** Definition, terminology, causes, earthquake waves, intensity, recording of earthquakes, seismic zones in India, factors to be considered and methods in earthquake proof construction.
 - 8. Earth movements:** Landslides and land subsidence, elementary idea about classification, factors causing landslides and land subsidence. Preventive measures for landslides viz retaining walls, slope treatment, chemical stabilization and drainage control.

Note: The subject will be treated with special reference to Indian Conditions. A conducted / guided tour through representative geological formations will be planned as a compulsory part of the course covering Stratigraphical, Structural and Petrological aspects.

Text Books:

1. Engineering Geology by Parbin Singh, Kataria and Sons, Ludhiana/Delhi.
2. Geology for Engineers by D.S. Arora, Mohindra Capital Publishers, Chandigarh.
3. Introduction to Rock Mechanics by Richard E. Goodman, John Wiley and Sons, New York.

Reference Books:

1. Geology for Civil Engineers by Mcleans & Gribble; E & F Spon, London, U.K.
2. Engineering Geology by Richard E. Goodman, John Wiley and Sons, USA.
3. Engineering Behaviour of Rocks by I.W. Farmer; E & F Spon, London, U.K.
4. Rock Mechanics and Engineering by C.Jeager, Cambridge Univ. Press, London, UK
5. Fundamentals of Rock Mechanics by Jaeger and Cook, Metheun, London, U.K.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 106: GEOMATIC ENGINEERING

B. Tech. 1st Year (Semester - II)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- 1. Photogrammetry:** aerial and terrestrial, applications, types and geometry of aerial photograph, flying height and scale, relief displacement, **Stereoscopy**, photogrammetric mapping.
 - 2. Sources of Energy** - Active and Passive radiation - Electromagnetic Radiation - Nomenclature, Reflectance, Transmission and Absorption, Thermal Emission - Plank's formula, Stefan - Boltzman Law, Wein's Displacement Law; Emissivity - Kirchoff's Law, Characteristics of Solary Radiant Energy.
 - 3. Interaction of EMR with Atmosphere** - Scattering, Refraction, Absorption, Transmission. Atmospheric Windows.
 - 4. Interaction of EMR with Earth Surface** - Spectral Reflectance Curves. Radiation Calculation. Multi concept remote sensing. Idealised and Real sequence of remote sensing.
 - 5. Sensors and Platforms:** Orbital characteristics. Working Principles and Instrumentation. Storage and Retrieval of data. IRS and ERS satellite systems - Introduction, Stages of development, Sensory Characteristics, Orbit and Coverage's, Various types of data product and its uses.
 - 6. Data Processing:** Initial data statistics. Pre-processing - Atmospheric, Radiometric and Geometric corrections.
 - 7. Data analysis:** Image Interpretation Elements, Keys and Aids. Basic Instrumentation. Visual analysis of data in Application of remote sensing to various engineering fields.
 - 8. Introduction to GIS, GPS surveys:** Digital elevation model, application to various projects, Methods of plotting, errors

Text Books:

1. Remote Sensing and Image Interpretation, by Lillisand, T.M. & Kiefer R.W., John Wiley and Sons.
2. Introduction to Remote Sensing, by Campbell, J.B. Taylor and Francis.
3. Principles of Geographic information systems, Burrough, P.A and MacDonnel, R.a , Oxford University press

Reference Books:

1. Digital Remote Sensing, by Nag. P. & Kudrat, M. Concept Publication Company.
2. Remote Sensing and Photogrammetry - Principles and Applications, by Jhanwar, M.L. and Chouhan, T.S. Vigyan Prakashan, Jodhpur.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

HUM(W) - 101: ECONOMICS

B. Tech. 1st Year (Semester - II)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

COURSE OBJECTIVE: The purpose of this course is to:

1. Acquaint the student in the basic economic concepts and their operational significance and
2. Stimulate him to think systematically and objectively about contemporary economic problems.

UNIT-I: Definition of Economics - various definitions, Nature of Economic problem, Production possibility curve Economic laws and their nature. Relation between Science, Engineering, Technology and Economics.

UNIT-II: Concepts and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility - its practical application and importance.

UNIT-III: Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve, Elasticity of demand, measurement of elasticity of demand, factors effecting elasticity of demand, practical importance & applications of the concept of elasticity of demand.

UNIT-IV: Meaning of production and factors of production; Law of variable proportions, Returns to scale, Internal and External economics and diseconomies of scale.

Various concepts of cost - Fixed cost, variable cost, average cost, marginal cost, money cost, real cost opportunity cost. Shape of average cost, marginal cost, total cost etc. in short run and long run.

UNIT-V: Meaning of Market, Types of Market - Perfect Competition, Monopoly, Oligopoly, Monopolistic Competition (Main features of these markets)

Supply and Law of Supply, Role of Demand & Supply in Price Determination and effect of changes in demand and supply on prices.

UNIT-VI: Nature and characteristics of Indian economy (brief and elementary introduction), Privatization - meaning, merits and demerits. Globalisation of Indian economy - merits and demerits. Elementary Concepts of VAT, WTO, GATT & TRIPS agreement.

Text Books:

1. Principles of Economics : P.N. Chopra (Kalyani Publishers).
2. Modern Economic Theory - K.K. Dewett (S.Chand)

Reference Books:

1. A Text Book of Economic Theory Stonier and Hague (Longman's Landon)
2. Micro Economic Theory - M.L. Jhingan (S.Chand)
3. Micro Economic Theory - H.L. Ahuja (S.Chand)
4. Modern Micro Economics: S.K. Mishra (Pragati Publications)
5. Economic Theory - A.B.N. Kulkarni & A.B. Kalkundrikar (R.Chand & Co.)
6. Indian Economy: Rudar Dutt & K.P.M. Sundhram

Note: Eight questions are to be set atleast one question from each unit and the students will have to attempt five questions in all.

CE(W) - 108: MATERIAL SCIENCE AND ENGINEERING LAB

B. Tech. 1st Year (Semester - II)

L	T	P	Credits	Class Work	: 25 Marks
--	--	2	2	Examination	: 25 Marks
				Total	: 50 Marks
				Duration of Examination	: 3 Hours

List of Experiments:

1. To determine Curie temperature of a ferrite sample and to study temperature dependence of permeability in the vicinity of Curie temperature.
2. To study cooling curve of a binary alloy.
3. Determination of the Young's modulus and ultimate strength of a given fiber strand.
4. To determine the dielectric constant of PCB laminate.
5. Detection of Flaws using ultrasonic Flaw Detector (UFD).
6. To study the intensity response of L.D.R and voltage response of a V.D.R.
7. To prepare two metallic specimens for metallographic examination and measure their grain size.
8. Estimation of Band-Gap energy of Germanium.
9. To determine the light intensity response of a Silicon Solar Cell.
10. To determine the resistivity of a given sample using four probe method.
11. To determine Fiber and void fraction of a glass fiber reinforced composite specimen.
12. To investigate creep of a given wire at room temperature.
13. To estimate the Hall coefficient, carrier concentration and their mobility in GE Crystal using Hall Effect.
14. To estimate the Band-gap of energy of GE Crystal Using Four Probe Technique.
15. To Study the Corrosion behavior of metallic materials.

Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

CE(W) - 110: ENGINEERING GEOLOGY LAB

B. Tech. 1st Year (Semester - II)

L	T	P	Credits	Class Work	: 25 Marks
--	--	2	2	Examination	: 25 Marks
				Total	: 50 Marks
				Duration of Examination	: 3 Hours

List of Experiments:

1. Study of minerals-hand specimens.
2. Study of rocks-hand specimens.
3. Field description of rocks for engineering practices.
4. Study of elements of symmetry and Crystal systems with crystal models.
5. Study of Geological Maps.
6. Dip and strike problems.
7. Study of optical properties of minerals.

Note: All experiments are to be performed in the Semester however some more experiments may also be performed as designed & set by the concerned Institution as per the scope of the syllabus.

CE(W) - 112: GEOMATIC ENGINEERING LAB

B. Tech. 1st Year (Semester - II)

L	T	P	Credits	Class Work	: 25 Marks
--	--	2	2	Examination	: 25 Marks
				Total	: 50 Marks
				Duration of Examination	: 3 Hours

List of Experiments

1. Triangulation including base line measurement by Total Station.
2. Triangulation including base line measurement by GPS.
3. Study of Arial photographs.
4. Study and image interpretation of remote sensing data.

Note: The students will perform above experiments atleast for three sets of different areas/remote sensing data.

GPCE - 102 GENERAL PROFICIENCY

B. Tech. 1st Year (Semester - II)

L	T	P	Credits	Class Work	: 50Marks
--	--	--	2	Total	: 50 Marks

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

The evaluation will be made by the panel of experts/ teachers, preferably interdisciplinary to be appointed by the Vice-Chancellor of the University on recommendation of the Dean Academic Affairs. A Faculty Counselor will be attached to a group of students which will remain associated with him /her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him / her and will help them in terms of career guidance, personal difficulties.

A. The student will present a written report before the committee with following in view:

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

- | | | |
|-----|--------------------------------------|-----------|
| I. | Academic Performance | ----- |
| II. | Extra Curricular Activities | (4 Marks) |
| III | Technical Activities | (4 Marks) |
| IV | Industrial, Educational tour | (4 Marks) |
| V | Sports/games | (4 Marks) |
| VI | Community Service, Hostel Activities | (4 Marks) |

Note: Report submitted by the students should be typed on both sides of the paper.

B. A student will support his/her achievement and verbal & communicative skill through presentation before the committee. (20 Marks)

C. Faculty Counselor Assignment (10 Marks)

It will be the duty of the student to get evaluated by respective faculty counselor and to submit the counselor assessment marks in a sealed envelope to the committee.

A counselor will assess the student which reflects his/her learning graph including followings:

1. Discipline throughout the year
2. Sincerity towards study
3. How quickly the student assimilates professional value system etc.

CE(W) - 201: FLUID MECHANICS

B. Tech. 2nd Year (Semester - III)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

- 1. Introduction:** fluid properties, types, continuum principles.
- 2. Laminar flow:** Navier-Stokes, equation of motion (no derivation), Laminar flow through a pipe, Parallel Plates, Plates having relative motion, annulus, laminar flow past a sphere.
- 3. Turbulent Flow:** Transition from laminar to turbulent flow, Shear stress in turbulent flow, Eddy viscosity, Mixing length concept, Smooth & Rough surfaces, Velocity distribution in turbulent flow, Resistance of smooth and artificially roughened pipes, Commercial pipes.
- 4. Boundary Layer Analysis:** Boundary layer thickness and its characteristics, Laminar and turbulent boundary layers, Von-Karman Integral Momentum equation and its application for different velocity profiles, Separation of boundary layer and methods for its preventions.
- 5. Fluid statistics:** manometers, static forces on immersed plane and curved surfaces, Buoyancy, stability of floating and submersed bodies.
- 6. Fluid kinematics:** types of flow, stream line, streak line, path line, conservation of mass, rotation, vorticity and circulation, stream function and velocity potential flow net.
- 7. Fluid dynamics:** Euler's equation, Bernoulli's equation, momentum and angular momentum equations, Kinetic energy and momentum correction factors, **Dimensional analysis:** Rayleigh's method and Buckingham Pi theorem, similarity principles, dimensionless numbers, model scales.
- 8. Flow through pipes:** Pipe, flow energy losses, Darcy-Weisbach equation, estimation of friction factor, minor losses, pipe flow computations, hydraulic gradient and total energy lines, concept of equivalent pipe, pipes in series and parallel, flow measuring devices.

Text Books:

1. R.J. Garde and Mirajgaonkar, "Engineering Fluid Mechanics", Nem Chand & Brothers, Roorkee.
2. H. Schlichting, "Boundary Layer Theory", McGraw Hill Publishing Company, New York.
3. Fox R. W. and McDonald, A T, "Introduction to Fluid Mechanics", John Wiley Wilson
4. K L Kumar, "Engineering Fluid Mechanics", Eurasia Publishing House.
5. Streeter, V L and Benjamin, W E, "Fluid Mechanics", McGraw Hill.

Reference Book

1. Fluid Mechanics Through Problems, R J Garde, Nem Chand & Brothers, Roorkee
2. Hydraulics and Fluid Mechanics, P N Modi & S M Seth

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 203: STRUCTURAL ANALYSIS - I

B. Tech. 2nd Year (Semester - III)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

- 1. Introduction:** Forms of structure, idealization, elastic and linear behavior, equations of equilibrium, free body diagrams, principle of superposition.
- 2. Analysis of Statically Determinate Structures:** Compound and complex trusses, Analysis of pin jointed space trusses using tension coefficients and equilibrium equations.
- 3. Deflections:**
 - Geometric Methods: Deflected shapes, moment-area method, conjugate-beam method.
 - Energy Methods: Strain energy in members, , Betti's and Maxwell's Laws of reciprocal deflections, Concept of Virtual work and its applications, Castigliano's theorems, unit load method, deflections of trusses and 2D-frames.
- 4. Indeterminate Structures:** Introduction, static and kinematic indeterminacies, stability of structures, internal forces in two and three-dimensional structures.
- 5. Analysis of Indeterminate Beams and Frames:**
 - Classical Methods: Methods of consistent deformation, method of least work, and theorem of three moments.
 - Conventional methods of Analysis of rigid frames: Slope deflection method, moment distribution method.
 - Approximate methods: Portal method, and Cantilever method.
- 6. Moving Loads and Influence Line Diagrams:** Bending moment and shear force diagrams due to single and multiple concentrated rolling loads, uniformly distributed moving loads, equivalent UDL, Muller Breslau principle, Influence lines for beams, girders with floor beams and frames calculations of the maximum and absolute maximum, shear force and bending moment envelopes.
- 7. Influence lines for Indeterminate Structures:** Influence lines for bending moment, shear force and reactions for continuous, balanced cantilever beams and rigid frames using elastic theorems.
- 8. Analysis of Typical Structures:** Three hinged, two hinged and fixed arches, influence lines for thrust, radial shear and bending moment.

Text Books:

1. Elementary Structural Analysis, Norris & Wilbur, McGraw Hill Publisher,
2. Basic Structural Analysis, C.S. Reddy, Tata McGraw Hill Publication.
3. C K WANG, " Intermediate Structural Analysis" McGraw Hill Publisher

Reference Books:

1. Structural Analysis (A unified approach), D.S. Parkash Rao, University Press.
2. Theory of structures, Punmia and Jain, Luxmi Publications.

Reference Manual

Experimental Methods in Structural Mechanics, V.V. Sastry, C.B. Kukreja, Dhanpat Rai & Sons

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 205: GEO-MECHANICS
B. Tech. 2nd Year (Semester - III)

L	T	P	Credits			
3	1	--	4	Class Work	:	50 Marks
				Examination	:	100Marks
				Total	:	150 Marks
				Duration of Examination	:	3 Hours

1. **Basic Soil Properties:** Introduction to soil mechanics. Soil formation, various soil types, Soil map of India, Phase relationships; Index properties, sieve & hydrometer analysis, Atterberg's limits, sensitivity, thixotropy, and plasticity charts. Indian standard and Unified classification systems of soils, Introduction to Clay minerals, their characteristics. Soil structure, granular soil fabric.
2. **Rock Mechanics:** importance, composition of rocks, classification for engg. purposes, theories of brittle failure, elastic and dynamic properties of rocks.
3. **Permeability of soil:** Darcy's law, validity of Darcy's Law, seepage velocity, factors affecting permeability, Laboratory and field determination of permeability. Flow net and its properties, Laplace equation, methods of drawing flownet, seepage through earth dams, exit gradient and seepage pressures, phenomenon of piping and heaving, filters. Anisotropy & average permeability of layered soils.
4. **Effective Stress Principle:** Capillarity, types of head, seepage forces, quick sand condition, and critical hydraulic gradient.
5. **Compaction:** compaction tests, OMC, factors affecting compaction, control of compaction, field compaction equipment and their suitability.
6. **Stresses in Soils:** Boussinesq and Westergarrd's formulae, pressure bulbs, Newmark's chart. Approximate methods
7. **Compressibility and Consolidation:** isotropic one and three dimensional compressions, Terzaghi's theory, time rate of consolidation, consolidation test, Compressibility & Coefficient of Consolidation, NC, OC soils, determination of pre-consolidation pressure, settlement analysis, secondary consolidation.
8. **Shear Strength:** Mohr's circle, Failure theories, direct, tri-axial, unconfined and vane shear tests. Drainage conditions, Concept of pore pressure coefficients, shear characteristics of normally consolidated, over consolidated clays and dense and loose sands, Dilatancy, residual strength, stress path, constant volume shear.

Text Books:

1. Basic and Applied Soil mechanics by Gopal Ranjan & A.S.R. Rao, New Age Publisher, New Delhi
2. A text book on Soil Mechanics and Foundation Engineering by V.N.S. Murthy, U.B.S. Publisher, New Delhi
3. Geotechnical Engg. by Parshotham Raj, Tata McGraw Hill, New Delhi.

Reference Books:

1. Soil Mechanics by R. F. Craig, Chapman and Hall, U.K.
2. Principles of Soil Mechanics by B.M. Das, PWS and Kent Publisher USA.
3. Geotechnical Engg. by Venkatramaiah, New Age Publisher, New Delhi.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

HUM(W) – 103: FUNDAMENTALS OF MANAGEMENT

B. Tech. 2nd Year (Semester – III)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100 Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- UNIT-I** Meaning of management, Definitions of Management, Characteristics of management, Management Vs. Administration. Management - Art, Science and Profession. Importance of Management. Development of Management thoughts.
Principles of Management. The Management Functions, Inter-relationship of Managerial functions.
- UNIT-II** Nature and Significance of staffing, Personnel management, Functions of personnel management, Manpower planning, Process of manpower planning, Recruitment, Selection; Promotion - Seniority Vs. Merit. Training - objectives and types of training.
- UNIT-III** Production Management: Definition, Objectives, Functions and Scope, Production Planning and Control; its significance, stages in production planning and control. Brief introduction to the concepts of material management, inventory control; its importance and various methods.
- UNIT-IV** Marketing Management - Definition of marketing, Marketing concept, objectives & Functions of marketing. Marketing Research - Meaning; Definition; objectives; Importance; Limitations; Process. Advertising - meaning of advertising, objectives, functions, criticism.
- UNIT-V** Introduction of Financial Management, Objectives of Financial Management, Functions and Importance of Financial Management. Brief Introduction to the concept of capital structure and various sources of finance.

Text Books:

1. Principles and Practice of Management - R.S. Gupta, B.D.Sharma, N.S. Bhalla. (Kalyani Publishers)
2. Organisation and Management - R.D. Aggarwal (Tata Mc Graw Hill)

Reference Books:

1. Principles & Practices of Management – L.M. Prasad (Sultan Chand & Sons)
2. Management – Harold, Koontz and Cyrilo Donell (Mc.Graw Hill).
3. Marketing Management – S.A. Sherlikar (Himalaya Publishing House, Bombay).
4. Financial Management - I.M. Pandey (Vikas Publishing House, New Delhi)
5. Management - James A.F. Stoner & R.Edward Freeman, PHI.

Note: Eight questions are to be set at least one question from each unit and the students will have to attempt five questions in all.

CE(W) - 207: BUILDING CONSTRUCTION AND MATERIALS

B. Tech. 2nd Year (Semester - III)

L	T	D	Credits	Class Work	: 50 Marks
2	--	2	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

- Bricks and Stones and Masonry:** Composition of good brick earth, harmful ingredient, manufacture of bricks, characteristics of good bricks, classification of bricks as per IS 1077-1985. Stones: Classification of rocks, test for stones, characteristics of a good building stone, deterioration of stones, common building stones of India, comparison of the brick work and stone work. Masonry: Stone & Brick: load bearing & non load bearing brick masonry for multistoried constructions, brick panel walling, reinforced masonry, Bonds & junctions, Cavity wall, Prefabricated components, Assembly at site: Low cost housing & hollow blocks, Drawings.
- Cement, Concrete, Lime & Mortar:** Types, Manufacture, basic properties of cement compounds, grades, packing, storage, quality control and curing, additives, special cements. Lime & Mortar: Classifications & Properties, Admixtures. Concrete: Introduction, properties of concrete, initial and final setting time, curing, water cement ratio, workability, compressive strength, grades, Production of Concrete: Batching, mixing, transportation, placing, compaction and curing of concrete, quality control of concrete, concrete mix design. Special Concretes: Introduction to special concretes, RMC, Short Crete, applications in hot and cold climate.
- Timber, Steel:** Classification and identification of timber, defects in timber, characteristics of good timber, seasoning of timber and its methods, preservation of timber, varieties of industrial timber, famous Indian timber tress, Plywood. Manufacture of steel, market forms of steel e.g. mild steel and HYSD steel bars, rolled steel sections.
- Housing:** Introduction, definitions, Acoustics and sound proofing, Ventilation and air-conditioning, Lift and escalators, Fire hazards, fire fighting system means of escape alarms system, Fire prevention measures, maintenance standards, Maintenance problems in buildings, Form Work and Scaffolding, Expansion/ Contraction Joints. Aspects of Architecture Design: Proportion, orientation etc. basic planning of residential, commercial and public buildings, Building layout, Architectural, structural working drawings, Modular co-ordination and drawing on modules, Building bye-laws.
- Foundations, Damp proof course:** types and suitability, spread, arch, combined, cantilevered, Raft, Grillage, Piles & wells, Footings in block cotton soil, IS Specifications and drawings. Damp proof course: Points of its requirement in buildings, D.P.C. at Plinth level, in basement and roof tops etc. joints in prefabricated construction. Anti-termite treatment, drawings. Basement & Retaining walls.
- Lintels, Arches, Stairs & Stair cases:** Location and construction details in wood, brick, stone and R.C.C., drawings, Stairs & Stair cases: Suitability of location, stairs in multistoried buildings, Residential and public buildings, Fire escape, Stairs in timber, stone, brick, RCC and Metal Drawings in Plan elevation and sections. Hand rail & railings, description and sketches of lifts escalators, drawings.
- Doors & windows:** Details, location in buildings, sizes & construction for wooden & metal, Battened braced, framed, flush and paneled, sliding, folding telescopic, with louvers, collapsible. Windows in timber & Metal casement, double hung, Dormer, Corner, Fanlight, skylight, clear storey etc. Low cost ideas, Revolving doors, Aluminum door and windows, drawings.
- Roofs & roof coverings:** (a) Flat roofs: Waffle floor, channels, cored units etc. (b) Folded plates, shells (c) Roof covering tiles, ACC, Tin & G.I. Sheets with details at joints bearings and ridges.

Text Books:

- Building Construction by Sushil Kumar, Standard Publisher and Distributors.
- Building Construction by B.C.Punima, Laxmi Publisher House

3. A Text Book of Building Construction by Sharma and Kaul
4. Masonry & timber structures including earthquake resistant design, A S Arya, Nem Chand & Bros.
5. Concrete Technology, by M.L. Gambhir, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
6. Engineering Materials, by S.C. Rangawala, Charotar Publishing House, Anand.

Reference Books:

1. Indian Practical Civil Engg. Handbook, P N Khanna, Engineers Publishers, 2000.
2. National Building Code, B. I. S.
3. Handbook of Building Construction, M M Goel, Amrindia Consultancy.
4. Engineering Materials, by Sushil Kumar, Metropolitan Press.
5. Building Construction by Sushil Kumar, Standard Publishers and Distributors.
6. Engineering Materials by N.C. Choudhary, Technical Publishers.
7. Building Construction by B.C. Punmia, Laxmi Publishing House.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 209: FLUID MECHANICS LAB
B. Tech. 2nd Year (Semester - III)

L	T	P	Credits	Class Work	: 25 Marks
--	--	2	2	Examination	: 25 Marks
				Total	: 50 Marks
				Duration of Examination	: 3 Hours

List of Experiments

1. Verification of Bernoulli's Theorem.
2. Calibration of Venturimeter, orifice meter.
3. Verification of momentum equation.
4. Determination of Coefficients of Contraction, Velocity and Discharge of an orifice.
5. Determination of friction factor for pipes of different material.
6. Determination of loss coefficients for pipe fittings.
7. Determination of centre of pressure of a vertically immersed surface.
8. Visualization of laminar and turbulent flow.
9. Demonstration of free vortex, forced vortex.
10. Study of water turbines, pumps.
11. To check the stability of a ship model under loaded conditions.

Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

CE(W) - 211: STRUCTURAL ANALYSIS-I LAB

B. Tech. 2nd Year (Semester -III)

L	T	P	Credits	Class Work	: 25 Marks
--	--	2	2	Examination	: 25 Marks
				Total	: 50 Marks
				Duration of Examination	: 3 Hours

List of Experiments:

1. To verify Betti's Law
2. To find the deflection of a pine connected truss.
3. To determine the flexural rigidity (E1) of a given beam.
4. To verify Moment-Area Theorems for slope and deflection of a beam.
5. To study the behavior of different types of struts.
6. To determine the loads in three suspension rods supporting an elastic beam.
7. To obtain experimentally the influence line for the horizontal thrust in a two hinged arch.
8. To determine the elastic displacement of curved members.
9. To determine the horizontal displacement of the roller end in a curved beam.
10. To make computer programs for theoretical verification of the above experiments.

Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

CE(W) - 213: GEO-MECHANICS LAB

B. Tech. 2nd Year (Semester - III)

L	T	P	Credits	Class Work	: 25 Marks
--	--	2	2	Examination	: 25 Marks
				Total	: 50 Marks
				Duration of Examination	: 3 Hours

List of Experiments:

1. Visual Soil Classification
2. Determination of water content.
3. Determination of field density by Core cutter method
4. Determination of field density by Sand replacement method
5. Grain size Analysis by Mechanical Method.
6. Grain size Analysis by Hydrometer Method.
7. Determination of Specific Gravity by Psychomotor.
8. Determination of Atterberg's limits
9. Determination of Permeability by constant head permeameter.
10. Determination of permeability by variable head permeameter.
11. Proctor's Compaction Test
12. Unconfined Compression Test.
13. Direct Shear Test.

Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

CE(W) - 202: STRUCTURAL ANALYSIS - II

B. Tech. 2nd Year (Semester - IV)

L	T	P	Credits
3	1	--	4

Class Work	: 50 Marks
Examination	: 100Marks
Total	: 150 Marks
Duration of Examination	: 3 Hours

-
- 1. Introduction:** Introduction to matrix algebra, systems approach: force and displacement methods and their comparison.
 - 2. Matrix Force Method:** Introduction to flexibility approach, Choice of redundant, static equilibrium matrix, deformation compatibility matrix, member flexibility matrix, static equilibrium and deformation compatibility checks. Application for trusses, continuous beams and rigid frames.
 - 3. The matrix displacement or Stiffness Method:** Conditions of stress-strain relationships, equilibrium and compatibility, Application for trusses, continuous beams and rigid frames.
 - 4. Formulation of various matrices:** Static equilibrium matrix - deformation compatibility matrix, member stiffness matrix, global stiffness matrix, external load matrix, static equilibrium and deformation, compatibility checks and effects of support settlement and lack of fit. Conversion of member loads into joint loads. Partitioning of global stiffness matrix.
 - 5. Direct Stiffness Method:** Derivation of global matrix from energy considerations, transformation matrices, member stiffness matrix with respect to member coordinate system, member stiffness matrix for global coordinates and global stiffness matrix. Displacement boundary conditions, computer generation of global stiffness matrix, effect of temperature and lack of fit.
 - 6. Analysis of Cables and Suspension Bridges:** General cable theorem, shape, elastic stretch of cable, maximum tension in cable and back-stays, pressure on supporting towers, suspension bridges, three hinged and two hinged stiffening girders.
 - 7. Finite Element Method:** Introduction and basic concepts. Energy approach and variation principles in Finite-Element Method, Various element shapes, 1-D bar element
 - 8. Plastic analysis:** Basics of plastic analysis, static and kinematic theorem for plastic analysis of beams and frames.

Text Books:

1. Matrix Analysis of Framed Structures, Gere and Weaver, CBS Publishers & Distributors.
2. Basic Structural Analysis, C.S. Reddy, Tata McGraw Hill Publication.

Reference Books:

1. Matrix method of Analysis, Martin, McGraw Hill Book Company, New York.
2. Structural Analysis – A Unified Approach, D.S. Prakash Rao, Tata McGraw Hill Publishing Co., New Delhi.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 204: REINFORCED CONCRETE DESIGN - I

B. Tech. 2nd Year (Semester - IV)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

- 1. Introduction:** Reinforced concrete, definition, properties of materials, grades of concrete and reinforcing steel, stress-strain curves, permissible stresses, concrete structural systems-slabs, beams, columns and foundations, design philosophies working stress design, ultimate strength and limit state design method, Codal Provision for RC Elements: (I) General (II) for ductility.
- 2. Working Stress Design Method - 1:** Introduction, Assumptions, derivation of design constants, problems on computation of moment of resistance, determination of stresses, and design of rectangular beams reinforced in tension and compression, flanged beams and slabs.
- 3. Working Stress Design Method - 2:** Design for shear and bond and torsion, Permissible shear strength, maximum shear strength, shear reinforcement and design procedure for shear reinforcement, bond and development length, anchoring and curtailment of bars.
- 4. Working Stress Design Method - 3:** Design for Compression, Design of short and long columns, sections subjected to direct load and uniaxial bending.
- 5. Limit State Design Method - 1:** Introduction, Limit States, Characteristic values, characteristic strength, characteristic loads, design values for materials and loads, factored loads. Limit State of Collapse (Flexure) Types of failures, assumptions for analysis and design of singly reinforced, doubly reinforced sections, and flanged sections.
- 6. Limit State Design Method - 2:** Limit State of Collapse (Shear, bond and torsion) Introduction - Design for shear, structural components subjected to torsion, design of rectangular beam section for torsion, development length, continuation of reinforcement (beyond cut off points). Limit State of Collapse (Compression) Columns and their classification, reinforcement in columns, assumptions, short and long (both tied and helical) columns subjected to axial load, short columns subject to axial, uniaxial and biaxial bending. Limit State of Serviceability Deflection, effective span to effective depth ratio, modification factors for singly reinforced, doubly reinforcement and flanged beams, crack formation and its control.
- 7. Limit State Design of various elements and miscellaneous structures:**
Design of Rectangular and Flanged beams, Design of Lintels, Design of one-way slabs and two-way rectangular slabs, Circular slabs: Slabs with different edge conditions, Design of columns, Interaction Diagrams, Design of staircases, Design of isolated footings, Beams curved in plan: Circular beam loaded uniformly and supported on symmetrically placed columns, Application of SP 16, Detailing of Reinforcement - SP : 34
- 8. Retaining walls:** Design of gravity and cantilever type retaining walls.

Text Books:

1. Reinforced Concrete Design, M.L. Gambhir, Macmillan India Limited, New Delhi
2. Limit State Design of Reinforced Concrete, A.K. Jain, Nem Chand Brothers, Roorkee.
3. Limit State Design, Ram Chandra, Standard Book House, New Delhi

Reference Books:

1. Reinforced Concrete Design, Pillai & Menon, Tata McGraw Hill Publishers, New Delhi
2. Design of Concrete Structures, Vol.-I, Ram Chandra, Standard Book House, New Delhi.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 206: OPEN CHANNEL FLOW
B. Tech. 2nd Year (Semester - IV)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- 1. Flow in Open Channels:** Difference between pipe flow and channel flow, Types of channels, Classification of flows, Velocity distribution and Uniform flow formulae.
 - 2. Design of Channels:** Design of Channels, Most efficient channel sections.
 - 3. Flow Measurement:** Flow over notches and weirs, Flow over Spillways, Side weirs, Sluice gates, free overfall.
 - 4. Concepts of Specific energy and specific Force:** Specific energy and specific curve, Momentum Equation in open channels, Specific force & specific force curve Critical depth and its computation.
 - 5. Gradually Varied Flow:** Channel transitions, Non-uniform flow in open channels, Dynamic equation for GVF, Water surface profiles in channels of different slopes GVF flow computations.
 - 6. Unsteady flow and Hydraulic jump:** Types, Applications Jumps in channels of varying shapes. Unsteady flow equation, Surges.
 - 7. Turbines:** Force exerted by fluid jet on stationary and moving flat vanes. Classification of turbines, Pelton wheel and Francis turbines, cavitation and setting of turbines.
 - 8. Pumps:** type of pumps, work done by single and double acting pumps, static and manometric heads.

Text Books:

1. K.G. Ranga Raju, "Flow Through Open Channels", Tata McGraw Hill, New Delhi.

Reference Books:

1. K. Subramanya, "Flow in Open Channels", Tata McGraw Hill, New Delhi.
2. F.M. Hendersen, "Open Channel Flow", McMillan, New York.
3. R.H. French, "Open-Channel Hydraulics", McGraw Hill Publishing Company, New York.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions

CE(W) - 208: SURFACE AND SUBSURFACE HYDROLOGY

B. Tech. 2nd Year (Semester - IV)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

- 1. Precipitation:** Hydrologic cycle and Budget, Scope and Applications, Drainage basin and its characteristics. Precipitation: Types and Forms, Measurement by rain gauge and other methods, Design of rain gauges station, Mean precipitation, Presentation of rainfall data, Estimation of missing rainfall data. Test for consistency of record, Analysis of rainfall data, Intensity-depth-area relationship, Duration-Frequency curves, Depth-Area-Duration curves, Frequency analysis of rainfall data.
- 2. Abstractions From Precipitation:** Evaporation and Transpiration, Factors affecting evaporation, Measurement by different methods, Evaporation measurement, infiltration, Factors affecting infiltration Measurement, Infiltration capacity curve, Infiltration indices.
- 3. Run Off:** Factors affecting run off, Estimation of run off by various methods Rainfall-runoff co-relations.
- 4. Hydrographs:** Components, Base flow separation, Derivation of unit hydrograph and its applications & limitations, Distribution graph, Synthetic and Instantaneous unit hydrograph.
- 5. Watershed Management and Rainwater Harvesting:** Basic concepts, objectives, methods.
- 6. Reservoir Planning:** Types of reservoir, Storage zones, Selection of reservoir site, Mass curve analysis for reservoir capacity, Reservoir yield and its determination for a given reservoir capacity, Reservoir sedimentation and its control, Reservoir evaporation and Methods for its reduction
- 7. Floods:** Frequency analysis, Estimation of peak flood, Design flood, Methods of flood control, Flood control economics and Flood routing,
- 8. Ground Water:** Role of Ground Water in hydrological cycle, Distribution of Ground Water, Types of aquifers, Aquifers parameters, Well Hydraulics: Darcy's law, Types of aquifers, Steady flow towards fully penetrating well, Equation of motion and its applications to ground water flow problems, Determination of aquifer constant in various types of aquifers, Types of tube wells, Methods of construction, Well development.

Text Books:

1. Engineering Hydrology by K. Subramanya, Tata McGraw-Hill Publication
2. Hydrology by H.M. Raghunath, New Age International Publishers

Reference Books:

1. Applied Hydrology, V T Chow, D R Maidment and W L Mays, McGraw-Hill Publication
2. Hydrology, M Wanielista, R Kersten, R Eaglin, John Wiley

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 210: ESTIMATING AND COSTING

B. Tech. 2nd Year (Semester - IV)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- 1. Estimate - I:** Principles of estimation, units, items of work, different kinds of estimates, different methods of estimation, estimation of materials in single room building, two roomed building with different sections of walls, foundation,
 - 2. Estimate - II:** Floors and roofs, R.B. and R.C.C. works, Plastering, White-washing, Distempering and painting, doors and windows, lump sum items, Estimates of canals, roads etc.
 - 3. Specification of Works - I:** Necessity of specifications, types of specifications, general specifications, specification for bricks, cement, sand, water, lime, reinforcement;
 - 4. Specification of Works - II:** Detailed specifications for Earthwork, Cement, concrete, brick work, floorings, D.P. C., R.C.C., cement plastering, white and color washing, distempering, painting.
 - 5. Rate Analysis:** Purpose, importance and requirements of rate analysis, units of measurement, preparation of rate analysis, procedure of rate analysis for items:- Earthwork, concrete works, R C. C. works, reinforced brick work, plastering, painting, finishing(white-washing, distempering).
 - 6. Contracts and Tenders:** Contract, guidelines, types of contracts, their advantages and disadvantages, Tenders: Tender and acceptance of tender, Earnest money, security money, retention money,
 - 7. Public Works account:** Introduction, function of Public Works department, measurement book, cash book, preparation, examination and payment of bills, first and final bills, administrative sanction, technical sanction.
 - 8. Preparation of Feasibility Report and DPR**

Text Books:

1. A Text book on Estimating and Costing and Accounts by D.D. Kohli, S. Chand & Company, ND.
2. Construction Planning, Equipment and Methods by Robert L. Peurifoy Tata Mcgraw Hill Publication New Delhi
3. "Estimating and Costing", B N Dutta, S Dutta & Co., 2000.

Reference Books:

1. Indian Practical Civil Engg. Handbook, P N Khanna, Engineers Publishers, 2000

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 212: REINFORCED CONCRETE DESIGN - I LAB

B. Tech. 2nd Year (Semester - IV)

L	T	P	Credits	Class Work	: 25 Marks
--	--	2	2	Examination	: 25 Marks
				Total	: 50 Marks
				Duration of Examination	: 3 Hours

List of Experiments:

1. Design of a concrete mix in accordance with IS and ACI guidelines.
2. Determination of flexural strength of concrete.
3. Determination of split tensile strength of concrete.
4. Plotting of stress-strain curve of given concrete mix and to determine the modulus of elasticity.
5. Plotting stress-strain curve of mild steel and HYSD bars.
6. Behaviour of Under - reinforced RCC beams subjected to flexure.
7. Behaviour of Over - reinforced RCC beams subjected to flexure.
8. Behaviour of Balanced section RCC beams subjected to flexure
9. Behaviour of RCC beams in shear.
10. Effect of partial replacement of cement by fly ash on properties of concrete
11. Demonstration of Non-destructive testing equipment like Impact Hammer, Ultrasonic Pulse Velocity Tester, Profometer, Corrosion analyser an Resistometer.

Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

CE(W) - 214: OPEN CHANNEL FLOW LAB

B. Tech. 2nd Year (Semester - IV)

L	T	P	Credits	Class Work	: 25 Marks
--	--	2	2	Examination	: 25 Marks
				Total	: 50 Marks
				Duration of Examination	: 3 Hours

List of Experiments:

1. To determine Manning's co-efficient of roughness for the bed of a given flume.
2. To measure the velocity distribution in a rectangular flume and to determine the energy and momentum correction factors
3. To study the flow through a horizontal contraction in a rectangular open channel.
4. To calibrate a current meter
5. To study the formation of hydraulic jump in a horizontal rectangular open channel
6. To measure velocity distribution over a flat surface in a wind stream and to determine the displacement and momentum thickness.
7. To study the pressure distribution along the spillway surface.
8. To calibrate a bend meter.
9. To calibrate a broad-crested weir and to study the pressure distribution along its surface.
10. To measure the pressure distribution around a cylinder placed in a wind stream and to calculate the coefficient of drag.
11. To calibrate a venturi flume.
12. To study the performance characteristics of a single stage centrifugal pump.

Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

GPCE(W) - 202 GENERAL PROFICIENCY

B. Tech. 2nd Year (Semester - IV)

L	T	P	Credits	Class Work	: 50Marks
--	--	--	2	Total	: 50 Marks

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

The evaluation will be made by the panel of experts/ teachers, preferably interdisciplinary to be appointed by the Vice-Chancellor of the University on recommendation of the Dean Academic Affairs. A Faculty Counselor will be attached to a group of students which will remain associated with him /her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him / her and will help them in terms of career guidance, personal difficulties.

A. The student will present a written report before the committee with following in view:

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

- | | | |
|-----|--------------------------------------|------------------|
| I. | Academic Performance | ----- |
| II. | Extra Curricular Activities | (4 Marks) |
| III | Technical Activities | (4 Marks) |
| IV | Industrial, Educational tour | (4 Marks) |
| V | Sports/games | (4 Marks) |
| VI | Community Service, Hostel Activities | (4 Marks) |

Note: Report submitted by the students should be typed on both sides of the paper.

B. A student will support his/her achievement and verbal & communicative skill through presentation before the committee. **(20 Marks)**

C. Faculty Counselor Assignment **(10 Marks)**

It will be the duty of the student to get evaluated by respective faculty counselor and to submit the counselor assessment marks in a sealed envelope to the committee.

A counselor will assess the student which reflects his/her learning graph including followings:

1. Discipline throughout the year
2. Sincerity towards study
3. How quickly the student assimilates professional value system etc.

CE(W) - 301: DESIGN OF STEEL STRUCTURES - I

B. Tech. 3rd Year (Semester - V)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- 1. Introduction:** Loads, structural steels and their specifications, structural elements, steel vs. concrete and timber, design approaches—elastic and limit state methods, design specifications as per IS: 800, structural layout, strength and stiffness considerations, efficiency of cross-section, safety and serviceability considerations.
 - 2. Structural Fasteners and Connections:** Riveting and bolting, their types, failure of riveted joint, efficiency of a joint, design of riveted joint, concentric riveted joints, advantages and disadvantages of bolted connections, stresses in bolts, types of welded joints, design of welded joint subjected to axial loads, welded joints subjected to eccentric loads, simple, semi-rigid and rigid connections.
 - 3. Tension Members:** Types of sections, net area, net effective area for angles, tees, design of tension members, tension splice, high strength steel cables.
 - 4. Compression Members:** Axially loaded columns, effective length, slenderness ratio, allowable stresses, general specifications, design of axially loaded members, laced and battened columns and their design, built up compression members, eccentrically loaded columns and their design, column splice and its design, encased columns.
 - 5. Flexural Members:** Design criteria, permissible stresses, laterally supported beams and their design laterally unsupported beams and their design, web buckling, web crippling, built up beams, encased beams, members subjected to bending and compression, Plate Girders: Introduction, weight and economic depth, design of flanges, design of web, curtailment of flange plates, intermediate and bearing stiffeners, design of a riveted and welded plate girders, web and flange splice.
 - 6. Column Bases:** Introduction, slab base, gusseted base, column base subjected to moment, grillage foundation.
 - 7. Tubular Structures:** Permissible stresses, tube columns and compression members, tube tension members, tubular roof trusses, joints in tubular trusses, tubular beams and purlins
 - 8. Aluminium Structures:** Permissible stresses, tension members, compression members, local buckling of compression members, design of beams and connections

Text Books:

1. Design of Steel Structures, Vol. 1 and Vol. II, Ram Chandara, Standard Book House.
2. Design of Steel Structures, by A.S. Arya and J.L. Ajmani. , Nem Chand Brothers, Roorkee.

Reference Books:

1. Design of Steel Structures, P. Dayaratnam, Wheeler Publishing, New Delhi.
2. Design of Steel Structures, M. Raghupathi, Tata McGraw Hill, New Delhi.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 303: TRANSPORTATION ENGINEERING - I

B. Tech. 3rd Year (Semester - V)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- 1. Highways development Planning:** Introduction, Different modes of transport, Development of Transport System, Phased development of Roads in India. Planning & Management of Highways, Highway Surveys & Alignment, Design, Drawings, Estimates & Project Report.
 - 2. Highway materials and testing:** sub grade, sub base and base course materials, bituminous materials, testing of soil, aggregate and bitumen.
 - 3. Geometric Design of Highways:** Introduction, Highways Classification, Right of way, Land width, width of formation, width of pavement, Sight Distances, camber, horizontal and vertical Road Curves, Transition Curves. Flyovers and Expressways.
 - 4. Traffic Studies:** Road user characteristics, Importance of traffic studies, spot speed, speed and delay and origin and destination studies. Vehicular flow models. Stream variables: Spacing and concentration, headway and flow, mean speed. Time distance diagram of flow. Experimental data and model parameters, model calibration. Traffic operations and control devices, intelligent transport systems.
 - 5. Design of Pavements:** Types of pavements, Factors affecting design of pavements, wheel load factor, Climatic Factors, Structure of Flexible pavement, Function of various components of Flexible pavement, design of flexible pavements by G.I. & CBR methods, stresses in rigid pavements, design of rigid pavements by IRC method.
 - 6. Highway construction:** road types--earth roads, gravel roads, water bound macadam, bituminous pavement including surface treatment, premix carpet, mastic asphalt, bituminous macadam, bituminous concrete and cement concrete roads. Construction of earth, gravel and water bound macadam roads, Construction Equipments.
 - 7. Maintenance and economy:** Introduction, Maintenance of Earth, gravel, WBM, GSB, WMM Roads, Bituminous Roads, Maintenance of berms, Side Slopes, Pavement edge and draining work. Failures of flexible and rigid pavements: Maintenance, evaluation and its strengthening. Economics of Pavement types, Economic Evaluation of Highway Schemes, Life Cycle Costing
 - 8. Highway Environment and Road Safety Audits:** Effect of Highways on environment, Noise pollution, Air pollution, visual Intrusion & Degrading the Aesthetics, Roadside Amenities, Landscaping, Roadside Arboriculture. Road Safety Audits: Safety concerns in highway projects, Systems approach, various stages of Safety Audit, Preparation of Audit Reports.

Text Books:

1. Highway Engineering by Khanna and Justo, Nem Chand & Brothers, Roorkee
2. Highway Engineering by L.R. Kadyali, Nem Chand & Brothers, Roorkee

Reference Books:

1. Highway Engineering by Oglesby and Hews
2. Transportation Engineering by G.V. Rao, Tata McGraw Hill Publisher, New Delhi
3. Principles of Pavement Design by E.J. Yodder
4. Traffic Engineering by Matson,Smith & Hurd

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 305: REINFORCED CONCRETE DESIGN - II

B. Tech. 3rd Year (Semester - V)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- 1. Continuous Beams:** Basic assumptions, Moment of inertia, settlements, Modification of moments, maximum moments and shear, beams curved in plan-analysis for torsion, redistribution of moments for single and multi-span beams, design examples.
 - 2. Flat slabs:** Advantages of flat slabs, general design considerations, approximate direct design method, design of flat slabs, openings in flat slabs, design examples.
 - 3. Foundations:** Combined footings, raft foundation, design of pile cap and piles, underreamed piles, design examples.
 - 4. Water Tanks, Silos and Bunkers:** Estimation of Wind and earthquake forces, design requirements, rectangular and cylindrical underground and overhead tanks, Intze tanks, design considerations, design examples. Silos and Bunkers- Various theories, Bunkers with sloping bottoms and with high side walls, battery of bunkers, design examples.
 - 5. Domes:** Analysis and Design of spherical and conical domes.
 - 6. Prestressed Concrete:** Basic principles, classification of prestressed members, various prestressing systems, losses in prestress, initial and final stress conditions, analysis and design of sections for flexure and shear, load balancing concept, IS Specifications. End blocks-Analysis of stresses, Magnel's method, Guyon's method, Bursting and spalling stresses, design examples.
 - 7. Building Frames:** Introduction, Member stiffnesses, Loads, Analysis for vertical and lateral loads, Torsion in buildings, Ductibility of beams, design and detailing for ductibility, design examples.
 - 8. Yield Line Theory:** Basic assumptions, Methods of analysis, yield line patterns and failure mechanisms, analysis of one way and two way rectangular and non-rectangular slabs, effect of top corner steel in square slabs, design examples.

Text Books:

1. Reinforced Concrete Structures, Vol. I and II, P. C. Varghese, Tata McGraw Hill
2. Reinforced Concrete Design, M.L. Gambhir, Macmillan India Ltd., New Delhi
3. Limit State Design of Reinforced Concrete, A.K. Jain, Nem Chand and Bros., Roorkee
4. Behaviour, Analysis and Design of R.C.C. Structural Elements, I.C. Syal and Ummat, A.H. Wheelers, New Delhi

Reference Books:

1. BIS codes
2. Plain and Reinforced concrete, Vol. 2, O P Jain and J. Krishna, Nem Chand and Bros., Roorkee
3. Reinforced Concrete Design, S U Pillai and D Menon, Tata McGraw Hill

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 307: FOUNDATION ENGINEERING

B. Tech. 3rd Year (Semester - V)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- 1. Introduction to soil exploration:** scope, soil exploration for different structures, spacing, significant depth, boring and sampling techniques, types of samples, penetration test (SCP and SPT), sample disturbances and Geophysical methods.
 - 2. Earth Pressure:** Earth Pressures at rest condition, states of plastic equilibrium, Rankine and Coulomb's theories for active and passive conditions, Influence of surcharge, water table, wall friction, Rehmann's and Culmann's graphical methods, open cuts, Retaining Walls.
 - 3. Stability of Slopes:** Infinite slope, types of failure, total and effective stress analysis, Taylor's stability numbers, concept of factors of safety, method of slices, Swedish's circle method, friction circle method, effect of sudden draw down and submergence.
 - 4. Design of Shallow Foundation:** Bearing Capacity, Definitions, depth of foundation, Terzaghi's general bearing capacity equation, IS code equation, factors affecting bearing capacity. Settlements for clays and sands, permissible settlements, bearing capacity by penetration tests, plate load test. Types of Shallow Foundations, Design Criteria, Stability, Shear, and Settlement Failures, Influence of eccentric and inclined loads.
 - 5. Pile Foundations:** Types, function, selection of piles, pile driving formulae, equipment, point, bearing and friction piles. Load carrying capacity of single pile, group action, spacing of piles, Negative skin friction, Piles subjected to lateral loads, settlement of pile groups, under reamed piles.
 - 6. Caissons and Wells:** Introduction, components, shapes, stability of well foundation, Terzaghi's method of analysis, sinking of well, tilts and shifts.
 - 7. Foundation in Difficult Grounds:** Ground Improvement techniques, drainage and dewatering, Foundation in Swelling Soils, use of Soil reinforcement.
 - 8. Machine Foundation:** Definition, types, problem of machine foundation, spring mass analogy, coefficient of elastic uniform compression, free and damped vibration, block foundation test, Cyclic plate load test, mathematical models, design criteria.

Text Books:

1. Basic and Applied Soil Mechanics, by Gopal Ranjan Rao, ASR Rao, New Age Int. (P) Ltd. Pub., New Delhi,
2. Soils and Foundations, by Cheng Liu & Jack B Evett, Prentice-Hall Inc., USA.
3. A Text Book of Soil Mechanics Foundation Engg. by VNS Murthy - U.B.S, New Delhi.

References Books:

1. Foundation Analysis and Design, by J.E. Bowles McGraw Hill Book Company, New York.
2. Foundation Engineering by Peck, Wiley Eastern India Limited, New Delhi.
3. Soil Mechanics & Foundation Engineering, by K.R. Arora, Standard Publishers, New Delhi.
4. Soil Dynamics and Machine Foundations by Swami Saran, Galgotia Publishers, New Delhi.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 309: TRANSPORTATION ENGINEERING - I LAB

B. Tech. 3rd Year (Semester - V)

L	T	P	Credits	Class Work	: 25 Marks
--	--	2	2	Examination	: 25 Marks
				Total	: 50 Marks
				Duration of Examination	: 3 Hours

List of Experiments:

1. Aggregate crushing value, abrasion and Impact test.
2. Shape test.
3. Water absorption and specific gravity tests.
4. Penetration test.
5. Stripping value test.
6. Ductility test.
7. Softening, Flash & fire point test.
8. Viscosity test.
9. Soundness test.
10. Determination of speed by radar and endoscopes.
11. Study of driving skills.
12. CBR test.
13. Traffic Volume Count on approaches of a Intersection

Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

CE(W) - 311: REINFORCED CONCRETE DESIGN - II LAB

B. Tech. 3rd Year (Semester - V)

L	T	P	Credits	Class Work	:	25 Marks
--	--	2	2	Examination	:	25 Marks
				Total	:	50 Marks
				Duration of Examination	:	3 Hours

List of Experiments:

Preparing drawing sheets showing reinforcement details in case of:

1. Flat slabs
2. Underground Water Tanks
3. Overhead Water Tanks
4. Combined Footings
5. Pile Foundations
6. Raft foundation
7. T-Beam Bridge.
8. Silos
9. Bunker
10. Spherical Domes

Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

CE(W) - 313: FOUNDATION ENGINEERING LAB

B. Tech. 3rd Year (Semester - V)

L	T	P	Credits	Class Work	: 25 Marks
--	--	2	2	Examination	: 25 Marks
				Total	: 50 Marks
				Duration of Examination	: 3 Hours

List of Experiments:

1. Determination of Relative density of coarse grained soils in dry and saturated conditions.
2. Determination of shear strength at different densities by Direct shear test.
3. Determination of MDD and OMC at different compactive effort by compaction test.
4. Determination of Unconfined compressive strength at different compactive effort.
5. Determination of compressibility characteristics of fine grained soils by Consolidation test.
6. Determination of bearing capacity by Standard Penetration test.
7. Determination of shear strength of dry sands by Tri-axial shear test.
8. Determination of shear strength of saturated sands by Tri-axial test.
9. Determination of bearing capacity by Plate load test.
10. Determination of bearing capacity by Cone Penetration test.
11. Determination of bearing capacity by Pressuremeter test.

Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

CE(W) - 302: ENVIRONMENTAL ENGINEERING - I

B. Tech. 3rd Year (Semester – VI)

L	T	P	Credits
3	1	--	4

Class Work	: 50 Marks
Examination	: 100Marks
Total	: 150 Marks
Duration of Examination	: 3 Hours

-
- 1. Water Sources:** Definition and Scope of Environmental Engineering, Surface and ground water sources; Selection and development of sources; Assessment of potential; Water harvesting.
 - 2. Water Quality:** Physical, chemical and biological water quality parameters; Water quality index; Water quality standards; Classification of water bodies.
 - 3. Water Supply Systems:** Municipal water demands and demand variations, Population forecasting and water demand estimations; Intakes and transmission systems, pipes for transporting water and their design, water distribution systems and appurtenances;
 - 4. Design of Water Supply Systems:** Data and background information for the design of water supply system; Water supply network design and design of balancing and service reservoirs; operation and maintenance of water supply systems.
 - 5. Pumps and pumping stations:** Types of pumps and their characteristics and efficiencies; Pump operating curves and selection of pumps; Pumping stations.
 - 6. Water treatment - I:** Water treatment schemes; Basic principles of water treatment; Design of plain sedimentation, coagulation and flocculation, filtration – slow, rapid and pressure; Disinfection units.
 - 7. Water treatment - II:** Fundamentals of water softening, fluoridation and defluoridation, and water desalinization and demineralization.
 - 8. Small scale and household level water purification system and water fixtures**

Text Books:

1. Manual on Water Supply and Treatment by Ministry of Urban Development, New Delhi.
2. Water Supply and Sewerage, McGhee, McGraw Hill.
3. Environmental Engineering, Vol. I, S.K. Garg, Khanna Publishers, New-Delhi.

References Books:

1. Environmental Engineering Peavy, Rowe and Tchobanglous, McGraw Hill.
2. Water and Waste Water Engineering (Vol. 1&2), Fair, Geyer & Okun, John Wiley, New York.
3. Water Supply Engineering P.N. Modi, Standard Book House New-Delhi.
4. Environmental Chemistry, Sawyer, McCarty & Parkins, McGraw Hill.
5. Standard Methods for the Examination of Water and Waste Water, American Public Health Association.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 304: DESIGN OF STEEL STRUCTURES - II

B. Tech. 3rd Year (Semester – VI)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

1. **Elementary Plastic Analysis and Design:** Introduction, Scope of plastic analysis, ultimate load carrying capacity of tension members and compression members, flexural members, shape factor, mechanisms, plastic collapse, analysis, plastic analysis applied to steel beams and simple portal frames and design.
2. **Industrial Buildings:** Loads, general arrangement and stability, design considerations, design of purlins, design of roof trusses, industrial building frames, bracings and stepped columns.
3. **Design of Water Tanks:** Introduction, permissible stresses, design of circular, rectangular and pressed steel tanks including staging
4. **Design of Steel Stacks:** Introduction, various loads to be considered for the design of steel stacks, design of steel stacks including foundation.
5. **Towers:** Transmission line towers, microwave towers, Design loads, classification, design procedure and specification
6. **Cold Formed Sections:** Introduction and brief description of various type of cold formed sections, local buckling, concepts of effective width and effective sections, elements with stiffeners, design of compression and bending elements.

Text Books:

1. Design of Steel Structures, A.S. Arya and J.L. Ajmani , Nem Chand Brothers, Roorkee
2. Design of Steel Structures, Ram Chandra, Vol. I & II, Standard Book House
3. Design of Steel Structures, P. Dayaratnam, Wheeler Publishing, New Delhi.

Reference Books:

1. BIS Codes IS 800:2007, IS 801:1975, IS 875
2. Design of Steel Structures, Gaylord and Gaylord, Mcgraw hill Publication, Newyork

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 306: IRRIGATION ENGINEERING

B. Tech. 3rd Year (Semester - VI)

L	T	P	Credits
3	1	--	4

Class Work	: 50 Marks
Examination	: 100Marks
Total	: 150 Marks
Duration of Examination	: 3 Hours

-
- 1. Water Requirement of Crops:** Types and Methods of irrigation, Duty and Delta relationship, Factors affecting duty, Irrigation efficiencies, Consumptive use and its determination, Soil moisture-irrigation relationship, Depth and frequency of irrigation.
 - 2. Canal Irrigation:** Canal irrigation system, Canal alignment, Canal losses, Estimation of design discharge of a canal, Hydraulics of alluvial channels, Sediment transports, Design of stable channels, Lacey's and Kennedy's theory, Garrets diagrams, Procedure for design of irrigation channels, Lined channels destroy, Maintenance of irrigation channels, Designed of lines channels, Types and economics of lining, Water logging- effects, causes, remedial measures, Land drainage, Design of tile drains.
 - 3. Design of Hydraulic Structures:** Types, Considerations in design, Causes of failure of hydraulic structures founded on previous foundations, Bligh's creep theory and Khosla seepage theory.
 - 4. Dams and Spillways:** Types, design
 - 5. Canal Headworks:** Layout and parts of diversion headworks, Location, Design of weir and barrage; Canal head regulator, River training for canal headworks, Sediment control in canals.
 - 6. Canal Regulation Works:** Canal falls, necessity, location, types and classification of falls, Roughening measures for energy dissipation, cistern element, Design of glacis fall. Cross regulators and distributary's head regulators; Canal escape, Metering flumes.
 - 7. Outlets:** Canal outlets, requirement of a good outlet, Types; Criteria for judging the performance of outlets, Design principle of open flume outlet and A.P.M. outlet.
 - 8. Cross Drainage Works:** Need, Types, Selection of suitable CD work, Design of CD works, Design of transitions for canal waterways, Uplift pressure on bottom floor of CD works.

Text Books:

1. Bharat Singh, "Fundamentals of Irrigation Engineering", Nem Chand, Roorkee.
2. S. K. Garg, "Irrigation Engineering and Hydraulic Structures", Khanna Publishers, New Delhi.

Reference Books:

1. Linsely et al., "Water Resource Engineering", McGraw Hill Publishing Company, New York.
2. K.R. Arora, "Irrigation Water Power and Water Resources Engineering", Standard Publishers Distributors, New Delhi.
3. B.C. Punmia and R.B. Pande, "Irrigation and Water Power Engineering", Standard Publishers Distributors, New Delhi.
4. R.J. Garde and K.G. Ranga Raju, "Mechanics of sediment Transportation and Alluvial Stream Problems", Wiley Eastern Limited, New Delhi.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 308: TRANSPORTATION ENGINEERING - II

B. Tech. 3rd Year (Semester – VI)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

- 1. Introduction:** Role of railways in transportation, historical development of railways.
- 2. Permanent way and components:** gauges in railway tracks, typical railway track cross-section, coning of wheels, Function of rails, requirement of rails, types of rail sections – comparison of rail types, length of rail, rail wear, rail failures, creep of rails, rail fixtures and fastenings – Fish plates, spikes, bolts, chairs, keys, bearing plates. **Sleepers:** Functions and requirements of sleepers, classification of sleepers, timber, metal and concrete sleeper, comparison of different types of sleepers, spacing of sleepers and sleeper density. **Ballast:** Function and requirements of ballast, types, comparison of ballast materials.
- 3. Geometric design:** Vertical and horizontal alignment, horizontal curves, super elevation, equilibrium, cant and cant deficiency, length of transition curve, gradients and grade compensation. Stations and yards, and their classification, **Points and crossings:** introduction, necessity of points and crossings, turnouts, points and crossings, design of a simple turnout.
- 4. Track safety, Signaling and Interlocking:** objects of signaling, engineering principle of signaling, classification, control of train movements, absolute, automatic block system, centralized control system, ATS. Interlocking: definition, necessity and function, methods of interlocking, mechanical devices for interlocking. Traction and tractive resistance, stresses in track, Equipments, Mechanized Maintenance, Track Recording & track Tolerances, Mass Rapid Transport Systems, High Speed Trains, Present & Future, modernization of railway tracks, railway systems in modern era.
- 5. Tunnels:** sections of tunnels – advantages, limitations and suitability, shafts, pilot tunnels, methods of driving tunnels in rocks and soft grounds. Stress around the tunnels.
- 6. Airport Engineering:** Brief history of air transport: Aircraft characteristics. Airport site selection, various surveys for site selection. Classifications of obstructions, Imaginary surfaces, Approach zone and turning zone. Runway orientation, basic runway length, corrections for elevation, temperature & gradient, airport classifications.
- 7. Airport Design:** runway geometric design, airport capacity, factors controlling taxiway layout, geometric design standards for taxiway holding aprons. Terminal area, building area, parking area, apron, hanger typical airport layouts. LCN/PCN method of rigid pavement design. Trend growth of Domestic Air Traffic in India, Air Cargo.
- 8. Air traffic control aids:** visual aids, marking and lighting of runway and apron area, wind and landing direction indicator

Text Books:

1. Railway Engineering by Arora and Saxena, Dhanpat Rai & Sons, New Delhi
2. Airport Planning and Design by Khanna, Arora & Jain, Nem Chand & Brothers, Roorkee
3. Elements of Bridge Engineering, , D. Johnsons Victor, Oxford and IBH Publishers, New Delhi

Reference Books:

1. Railway Engineering by Rangawala, Charotar Publishing House, Anand
2. Railway Engineering by M.M. Aggarwal
3. Airport Engineering by Harnjeff, McGraw Hill Inter. Publisher
4. Principles and Practice of Bridge Engineering, S.P. Bindra. Dhanpat Rai & Sons New Delhi

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 310: ENVIRONMENTAL ENGINEERING - I LAB

B. Tech. 3rd Year (Semester - VI)

L	T	P	Credits	Class Work	: 25 Marks
--	--	2	2	Examination	: 25 Marks
				Total	: 50 Marks
				Duration of Examination	: 3 Hours

List of Experiments:

- 1) Flow measurements in closed conduits – venturimeter, orifices.
- 2) Determination of Color & Turbidity.
- 3) Determination of Solids: Total, Dissolved and Suspended; dissolved solids through conductivity.
- 4) Determination of Alkalinity and its species.
- 5) Determination of pH, and Acidity and its species.
- 6) Determination of Hardness (different types)
- 7) Determination of Chlorides.
- 8) Determination of Fluorides.
- 9) Jar test for optimum coagulant dose estimation.
- 10) Determination of residual chlorine and chlorine dose.
- 11) MPN Test.

Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

CE(W) - 312: IRRIGATION ENGINEERING LAB
B. Tech. 3rd Year (Semester - VI)

L	T	P	Credits	Class Work	: 25 Marks
--	--	2	2	Examination	: 25 Marks
				Total	: 50 Marks
				Duration of Examination	: 3 Hours

List of Experiments:

1. Study of various existing Barrages.
2. Study of various existing Canals.
3. Design of different types of dams.
4. Design of different types of spillways.
5. Comprehensive Design of a Barrage.
6. Design of an Irrigation System for a particular Area.
7. Design of canal.
8. Design of canal headworks.
9. Design of cross drainage structures.

Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

GPCE(W) - 302 GENERAL PROFICIENCY

B. Tech. 3rd Year (Semester – VI)

L	T	P	Credits	Class Work	: 50Marks
--	--	--	2	Total	: 50 Marks

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

The evaluation will be made by the panel of experts/ teachers, preferably interdisciplinary to be appointed by the Vice-Chancellor of the University on recommendation of the Dean Academic Affairs. A Faculty Counselor will be attached to a group of students which will remain associated with him /her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him / her and will help them in terms of career guidance, personal difficulties.

C. The student will present a written report before the committee with following in view:

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

- | | | |
|-----|--------------------------------------|-----------|
| I. | Academic Performance | ----- |
| II. | Extra Curricular Activities | (4 Marks) |
| III | Technical Activities | (4 Marks) |
| IV | Industrial, Educational tour | (4 Marks) |
| V | Sports/games | (4 Marks) |
| VI | Community Service, Hostel Activities | (4 Marks) |

Note: Report submitted by the students should be typed on both sides of the paper.

- D. A student will support his/her achievement and verbal & communicative skill through presentation before the committee. (20 Marks)

C. Faculty Counselor Assignment (10 Marks)

It will be the duty of the student to get evaluated by respective faculty counselor and to submit the counselor assessment marks in a sealed envelope to the committee.

A counselor will assess the student which reflects his/her learning graph including followings:

1. Discipline throughout the year
2. Sincerity towards study
3. How quickly the student assimilates professional value system etc.

CE(W) - 401: ENVIRONMENTAL ENGINEERING - II

B. Tech. 4th Year (Semester - VII)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

- Sewerage system:** Generation and Estimation of Community Sewage; Flow variations; Storm Water flow; Alternate systems for sewage collection and conveyance; Drains and sewers; Sewer appurtenances; Construction and Maintenance of sewers; Sewage pumping and pumping stations; Sewerage system design and case study.
- Characterization of sewage:** Parameters for characterization; Sampling, testing and analysis of sewage; Relative stability and population equivalent; BOD and BOD kinetics.
- Treatment of sewage:** Effluents standards; Basic principles of sewage treatment; Introduction to unit operations and processes - primary treatment units such as screening, grit chamber, and Sedimentation tanks. Secondary treatment units such as different types of aerobic suspended and attached growth systems, and tertiary treatment for polishing, nutrient removal and disinfection; Sludge Handling and disposal - thickening, stabilization, dewatering, drying and disposal.
- Sewage treatment units design:** Design of grit chamber, primary and secondary clarifiers, ASP, TF, stabilization ponds.
- Treated effluent disposal:** Disposal into surface water bodies; Reuse for irrigation and aqua-culturing; Land disposal; Disposal through injection into groundwater. Indian standards for disposal of effluent.
- Low cost sanitation systems** - Imhoff tanks, septic tank - soakage pit/soil absorption systems; stabilization ponds; macrophyte ponds; oxidation ponds; and constructed wetland systems.
- Plumbing:** Sewer connections for houses and buildings; Traps, sanitary fittings & fixtures.
- Environmental Impact Assessment:** Impact Analysis of Hydro/thermal power projects etc. Laws and status of Environmental Impact Assessment in India. Elements of environmental auditing – Water, Material, and Fuel balance, Conversion efficiency of manufacturing process, Concepts of sustainable development. Green buildings and Energy efficient buildings.

Text Books:

- Introduction to Environmental Engg. by M.L Davis and Corn Well , McGraw Hill
- Introduction to Environmental Engg. & Science , G.M Masters, Prentice Hall of India
- Sewerage and Sewage Treatment, S R Krishansagar
- Environmental Engineering Vol. II S.K. Garg, Khanna Publishers New-Delhi.
- Environmental Impact Assessment, R K Jain, John Wiley Publication

References Books:

- Wastewater Engineering, Met Calf & Eddy, McGraw Hill.
- Manual on sewerage and sewage treatment, Ministry of Urban Development, New Delhi
- Water Supply and Sewerage, McGhee, McGraw Hill.
- Environmental chemistry, Sawyer & McCarty and Parkins, McGraw Hill.
- Standard Methods for the Examination of Water and Waste Water, American Public Health Association.
- Risk Assessment, a Text Book of Case Studies, D A Paustenbach, John Wiley Publication.
- Introduction to Environmental engg. & Science, G Masters, Prentice Hall of India.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 403: SYSTEM DESIGN TECHNIQUES

B. Tech. 4th Year (Semester - VII)

L	T	P	Credits
3	1	--	4

Class Work	: 50 Marks
Examination	: 100Marks
Total	: 150 Marks
Duration of Examination	: 3 Hours

-
- 1. Errors in Numerical Calculations:** Introduction, Numbers and their accuracy, Absolute, relative and percentage errors and their analysis, General error formula.
 - 2. Interpolation and Curve Fitting:** Taylor series and calculation of functions, Introduction to interpolation, Lagrange approximation, Newton Polynomials, Chebyshev Polynomials, Least squares line, curve fitting, Interpolation by spline functions.
 - 3. Fundamentals of Systemic Approach:** Definitions of a system, system components, classification linear, non-linear, time-invariant, time variant systems, system synthesis, role of optimization, examples from Civil Engineering.
 - 4. Linear Programming:** Graphical solution, formulation of primal, Simplex method, formulation of dual, Dual Simplex method, relationship between primal and dual.
 - 5. Non-Linear Programming:** Analytical methods, Kuhn-Tucker conditions numerical unconstrained optimization, direct search methods, descent methods, one dimensional minimization, constrained optimization direct methods, indirect methods, interior and exterior penalty function methods.
 - 6. Dynamic Programming:** Characteristics of dynamic programming problems, solution, Bellman's principle of optimality, multiple state variables.
 - 7. Queuing System:** Generalized Poisson queuing model, steady state measures of performance.
 - 8. Non-Traditional Optimization Methods:** Genetic Algorithms and simulated annealing.

Text Books:

1. Engg. Optimization, Theory and Practice, S S Rao, New Age International
2. Operations Research:An Introduction, H A Taha, Prentice Hall of India.
3. Optimization of Engg. Design, Deb Kalyanmoy, Prentice Hall of India.

Reference Books:

1. Water Resource Systems, S Vedula and P P Majmudar, Tata McGraw Hill
2. System Identification: Theory for Users, Ijung Lennant, Prentice Hall

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 405: ENVIRONMENTAL ENGINEERING - II LAB

B. Tech. 4th Year (Semester - VII)

L	T	P	Credits	Class Work	: 25 Marks
--	--	2	2	Examination	: 25 Marks
				Total	: 50 Marks
				Duration of Examination	: 3 Hours

List of Experiments:

1. Flow measurement in open channels using V and rectangular notches
2. Determination of DO.
3. Determination of BOD.
4. Determination of COD.
5. Determination of Sulphates.
6. Determination of Nitrite and Nitrate nitrogen.
7. Determination of Ammonical and Total Kjeldhal Nitrogen.
8. Determination of phosphorus (total and available).
9. Determination of SVI (including MLSS and MLVSS estimations).
10. Settling column test for primary settling tank design.
11. Settling column test for secondary setting tank design

Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

CE(W) - 407: SYSTEM DESIGN TECHNIQUES LAB

B. Tech. 4th Year (Semester - VII)

L	T	P	Credits	Class Work	: 25 Marks
--	--	2	2	Examination	: 25 Marks
				Total	: 50 Marks
				Duration of Examination	: 3 Hours

The students will be required to carry out the following exercises, that are based on the theory course CE - 310 SYSTEM DESIGN TECHNIQUES, with the help of MATLAB software / Pascal / C / C++ on personal computer.

1. Solution of Non-linear equation in single variable using the method of successive bisection.
2. Solution of Non-Linear equation in single variable using the Newton Raphson, Secant, Bi - Section and Modified Euler's, method.
3. Solution of a system of simultaneous algebraic equations using the Gaussian elimination procedure.
4. Solution of a system of simultaneous algebraic equations using the Gauss-Seidel iterative method.
5. Solution of a system of simultaneous algebraic equations using the Gauss-Seidel iterative method employing the technique of successive relaxation.
6. Numerical solution of an ordinary differential equation using the Euler's method.
7. Numerical solution of an ordinary differential equation using the Runge - Kutta 4th order method.
8. Numerical solution of an ordinary differential equation using the Predictor - corrector method.
9. Numerical solution of a system of two ordinary differential equation using Numerical integration.
10. Numerical solution of an elliptic boundary value problem using the method of Finite Differences.

Note: Ten exercises are to be performed in the Semester taking atleast seven exercises from the above list. Remaining three exercises should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

CE(W) - 409: PROJECT
B. Tech. 4th Year (Semester - VII)

L	T	P	Credits	Class Work	: 50 Marks
--	--	4	4	Total	: 50 Marks

The primary objective of this course is to develop in students the professional quality of synthesis employing technical knowledge obtained in the field of Engineering & Technology through a project work involving design, analysis augmented with creativity, innovation and ingenuity.

Project involving design/ fabrication/ testing/ computer simulation/ case studies etc. which commences in the VII Semester will be completed in VIII Semester and will be evaluated through a panel of examiners consisting of the following:

Chairman of Department	: Chairperson
Respective project supervisor	: Member
Project coordinator	: Member Secretary

The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).

Project coordinator will be assigned the project load of, maximum of 2 hrs. per week including his own guiding load of one hour. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

The format of the cover page and the organization of the body of the report for all the B. Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

CE(W) - 411: COLLOQUIUM
B. Tech. 4th Year (Semester - VII)

L	T	P	Credits	Class Work	: 25 Marks
--	--	2	2	Examination	: 25 Marks
				Total	: 50 Marks
				Duration of Examination	: 3 Hours

The objectives of the course remains

- To learn how to carry out literature search
- To learn the art of technical report writing
- To learn the art of verbal communication with the help of modern presentation techniques

A student will select a topic in emerging areas of Engineering & Technology and will carry out the task under the observation of a teacher assigned by the department.

He/ She will give a seminar talk on the same before a committee constituted by the chairperson the department. The committee should comprise of three faculty members from different specializations. The teacher associated in the committee will be assigned 2 hours teaching load per week.

However, guiding students' colloquium will not be considered towards teaching load.

The format of the cover page and the organization of the body of the seminar report for all the undergraduate programs will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

CE(W) - 402: ELEMENTS OF EARTHQUAKE ENGINEERING

B. Tech. 4th Year (Semester - VIII)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

1. **Introduction:** Introduction to various disasters, Disaster Management, Nature of dynamic loads, earthquake, wind and blast loads, characteristics of dynamic problems, method of discretization etc.
2. **Theory of Vibrations:** Formulation of Equation of Motions: Free and forced vibrations of single degree of freedom systems, damping and its effects, transient vibration, response spectrum theory. Review of formulation of flexibility and stiffness matrices of framed structures, application of vibration theory.
3. **Multi-degree of freedom systems:** Mode shapes and frequencies, numerical techniques for finding modes shapes and corresponding frequencies, orthogonality relationship of principal modes, Determination of fundamental frequency, Rayleigh's principle and its applications, normal mode theory for forced vibration, analysis of multi-degree freedom system, and dynamic response by mode superposition method.
4. **Seismic performance, repair and strengthening:** Vibration of continuum system, free and forced vibration response. Identification of Seismic damage in RC Buildings, effect of structural irregularities on performance, criteria for repair and strengthening, various techniques and their applications, seismic resistant building Architecture.
5. **Introduction to Structural Failures due to Earthquake**
6. **Introduction to IS: 1893 - 2002:** Seismic analysis and design of OHSR's, Framed structures by equivalent lateral load procedure and Modal analysis
7. **Introduction to Ductile Detailing** of Structures, Concept of Soft Story Shear Walls
8. **Use of Codes with reference to Masonry Buildings like IS: 4326, IS: 13828, IS: 13827**

Text Book

1. Dynamics of Structures, Clough and Penzian, McGraw Hill Publishing Co., New York
2. Structural Dynamics (Theory and Computation) Mario Paz, CBS Publishers and Distributors.

Reference Books:

1. Structural Dynamics (An Introduction to computer methods), Roy R. Carig, Jr., John Wiley & Sons

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 404: PROJECT PLANNING AND MANAGEMENT

B. Tech. 4th Year (Semester - VIII)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
1. **Introduction:** Definitions, Functions, characteristics of project, planning and principles of Planning and Management. Bar milestone charts.
 2. **Network Techniques (PERT):** Planning and scheduling of PERT, Probability concepts, Allocation of resources and resource leveling, Updating, controlling and monitoring.
 3. **Network Techniques (CPM):** Planning and scheduling of CPM, Time cost optimization, Allocation of resources and resource leveling, Updating, controlling and monitoring.
 4. **Material Management:** Importance, scope, objectives and functions, identification of source and vendor analysis, purchase procedure, inventory control, EOQ analysis, ABC Analysis, layout and storage of stores, safety in handling and precautionary measures, wastage and analysis of wastages.
 5. **Construction Equipments:** Importance, need, functions and principles, types of equipment and their uses, selection planning and matching of construction plant and equipment.
 6. **Financial Management:** Concept of cost, profit, price, budgeting, cash flow, cost control methods, sources of funds, balance sheet, profit and loss statement. Valuation and, its types, Determination of value of a property, Calculation of standard rent.
 7. **Account Procedure of PWD Works:** Classification of Works, Master Roll, and Deposit works. Cash Book, Imprest, temporary Advance, MAS Account, Stores, Indent, Tools and Plants.
 8. **Safety in Construction:** Hazards in construction projects, causes of accidents, classification and costs of accidents, measurement of losses, protective equipments, general safety programme for construction.

Text Books:

1. PERT and CPM Principle and application by L.S. Srinath.
2. Construction Planning, Equipment and Methods by Robert L. Peurifoy Tata Mcgraw Hill Publication New Delhi

Reference Books:

1. Construction Engineering and management by S.Seetharaman, Umesh Publication Delhi.
2. Project Planning and Control with PERT and CPM by B.C. Punima and Khandelwal, Laxmi Publication New Delhi.
3. Construction Project Management by Chitakara, Tata McGraw hill Publication , New Delhi
4. Construction Management & Planning by B. Sengupta and Guha, Tata Mcgraw hill Publication New Delhi

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

MGT(W) - 402: HUMAN VALUES, ETHICS AND IPR

B. Tech. 4th Year (Semester – VIII)

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

1. **Introduction:** Role of Engineer in Nation Building and in service of mankind.
2. **Engineering Ethics:** Senses of 'Engineering Ethics' - variety of moral issues - types of inquiry - moral dilemmas - moral autonomy Kohlberg's theory -Gilligan's theory - consensus and controversy - professions and professionalism professional ideals and virtues - theories about right action - self-interest-customs and religion - uses of ethical theories.
3. **Human Values:** Morals, Values and Ethics - Integrity - Work Ethic - Service Learning - Civic Virtue - Respect for Others - Living Peacefully - caring - Sharing - Honesty - Courage - Valuing Time - Co-operation - Commitment - Empathy - Self-Confidence - Character - Spirituality
Engineering as Social Experimentation: Engineering as experimentation - engineers as responsible experimenters - codes of ethics-a balanced outlook on law-the challenger case study
4. **Engineer's Responsibility for Safety:** Safety and risk - assessment of safety and risk - risk benefit analysis-reducing risk-the three mile island and Chernobyl case studies.
5. **Responsibilities:** Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest, occupational crime.
6. **Rights:** professional rights - employee rights - intellectual property rights (IPR)-discrimination, Arbitration and litigations.
7. **Global Issues:** Multinational corporations - environmental ethics-computer ethics-weapons development- engineers as managers-consulting engineers-engineers as expert witnesses and advisors-moral leadership-sample code of conduct.

Text Books:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York 1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.
3. W.R. Cornish, 'Intellectual Property', Universal Law Publishing Co. Ltd., Delhi, 2001.
4. P.S. Narayan, 'Intellectual Property Law in India', Gogia Law Agency, 1999.

Reference Books:

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint now available).
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics - Concepts and Cases", Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.
5. B.L.Wadehra, 'Law Relating to Patents Trade Marks, Copy Right Design & Geographical Indicators', Universal Law Publishing Co. Ltd., 2002.
6. Avinash Shivade, 'Intellectual Property Manual' , Lexis, Nexis, 2004

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 409 PROJECT
B. Tech. 4th Year (Semester - VIII)

L	T	P	Credits	Class Work	: 50 Marks
--	--	8	8	Examination	: 100 Marks
				Total	: 150 Marks

- The project started in VII Semester will be completed in VIII Semester and will be evaluated through a panel of examiners consisting of the following:
 - Chairperson of Department : Chairperson
 - Project coordinator : Member
 - External expert : To be appointed by the University
- The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).
- Project coordinator will be assigned the project load of, maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.
- The format of the cover page and the organization of the body of the report for all the B. Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

GFCE(W) - 402 GENERAL FITNESS FOR THE PROFESSION

B. Tech. 4th Year (Semester - VIII)

L	T	P	Credits	Examination	: 100 Marks
--	--	--	4	Total	: 100 Marks

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

The evaluation will be made by the committee of examiners constituted as under:

1. Dean, Faculty of Engineering & Technology : Chairperson
2. Chairperson of the department : Member
3. External expert : Appointed by the university

A. The student will present a written report before the committee with following in view:

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

- | | | |
|-----|--------------------------------------|-----------|
| I. | Academic Performance | ----- |
| II. | Extra Curricular Activities | (8 Marks) |
| III | Technical Activities | (8 Marks) |
| IV | Industrial, Educational tour | (8 Marks) |
| V | Sports/games | (8 Marks) |
| VI | Community Service, Hostel Activities | (8 Marks) |

Note: Report submitted by the students should be typed on both sides of the paper.

B. A student will support his/her achievement and verbal & communicative skill through presentation before the examiners. (40 Marks)

C. Faculty Counselor Assignment (20 Marks)

It will be the duty of the student to get evaluated by respective faculty counselor and to submit the counselor assessment marks in a sealed envelope to the committee.

A counselor will assess the student which reflects his/her learning graph including followings:

1. Discipline throughout the year
2. Sincerity towards study
3. How quickly the student assimilates professional value system etc.

DEPARTMENTAL ELECTIVES

CE(W) - 451: BRIDGE ENGINEERING

B. Tech. 4th Year (Semester - VII) Departmental Elective - I

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- 1. Investigation of Bridges:** Definition, components of a bridge, classifications, importance of bridges. Need for investigations, selection of bridge site, preliminary data to be collected, design discharge and its determination, linear waterway, economical span, vertical clearance above HFL, scour depth, choice of bridge type
 - 2. Standard Specifications:** Road bridges, I.R.C. loadings, code provisions on width of carriageway, clearances, loads considered etc. Standard specifications for railway bridges, Railway bridge code.
 - 3. R.C.C. Culvert, Skew Culvert**
 - 4. Reinforced Concrete Bridges:** T-beam bridge, Courbon's theory for load distribution. Balanced cantilever bridges, prestressed concrete bridges, (General discussions).
 - 5. Steel Bridges:** Introduction to suspension bridges, cantilever bridges, cable-stayed bridges. General arrangement of single-track broad-gauge railway bridge with open floor, design of stringers, cross girders, main trusses, top and bottom lateral bracing, complete design of through type truss bridge.
 - 6. Sub Structure:** Types of piers and abutments, design forces, design of piers and abutments.
 - 7. Bearing and Joints:** Various types of expansion bearing and fixed bearings, elastomeric bearings, joints and their types, design of bearings
 - 8. Construction, inspection and maintenance of bridges.**

Text Books:

1. Elements of Bridge Engineering, D. Johnson Victor, Oxford and IBH Publishers, New Delhi.
2. Design of Steel Structures, A.S. Arya and J.L. Ajmani, Nem Chand Brothers, Roorkee.

Reference Books:

1. Design of Concrete Bridges, Khanna Publishers, New Delhi, Vazirani & Ratwani.
2. Analysis, Design and Construction of Bridges by V.K. Raina, Tata McGraw Hill

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 453: PRESTRESSED CONCRETE

B. Tech. 4th Year (Semester - VII) Departmental Elective - I

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

- 1. Introduction:** Basic concepts of prestressing, terminology, advantages and applications of prestressed concrete. Materials for Prestressed Concrete: High strength Concrete, permissible stresses in concrete, high strength steel, permissible stresses in steel.
- 2. Prestressing Systems:** Prestensioning and post tensioning systems, various types of tensioning devices, Lec-Macall systems, Magnel Blaton post tensioning, Freyssinet systems, Gifford Udal system.
- 3. Losses of Prestress :** Types of losses of prestress, loss due to elastic deformation of concrete, loss due to shrinkage of concrete, loss due to creep of concrete, loss due to relaxation of stress in steel, loss due to friction, loss due to anchorage slip, total loss in pretensioned and post tensioned members.
- 4. Analysis of Prestress and Bending stresses:** Basic assumptions, resultant stresses at a section, concept of load balancing, cracking moment.
- 5. Deflections:** Factors influencing deflections, short term deflections of un-cracked members, deflections of cracked members, prediction of long term deflections.
- 6. Shear and Torsional Resistance:** Ultimate shear resistance of prestressed concrete members, prestressed concrete members in torsion, design of reinforcements for torsion, shear and bending.
- 7. Design of Flexural Members :** Dimensioning of flexural members, design of pre-tensioned and post tensioned beams, design of partially prestressed members, design of one way and two way slabs, continuous beams. Design for axial tension, compression and bending, bond and bearing.
- 8. Limit State Design:** Review of limit state design concepts, design loads and strengths, crack widths in prestressed members, principles of dimensioning prestressed concrete members.

Text Books:

1. Prestressed Concrete by N. Krishna Raju, TMH Publishing Company, New Delhi,

Reference Books:

1. Prestressed Concrete by P. Dayartnam, Oxford and IBH Publication, New Delhi.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 455: CONSTRUCTION METHODS AND EQUIPMENT

B. Tech. 4th Year (Semester - VII) Departmental Elective - I

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

1. Modern Construction Methods - Open excavation, shafts and tunnels, pier and caisson foundation.
2. Basement construction - construction Methods - supporting the excavations- control of ground water- shoring and underpinning- basement waterproofing.
3. Construction Methods for Bridges, roads railways, high rise buildings.
4. Construction Methods for dams, harbours , river works and pipelines.
5. Construction techniques for Earth moving, excavating , drilling, blasting, tunneling and hoisting and erection.
6. Equipment for Dredging, tunneling, dewatering.
7. Equipment for Flooring, dewatering and floors finishing
8. Equipment for production of aggregate and concrete - Crushers- feeders- screening equipment - batching and mixing equipment - hauling, pouring and pumping equipment - transporters

Text Books:

1. Antil J.M., Civil Engineering Construction, McGraw Hill Book Co., 1982
2. Stuart Wood J.R. - Heavy construction equipment and methods, Prentice Hall Englewood Cliffs, New Jersey.
3. R.L. Peuritoy - Construction Planning equipment and methods, McGraw Hills International Book Company.

Reference Books:

1. Peurifoy, R.L., Ledbette. W.B Construction Planning , Equipment and Methods McGraw Hill Co, 2000
2. Ratay., R.T Hand Book of Temporary Structures in Construction, McGraw Hill,1984.
3. Koerner., R.M, Construction & Geotechnical Methods in Foundations Engineering, McGraw Hill, 1984.
4. Varma., M., Construction Equipment and its Planning & Application, Metropolitan Book Co., 1979.
5. Smith, R.C, Andres, C.K Principles and Prentice of Heavy Construction, Prentice Hall, 1986.
6. James F. Russel - Construction equipment, Metropolitan Book Co. Delhi. 1985.
7. Principles of Construction Management by Piltcher, McGraw Hill

Reference Journals

1. ASCE Journal on Construction Engineering & Management.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 457: SOIL EXPLORATION AND TESTING

B. Tech. 4th Year (Semester - VII) Departmental Elective - I

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
1. Objections, site investigation in Civil Engineering process, problem solving and various stages in site investigation process.
 2. Planning and Desk Study - topographic maps, aerial photographs, applications in site investigation and interpretation of aerial photographs, Geological maps, soil and planning maps, site reconnaissance and local enquiries.
 3. Geological methods - different stages, Geological exploration methods - General principle distribution of physical field in subsurface - Electrical resistivity, Seismic refraction methods, their principle, methods of survey, correction to field data, Interpretation and limitations. Index and Mechanical properties of rocks, Laboratory and insitu tests.
 4. Trial pits, shafts, tunnels, auguring, and different types of drilling methods, their merits and demerits, Bore hole logging techniques (subsurface geophysical exploration) - Need for logging techniques, classification and different types logging methods.
 5. Soil Exploration methods, samples, sampling procedure, sample disturbances, samplers, Factors controlling spacing and depth of bore hole.
 6. Insitu tests, SPT, SCPT, Pressure meter tests, interpretation and application, Laboratory testing, Index properties.
 7. Technical Report writing, report format, recommendations for earth work structures. highway excavations and drainage works, dams, check report, site preparation, investigation during construction and operation.

Text Books:

1. Joyce, M.D. 'Site Investigation Practice', ESN. SPON Publishers, 1982.

References Books:

1. Hunt, R.E., Geotechnical Engineering Analysis and Evaluation, McGraw Hill Book Company, 1986.
2. Bell, Fundamentals of Engineering Geology, Butterworth and Co., London, 1983.
3. Blyth, F.G.H. and De Freitas, M.H., A Geology for Engineers, Edward - Arnold publishers Ltd., 1984.
4. Legget and Karrow, Hand book of Geology in Civil Engineering, McGraw Hill Publishers, 1983.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 459: ROCK MECHANICS

B. Tech. 4th Year (Semester - VII) Departmental Elective - I

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

1. Introduction, Importance and application of rock mechanics to engineering problems.
2. Classification, Lithological classification of rocks, Engineering classification of intact and fissured rocks, Classification of fissures, joints and faults.
3. Engineering properties of rocks, Laboratory and site measurements.
4. Definition of stress in rock, Simple methods of determining in-situ stresses, Borehole over covering technique, Bore hole deformation gauges, Evaluation of rock stresses and deformation around tunnels.
5. Simple methods of tunnel design.
6. Stability of rock slope, Modes of failure in rock mass, Analysis by simple field Bishop's method and use of Hoek's chart.
7. Foundations on rocks, Limit equilibrium methods, Plastic equilibrium of foundations, Elastic solutions for loading and excavation of foundations, Consideration of uplift pressures.
8. Methods of improving the properties of rock masses.

Text Books:

1. Goodman, R.E. (1989), 'Introduction to Rock Mechanics', John Wiley, Chichester.
2. Hudson, J.A. and Harrison, J.P. (2000), 'Engineering Rock Mechanics', Pergamon Press, Amsterdam.
3. Roberts, A. (1977)., 'Geotechnology', Pergamon Press, England.
4. Stagg, K.G. and Zienkiewicz (1968)., 'Rock Mechanics in Engineering Practice', John Wiley and Sons, London.

Reference Books:

1. Hoek, E. and Brown, E. T., "Underground Excavations", Span Press
2. Hoek, E. and Bray, J.W., "Rock Slope Engg.", Span Press

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 461: INDUSTRIAL WASTE MANAGEMENT

B. Tech. 4th Year (Semester - VII) Departmental Elective - I

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- 1. Introduction:** Uses of water by Industry - Sources and types of wastewaters, quality criteria, effluent standards- Individual and common effluent treatment plants - Population equivalent, Effects of industrial wastes on streams, land, air and waste water treatment plants
 - 2. Pretreatment Methods:** Process modification - methods and materials changes - Reduce, reuse and recycle methods, house keeping etc. to reduce waste discharge and strength of the waste and established methods for by products recovery within the plant operations.
 - 3.** Equalization - Neutralization - Oil separation - Floatation - Precipitation -Adsorption - Aerobic and anaerobic biological treatment - High rate reactors.
 - 4. Chemical oxidation** - Ozonation -Ion Exchange - Membrane technologies.
 - 5. Residuals of Industrial waste treatment** --Characteristics of sludge - Thickening, digestion, conditioning, dewatering and disposal of sludge.
 - 6. Industrial Waste Treatment I:** manufacturing process description - wastewater characteristics and waste treatment flow sheet for typical industries - Textiles - Tanneries - Pulp and Paper.
 - 7. Industrial Waste Treatment I:** manufacturing process description - wastewater characteristics and waste treatment flow sheet for typical industries -Metal finishing - Petroleum refining - Chemical industries - Sugar and distilleries.
 - 8. Industrial Waste Treatment I:** manufacturing process description - wastewater characteristics and waste treatment flow sheet for typical industries-Dairy -Iron and Steel- Fertilizers -Nuclear power plants.

Text Books:

1. Eckenfelder. W.W., Industrial Water Pollution Control, McGraw Hill, 2000.
2. Arceivala.S.J. Wastewater Treatment for Pollution Control, Tata Mc.Graw Hill. 2008.

Reference Books:

1. Nemerow,N.L., Theories and Practices of Industrial Wastes Treatment, Addison
2. and Wesley, 1963.
3. Gurnham,C.F., Principles of Industrial Waste Treatment, John Wiley, New York,1948.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 463: GROUND WATER ENGINEERING

B. Tech. 4th Year (Semester - VII) Departmental Elective - I

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

1. Occurrence of groundwater, origin & distribution of groundwater, Role of Ground Water in hydrological cycle, geologic formation as aquifers, Types, Aquifer parameters
2. groundwater movement, groundwater flow in unsaturated zones and fractured media.
3. Hydro-geologic investigation, 3-D general flow equations.
4. Well Hydraulics: Darcy's law, Steady flow towards fully penetrating well, Equation of motion and its applications to ground water flow problems, Determination of aquifer constant in various types of aquifers, Types of tube wells, Methods of construction, Well development.
5. Response of confined and unconfined aquifers to pumping, leaky confined aquifers and partially penetrating wells.
6. Surface & subsurface investigation of groundwater.
7. Artificial recharge, Saline water intrusion
8. Groundwater modelling

Text Books:

1. Ground Water Hydrology: David Keith Todd
2. Fundamentals of Groundwater : Schwartz and Zhang
3. Water Resources Engineering : Ralph A. Wurbs and Wesley P. James
4. Groundwater Flow and Mass Transport Modelling (Theory and Applications) : M. Thangarajan

Reference Books:

1. Ground Water : Raghunath
2. Ground Water : Freeze and Cherry
3. Environmental Geology-An Earth System Science Approach : Dorothy Merritts, Andrew De Wet & Kirsten Menking
4. Applied Hydrology of Fractured Rocks : B. B. S. Singhal and R. P. Gupta
5. Groundwater Resources Development : L. Hamill and F. J. Bell
6. Construction Dewatering and Groundwater Control : J. Patrick Powers, Arthur B. Corwin, Paul C. Schmall and Walter E. Kaeck

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 452: DOCKS AND HARBOUR ENGINEERING

B. Tech. 4th Year (Semester - VIII) Departmental Elective - II

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- Growth and regulation of Ports:** History of Port - Classification of Harbours - Factors affecting the growth of Port. - Requirement of a Harbour- General Planning Port capacity -traffic analysis - Berth occupancy - financial evaluation - EIA -Description of selected Indian ports.
 - Harbour Planning (Technical):** Site investigation - harbour entrance - Navigational Channel - Depth of harbour - Turning basin - Anchor basin - berthing area - Storage area - Shipping terminal facilities - Essentials of passenger terminal, dry bulk cargo terminal, Liquid bulk cargo terminals and container terminals.
 - Introduction to ocean waves** - Wave transformation - Wave and wind climate inside Harbour.
 - Break waters:** Types - Factors determining their selection - Forces on break waters - Design of rubble mound and vertical break waters - Physical Model Studies.
 - Berthing structures** - Types - Loads - Selection of berthing structures - Design principles of diaphragm walls, dolphins and piles.
 - Selection and Design principles** of Dock fenders and Mooring accessories.
 - Design principles of dock structures** - Graving dry dock - Slip way - floating dry dock.
 - Monitoring and repair of harbour structures** - Dredging - Navigational aids - Light house.

Text Books:

- Harbour and Coastal Engineering (Indian Scenario) Vol - I & Vol - II; S. Narasimhan & S. kathiroli, NIOT- Chennai
- Design and construction of Port and marine Structures - Alonzo Def. Quinn - McGraw - Hill book Company

References

- IS: 7314 1974 - Glossary of terms relating to Port and harbour Engineering.
- IS: 4651 - Code of practice for Planning and Design of Port and harbour (Part - I) Site Investigation, (Part - II) Earth Pressure, (Part - III) Loading, (Part - IV) General Design Consideration, (Part - V) Layout and functional Requirement.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 454: ROAD SAFETY AND ENVIRONMENT

B. Tech. 4th Year (Semester - VIII) Departmental Elective - II

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
1. Planning for Network, Land Use and Road Environment for Safety, Designing for Safety: Road Link Design, Junctions.
 2. Introduction to Road Safety Engineering and Crash Investigation, Human Factors Relating to Crashes/Accidents, Crash/Accident Investigation & Crash Problem Diagnosing, Crash Problems into Solutions & Crash, Investigation Reporting, Crash/Accident Costing, Economic Appraisal.
 3. Road Safety Auditing- An Introduction, How to Conduct Road Safety Audit, Design Stage Road Safety Audit, Road Safety Audits of Land Use Developments, Traffic Control Devices & Safety, Needs of Different Road Users, Road Safety Audit in Road Works & Pre Opening Safety Audit..
 4. Street Lighting & Traffic Signals, Provisions for NMT Vehicles in India, Safety Provisions for Pedestrians & Cyclists, Road Signs and Pavement Markings.
 5. Safe System Approach- A Global Perspective, Speed Management & safety, Safe System and Speed & Assessing speed limit, Type of speed limit & Speed zone signing Infrastructure to support safe speed feedback and enforcement.
 6. Hazard Management Organizational commitment & encouraging RSA, Road Safety Audit Checklist.
 7. Site Visits and Preparation of the Audit Reports.
 8. Risk Assessment & Prioritization of audit recommendations, Solutions and effectiveness & Corrective, Action Report.

Text Books:

1. Highway Engineering by Khanna and Justo, Nem Chand & Brothers, Roorkee
2. Highway Engineering by L.R. Kadyali, Nem Chand & Brothers, Roorkee

Reference Books:

5. Highway Engineering by Oglesby and Hews
6. Transportation Engineering by G.V. Rao, Tata McGraw Hill Publisher, New Delhi
7. Traffic Engineering by Matson,Smith & Hurd
8. Road safety audit Manual

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 456: CONSTRUCTION MANAGEMENT

B. Tech. 4th Year (Semester - VIII) Departmental Elective - II

L	T	P	Credits	Class Work	:	50 Marks
3	1	--	4	Examination	:	100Marks
				Total	:	150 Marks
				Duration of Examination	:	3 Hours

- 1. Preparation:** Site Clearance, Layout, infra-structural facilities, organizing utilities, site grading Security, safety, legal frame-work, acquisition of land, liaison with local authorities.
- 2. Organization:** Various levels, job description, role of consultants, contractor and client and their responsibilities, training, Job layout, placement of material equipment on site. Documentation and inspection.
- 3. Mobilization:** Machinery, stores equipment, contractor, work-shop, Quarries, vendors
- 4. Supervision:** Procedure for quality assurance, Controlling and reporting system, Labour laws, legislation

Text Books:

1. Construction Management and Planning by R. Sengupta and H. Guha, Tata McGraw Hill
2. Hand Book for Construction Management, P.K.Joy, Mac Milan India Ltd.
3. Construction Planning, Equipment and Method by R. Peurofy; McGraw Hill
4. Ghalot, P.S., Dhir,D.M., Construction Planning and Management, Wiley Eastern Limited,1992.

Reference Books:

1. Total Project Management by P.K. Joy, McMilan India Ltd.
2. Hand Book on Labour Contract Legislation, ILO
3. Chitkara, K.K., Construction Project Management, Tata McGraw Hill Publishing Co, Ltd., New Delhi, 1998.
4. Punmia,B,C., Project Planning and Control with PERT and CPM, Laxmi Publications, New Delhi,1987.

Note: In the semester examination, the examiner will set eight questions in all, at least two questions from each unit and students will be required to attempt only 5 questions.

CE(W) - 458: SOIL DYNAMICS

B. Tech. 4th Year (Semester - VIII) Departmental Elective - II

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

1. Nature of dynamic loads, stress conditions on soil elements under Earthquake loading. Theory of vibrations.
2. **Dynamic Earth Pressure problem and retaining walls:** Behaviour of retaining walls during earthquakes. Modification of Coulomb's theory, Modified graphical constructions for lateral earth pressure, Analytic solution of $C - \phi$ soils, Indian standard code of practice. Dynamic Properties of soils.
3. **Liquefaction of Soils:** Theory, criterion of liquefaction, factor affecting and its determination, laboratory studies in Triaxial shear and oscillatory simple shear, Evaluation of liquefaction potential by various methods. Vibration table studies.
4. **Liquefaction behaviour of loose and dense sands;** silt and clayey silts. Introduction to Machine Foundations , Criteria for satisfactory functioning of machine foundation, methods of analysis, Degrees of freedom of a block foundation, Soil spring stiffness coefficients.
5. **Block Foundation:** Vibrations of a block, determination of dynamic coefficient by various methods. Design procedure for block foundation.
6. I.S. method for design of reciprocating machines.
7. Vibration Isolation & screening of waves.
8. Introduction to the dynamics of dams and reservoirs.

Text Books:

1. Rao, Kameswara "Vibration Analysis and Foundation Dynamics" Wheeler
2. Saran, Swami, "Soil Dynamics and Machine Foundations" Galgotia, New Delhi.

Reference Books:

1. Prakash, S., Soil Dynamics, McGraw Hill International Edition, New York. Publishing, New Delhi.
2. Barken, D.D., "Dynamics of Bases and Foundations," McGraw Hill Book Company, New York.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 460: GROUND IMPROVEMENT

B. Tech. 4th Year (Semester - VIII) Departmental Elective - II

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
1. Introduction to different methods of ground improvement and its importance. Mechanical method of ground improvement, Ruthfuch method; methods based on PI.
 2. Ground Freezing, methods, Hydrogeology of frozen soils, strength and behaviour of frozen soils. Ground heating, effect on soil properties, methods.
 3. Drainage Techniques, filter drains, sand drains, sandwicks & band drains, lime columns. Electro-osmosis and Electrochemical stabilization.
 4. Compaction & consolidation techniques viz. pre-compression, compaction piles, vibro-compaction (Vibro-floatation, Terra-probe, vibro-replacement, concrete columns & vibro-displacement), Dynamic compaction, explosive compaction.
 5. Soil Reinforcement, load transfer mechanism, strength development, anchored earth. In-situ reinforcement techniques viz soil nailing, reticuled micropiles, soil dowels and anchors.
 6. Grouts, properties, penetration, clay, cement clay, cement, clay-chemical, chemical and Bituminous grouts, grouting methods viz penetration, claquage, compaction & jet.
 7. Reinforced earth; Introduction, Mechanism of reinforced types of reinforcement strength characteristics. Design of reinforced earth retaining walls, abutments, earth slopes.
 8. Exclusion techniques viz. sheet piles, contiguous bored piles, secant piles, slurry trenches. Diaphragm walls. Design of stone columns.

Text Books:

1. Ground Improvement Techniques by P. Purushotham Raj, Tata McGraw Hill, ND.
2. Engineering Treatment of Soils by F.G. Bell, E & FN Spon Publishers, UK.

Reference Books:

1. Engineering Principles of Ground Modification by M.R. Hausmann, McGraw Hill Publishers, New York.
2. Ground Improvement Techniques & their Evolution by W.F. Van Impe., A.A. Balkema Publishers, Netherlands.
3. Koerner, R.M., Construction & Geotechnical methods in foundation engineering, MGH, New York,1985
4. Bowle's.J.E., Foundation Analysis and design,4th edition,MGL,1998.
5. Jones.C.J.F.P., Earth reinforcement and soil structures, Butter worth &co., London,1985
6. Arora.K.R., Soil mechanics and foundation Engineering,SPD,2001

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 462: ENERGY EFFICIENT BUILDINGS

B. Tech. 4th Year (Semester - VIII) Departmental Elective - II

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- 1. Introduction:** Fundamentals of energy - Energy Production Systems - Heating, Ventilating and air conditioning -Solar Energy and Conservation - Energy Economic Analysis - Energy conservation and audits -Domestic energy consumption - savings -Energy use in buildings - Residential - commercial buildings.
 - 2. Environmental:** Energy and Resource conservation - Design of green buildings - Evaluation tools for building energy - Embodied and operating energy - Peak demand - Comfort and Indoor air quality - Visual and acoustical quality - Land, water and materials - Airborne emissions and waste management.
 - 3. Design:** Natural building design consideration - Energy efficient design strategies - Contextual factors - Longevity and process Assessment -Renewable energy sources and design.
 - 4. Advanced building Technologies** - Smart buildings - Economies and cost analysis.
 - 5. Services:** Energy in building design - Energy efficient and environment friendly building - Thermal phenomena - thermal comfort - Indoor Air quality - Climate, sun and Solar radiations.
 - 6. Psychometrics** - passive heating and cooling systems - Energy Analysis - Active HVAC systems -Preliminary Investigation - Goals and policies.
 - 7. Energy audit:** Types of energy audit - Analysis of results - Energy flow diagram - Energy consumption/ Unit production - Identification of wastage -Priority of conservative measures - Maintenance of management programme.
 - 8. Energy Management:** Energy management of electrical equipment - Improvement of power factor - management of maximum demand - Energy savings in pumps - Fans - Compressed air systems - Energy savings in Lighting systems - Air conditioning systems - Applications.

Text Books:

1. Moore F., Environmental Control System McGraw Hill, Inc., 1994.
2. Brown, G Z, Sun, Wind and Light: Architectural design strategies, John Wiley, 1985.

Reference Books:

1. Cook, J, Award - Winning passive Solar Design, McGraw Hill, 1984.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 464: WATER POWER ENGINEERING

B. Tech. 4th Year (Semester - VIII) Departmental Elective - II

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

1. Water power utilization principles, power from flowing streams, demand for power, role of storage and pondage in water power development, firm power and secondary power.
2. **Types of water power developments:** Run-off river, storage, pumped storage, tidal and others, characteristics and layout of low, medium and high head hydropower developments.
3. **Conveyance of water:** Channels, Penstocks, flumes and tunnels.
4. **Surges in open channels and water hammer and surges in closed conduits.**

Text Books:

1. Water Power Engineering, H K Barrow, Tata McGraw Hill
2. Hydro Power Structures, R S Varshney, Nem Chand & Bros.
3. Hydropower Engg., C. C. Warnik, Prentice Hall.

Reference Books:

1. Applied Hydraulic Transients, M H Chaudhary, Van Nostrand Reinhold
2. Hydropower Development, Vol. 3,4,5,6, Norwegian Institute of Technology, Division of Hydraulic Engg.

Note: In the semester examination, the examiner will set eight questions in all, at least two questions from each unit and students will be required to attempt only 5 questions.

CE(W) - 482: FINITE ELEMENT METHODS

B. Tech. 4th Year (Semester - VIII) Departmental Elective - III

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

1. Introduction and basic concepts. Energy approach and variation principles in Finite-Element Method.
2. **Basics Elements I:** Various element shapes, Isoparametric elements, Axi-symmetric elements, plate bending elements.
3. **Basic Elements II:** introduction to 3-D elements, shell elements, interface elements, boundary elements, infinite elements.
4. **Direct and variational formulations of element stiffness and loads.**
5. **Assemblage of elements, Boundary Conditions and Solution of overall problems.**
6. **Techniques of nonlinear analysis:** Mesh generation, graphic display and software packages.
7. Organization of FEM programs, efficient solutions, input/output, pre and post processors.

Text Books:

1. Finite Element Analysis – Theory and Programming, C S Krishnamurthy, TMH Publication, New Delhi
2. Concept and Application of Finite Element Analysis, R D Cook, D S Malcus, John Wiley, Newyork.

Reference Books:

1. Introduction to Finite Element Method, C S Desai and J F Abel, Affiliated East West Press, New Delhi.
2. Finite Element Primer, V K Manicka Selvam, Dhanpat Rai Publication, New Delhi

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 484: RURAL WATER SUPPLY AND SANITATION
B. Tech. 4th Year (Semester – VIII) Departmental Elective - III

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

1. Introduction to Rural Water Supply, Nature of the Problem, Sources locating a well, Construction of a Dug-well, Drilled Tubewell.
2. Water-lifting arrangements, Hilly Areas lakes and ponds.
3. Treatment in Rural Water Supplies.
4. Sanitation, Choosing Waste Disposal Techniques, Options for Excreta Disposal and Techniques for Reusing.
5. Waste Disposal and Reuse, on Site collection and Disposal, pit latrines, Compositing privy.
6. Design of Septic Tanks and Aquaprivy.
7. Collection and off Site Treatment, Cartage, waterborne ponds, Composting, Aquatic weeds.
8. Reuse, Irrigation, Aquaculture, Algae, Fertilization and Biogas.

Text Books:

1. Excreta Disposal for Rural Areas and Small Communities. Wagner, Lanoix, WHO Publication.
2. Small Community water supplies - Holket (ed.) John Wiley & Sons.

Reference Books:

1. Manual on Water Supply and Treatment - CPHEEO Govt. of India.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 486: DISASTER MANAGEMENT

B. Tech. 4th Year (Semester - VIII) Departmental Elective - III

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

1. **Introduction to Disaster Management:** Natural and Man made Disasters- International Year of Disaster Reduction.
2. **Hydro-meteorological based disasters I:** Tropical Cyclones, Floods, droughts.
3. **Hydro-meteorological based disasters II:** Desertification Zones and Forest Fires.
4. **Geological based disasters:** Earthquake, Tsunamis, Landslides, and Avalanches.
5. **Manmade Disasters I:** Chemical Industrial hazards, major power break downs, traffic accidents, Fire hazards etc.
6. **Manmade Disasters II:** Chemical Industrial hazards, major power break downs, traffic accidents, Fire hazards etc.
7. **Use of remote sensing and GIS** in disaster mitigation and management.
8. **Risk and Vulnerability to disaster mitigation and management options:** Warning and Forecasting.

Text Books:

1. Thomas D. Schneid., Disaster Management and Preparedness, CRC Publication, USA, 2001
2. Patrick Leon Abbott, Natural Disasters, Amazon Publications, 2002
3. Ben Wisner., At Risk: Natural Hazards, People vulnerability and Disaster, Amazon Publications, 2001
4. Oosterom, Petervan, Zlatanova, Siyka, Fendel, Elfriede M., "Geo-information for Disaster Management", Springer Publications, 2005

Reference Books:

1. Selected Resources Published by the National Disaster Management Institute of Home Affairs, Govt. of India, New Delhi.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 488: WASTE MANAGEMENT

B. Tech. 4th Year (Semester – VIII) Departmental Elective – III

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- Types of Industrial Waste:** Liquid, solid, atmospheric and hazardous, Hazardous wastes: Characterization and treatment.
 - Solid wastes, non-hazardous wastes and hazardous wastes:** Definition, sources and characteristics; Sampling and analysis techniques; Inventorying wastes; Strategies for source reduction, for the recovery of residual substances, byproducts and resources and for recycling and reuse of wastes.
 - Municipal solid waste management:** Segregation and recycling and reuse of wastes; Collection, transportation and storage of municipal solid waste; Resource recovery from wastes; waste exchanges; Municipal solid waste management programs.
 - Treatment and disposal:** Biological and chemical treatment of hazardous wastes; Composting and vermi-composting of wastes.
 - Solidification and stabilization of wastes; Incineration for the treatment and disposal of municipal solid wastes and hazardous wastes.
 - Land farming; Landfill disposal of municipal solid waste and hazardous waste; and Bioremediation.
 - Electronic waste Management.
 - Legal requirements:** Municipal solid waste rules; Hazardous waste rules; Biomedical waste rules; Rules related to recycled plastics, used batteries, flyash, etc.

Text Books:

- Pollution Control Acts, Rules and Notifications Issued Thereunder. Pollution Control Law Series: PCLS/02/1992. Central Pollution Control Board, Delhi.
- Management of Municipal Solid Wastes - Status and Options. Control of Urban Pollution Series (CUPS/41/1994-95). Central Pollution Control Board. Delhi.
- Hazardous waste management. M.D. LaGrega, P.L. Buckingham, J.C. Evans and the Environmental Resources Management Group. McGraw-Hill International Editions.

Reference Books:

- Solid waste management in developing countries. A.D. Bhide and B.B. Sundaresan. INSDOC-UNESCO, New Delhi.
- Environmental Engineers Handbook. D.H.F. Liu and B.B. Liptak. Lewis Publishers, New York.
- Management of Solid Wastes in Developing Countries. Frank Flintoff. World Health Organization. New Delhi.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 490: MASS RAPID TRANSPORT SYSTEMS

B. Tech. 4th Year (Semester - VIII) Departmental Elective - III

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- 1. Role of Transportation:** History of transit, Recent Trends in transit, Mass transportation characteristics, Demand Characteristics: Spatial, temporal and behavioral characteristics.
 - 2. Mass Transportation Planning:** Transportation demand surveys, Mass transportation demand estimation, Demand projection, Trip generation, Trip distribution, Model split and route assignment.
 - 3. Transport system Performance:** Performance evaluation and analysis, Structure of decision making, Evaluation and selection methods, and selection procedure.
 - 4.** Generation of alternative schemes, Economic evaluation methods.
 - 5. Terminals:** Functions of terminals, Design, Typical Terminal characteristics.
 - 6. Scheduling and Routes:** Service analysis, Vehicle dispatch policy, Vehicle Requirements, Spacing of bus stops, Route spacing and performance.
 - 7. Management:** Operational and management issues in transport planning, Reserved bus lanes and signals, Vehicle monitoring and control system,, Nodal coordination.
 - 8. Special Systems:** People mover systems, Underground transportation, para transit, Rail transit system, case studies.

Text Books:

1. Kristhi, Lal, Transportation Engineering, PHI, Delhi, 2008 Hay, W.W., An Introduction to Transportation Engineering, 2nd Ed., John Wiley & Sons, 2001
2. Kadiyali, L. R, "Traffic Engineering and Transport Planning", Khanna Publishers New Delhi - 110006, 2006

Reference Books:

1. Hutchinson, Urban Transport Planning, John Wiley, 2006
2. Dickey, J.W., et. al., Metropolitan Transportation Planning, TMH edition, 2002.
3. Pagnette, R.J., et.al, Transportation Engineering - Planning and design, 2nd edn., John Wiley & Sons, 2002.
4. Railis, V.R, Intercity Transport, Engineering and Planning, The Macmillan Press, 2003.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE(W) - 492: WATER RESOURCES PLANNING AND MANAGEMENT

B. Tech. 4th Year (Semester - VIII) Departmental Elective - III

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
1. Introduction: Role of water in development of water resources, Assessment of water resources of the country, Requirement for various uses, Future of water resources engineering
 2. Planning and Management: Issues in planning, Water resources planning process, Planning for single purpose and multipurpose projects, Principles of multipurpose development. Functional requirement of multipurpose uses, Compatibility of multipurpose uses, Cost allocations in multipurpose projects, Comparison of alternatives, Inter-basin transfer of water, Conjunctive use of surface and ground water.
 3. Project Economics: Basic principles, Tangible and intangible values, Selection of interest rate, Cash flow diagrams Discounting factors, Discounting techniques - present-worth method, annual-cost method, benefit-cost ratio method, rate of return method, Risk and uncertainty, Application to water resources problems
 4. Systems Engineering: Water resources system, Objectives and constraints in water resources planning, The Ganga system, Punjab Water resources system; Lagrange multiplier, Linear programming, Simplex method, Application to water resources problems - conjunctive use of surface and ground water, Reservoir storage-yield models, Water quality management models, Dynamic programming and its application to water supply allocation problems, Capacity expansion and reservoir operation.

Text Books:

1. Linsely et al., "Water Resource Engineering", McGraw Hill Publishing Company, New York.
2. L.D. James and R. R. Lee, "Economics of Water Resources Planning", McGraw Hill Publishing Company, New York.
3. Loukes et al., "Water Resources Systems Planning and Analysis", Prentice Hall of India, New Delhi

Reference Books:

1. M.C. Chaturvedi, "Water Resources Planning and Management", Tata McGraw Hill.
2. B.C. Punmia and R.B. Pande "Irrigation and Water Power Engineering", Standard Publishers.
3. V.T. Chow, "Applied Hydrology", McGraw Hill Publishing Company, New York.
4. S.K. Garg, "Irrigation Engineering and Hydraulic Structures", Khanna Publishers, ND.

Note: In the semester examination, the examiner will set eight questions in all, at least two question from each unit and students will be required to attempt only 5 questions.

CE(W) - 494: DESIGN OF MASONRY

B. Tech. 4th Year (Semester - VIII) Departmental Elective - III

L	T	P	Credits	Class Work	: 50 Marks
3	1	--	4	Examination	: 100Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- 1. Introduction:** Brick masonry units, Concrete masonry units, types, grades and properties of concrete masonry units, mortar, grout and plaster.
 - Masonry construction, types of bonds, bond at connections, types of joints, contraction and expansion joints
 - 3. Brick Masonry in Buildings:** Brickwork, brick walls, brick columns and piers. Allowable stresses, cross sectional area, shape factor of units, slenderness ratio. Type of loading, net permissible stresses, composite brick concrete piers. Bed stone and bed plates.
 - 4. Laterally loaded Masonry Structure:** Structures and loads, stability of masonry, masonry dams, retaining walls.
 - 5. Foundations, Piers, Walls and Abutments:** Wall and column footings in buildings, bridge foundations, the substructure, loads on substructures. Determination of safe bearing capacity. Lateral load resistance of well foundations.
 - 6. Structural Design:** General, Load Dispersion, arching action, design thickness/cross section. Design of foundations, piers, walls, dams and retaining walls, design of RBC slabs, lintels, Reinforced Brick columns.
 - 7. Masonry Arches and Domes:** Arches in buildings, stability of masonry arches. Design of masonry arches by elastic theory. Analysis of masonry domes – stability of masonry domes.
 - 8. Seismic Design** of brick masonry buildings. Introduction to SP20 (S&T):1991 “Handbook on Masonry Design and Construction”.

Text Book

1. Structural Design in Steel, Masonry and Timber by A.S. Arya, Nem Chand & Bros.
2. Building Construction, Sushil Kumar, Standard Publishers and Distributors

Reference Books:

1. SP20 (S&T): 1991 “Handbook on Masonry Design and Construction”.

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

OPEN ELECTIVES

HUM(W) – 451: LANGUAGE SKILLS FOR ENGINEERS

B. Tech. 4th Year (Semester – VII) Open Elective

L	T	P	Credits	Class Work	:	50 Marks
4	--	--	4	Examination	:	100 Marks
				Total	:	150 Marks
				Duration of Examination	:	3 Hours

The real challenge before the students starts when they cross the threshold of the college after completing their degree. They, all of a sudden, find themselves competing for job/ P.G. Degrees, through various entrance tests and interviews. Verbal ability forms a major portion of these tests. Without sound language skills and its semantic-syntactic know-how, the students with engineering background find themselves almost under- prepared for such tests. With this difficulty of students in mind, this course is proposed to make them technically proficient in handling the language skills required in competitive exams. The course would expose students to almost all variety of items, the common run of such tests as CAT, GMAT etc. And in the context of LPG, this cutting edge competence becomes imperative, and no professional education can afford to overlook this aspect.

- UNIT I Remedial English:** Parts of speech; Gerunds, participles and infinitives; Clauses; Sentence-constructions (unity; avoidance of choppy and rambling sentences, logic and consistency, conciseness, sequencing of ideas); Sentence errors - agreement between verb and subject, pronoun and antecedents, sequence of tenses, problems involving modifiers (dangling and misplaced modifiers); Shifts in point of view - consistency of number and person, tense, mood, voice and subject; Parallelism; Omissions and mixed constructions.
- UNIT II Vocabulary:** Methods of building vocabulary - etymological roots, prefixes and suffixes; Commonly used foreign words and phrases; spelling; words often confused; synonyms and homonyms; one word substitutes; verbal idioms.
- UNIT III Punctuation and Mechanics:** End Punctuation; Internal Punctuation; Word Punctuation.
- UNIT IV Comprehension:** Abstracting; Summarising; Observations, Findings and Conclusions; Illustration and Inductive Logic; Deduction and Analogy.
- UNIT V Presentation:** Oral presentation - Extempore, discussion on topics of contemporary relevance, interviews.

Note: Eight questions will be set and students will be required to attempt five questions in all.

SUGGESTED READING:

1. Working with Words by R.Gairns and S.Redman, Cambridge University Press, London.
2. Meanings into Words - Upper Intermediate Students Book, Doff/jones, Foundation Books (Cambridge university Press), Delhi.
3. A Practical English Grammar by A.J. Thomson and A.V. Martinet, OUP, Delhi.
4. Examine your English by Margaret M. Maison, Orient Longman, New Delhi.
5. A Practical Guide to Colloquial Idiom by W.J. Ball, Longman.
6. A guide to Correct English by L.A. Hill, Oxford.
7. Structural Essentials of English by H. Whitehall, Longman.

8. Advanced English Practice by B.D. Graver, OUP. Delhi.
9. Public Speaking, Sudha Publication Pvt. Ltd., New Delhi.
10. Group Discussion, Sudha Publication Pvt. Ltd., New Delhi.

HUM(W) – 453: HUMAN RESOURCE MANAGEMENT

B. Tech. 4th Year (Semester – VII) Open Elective

L	T	P	Credits			
4	--	--	4	Class Work	:	50 Marks
				Examination	:	100 Marks
				Total	:	150 Marks
				Duration of Examination	:	3 Hours

- Unit-I** **Understanding Organisational Behaviour:** Definition, Goals of Organisational behaviour. Key forces affecting Organisational Behaviour. Fundamental Concepts of Organisational Behaviour.
- Unit-II** **Motivation:** Meaning, Objectives and importance of motivation. Theories of Motivation, Maslow’s theory, Mc Greger’s Theory Herzberg’s theory.

Morale : Meaning; Factors affecting morale, types of morale morale and productivity, Evaluation of morale, improving morale.
- Unit-III** **Communication:** Definition & importance of Communcation; Formal & informal communication, Barriers in communication.
- Unit-IV** **Leadership:** Definition & importance, Nature of leadership various approaches to leadership styles.
- Unit-V** Importance of human resources in industry, Definition of human resource management, mechanical approach towards personnel, Paternalism, Social system approach.
- Unit-VI** Need for human resource planning, process of human resource planning, Methods of recruitment, Psychological tests and interviewing, Meaning and importance of placement, Meaning and techniques of induction. Training and development : Concepts of training and development, Importance of training and development, Management development its nature, purpose and method.
- Unit-VII** Significant factors affecting compensation, Methods of wage payment, Wage differentials, Causes of difference in Wages, Types of wage differentials, Wage incentives, Meaning, Objectives, types of incentive plans.

Text Books:

1. Human Resource and Personnel Management – K. Aswathappa – Tata McGraw Hill Publishing Company Ltd.
2. Personnel Management : C.B. Mamoria, Himalaya Publishing House.
3. Organisational Behaviour – Dr. L.M. Prasad (Sultan Chand & Sons).

Reference Books:

1. Personnel Management & Industrial Relations : Dr. T.N. Bhagoliwal: Sahitya Bhawan Agra.
2. Personnel Management : V.G. Karnik, Jaico Publishing House.
3. Personnel management & Industrial Relation: Tripathi: Sultan Chand & Sons.
4. Personnel Management – Arun Monappa & Mirza Saiyadain – Tata McGraw Hill Publishing Co. Ltd.
5. Personnel Management and Industrial Relations – D.C. Sharma & R.C. Sharma S.J. Publications.
6. Principles of Personnel Management – Edwin B. Flippo (McGraw Hill).
7. Organisational Behaviour – K. Adwathappa.

8. Organizational Behaviour – John W. Newsstorn & Keith Davis, Tata McGraw Hill Publishing Company Limited, ND

Note: Eight questions are to be set at least one question from each unit and the students will have to attempt five questions in all.

HUM(W) – 455: ENTREPRENEURSHIP
B. Tech. 4th Year (Semester – VII) Open Elective

L	T	P	Credits	Class Work	: 50 Marks
4	--	--	4	Examination	: 100 Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- UNIT-I** Promotion of Entrepreneurship: Meaning, definition and functions of an entrepreneur, qualities of a good entrepreneur; Role of Entrepreneur in economic development; Government measures for the promotion of small scale industries with special reference to Haryana; Cultural factors in developing entrepreneurship.
- UNIT-II** Ownership and Location of Industrial Units: Different forms of Industrial Organisation. Theories of Industrial location. Process of preparing project reports.
- UNIT-III** Size of Firm and Pricing: Concept of optimum firm, factors determining Optimum size. Technical, Managerial, Marketing Uncertainties and risk. Pricing Methods, Policies and procedures.
- UNIT-IV** Financing of Small Industries: Importance and need : Commercial Banks and term lending in India; Banks and under-writing of capital issues; Brief description about the role of other financial agencies viz; Industrial Finance Corporation of India. State Financial Corporation, Industrial Development Bank of India; Unit Trust of India.
- UNIT-V** Problems Faced by Small Enterprises: Problems connected with Marketing, Management of New Products; Power; Finance; Raw Material; Under-utilization of capacity; Causes of under – utilization; Rehabilitation of Sick Mills.
- UNIT-VI** Government and Business: (a) Highlights of Industrial Policy and Licensing Policy. (b) International Marketing with special reference to export documentation.

Recommended Books:

1. Entrepreneurship of Small Scale Industries – Deshpande Manohar D. (Asian Publishers, New Delhi)
2. Environment and Entrepreneur – Tandon B.C. (Asian Publishers, New Delhi).
3. The Industrial Economy of India – Kuchhal S.C. (Chaitanya, Allahabad).
4. Emerging Trends in Entrepreneurship Development Theories & Practices – Singh P. Narendra (Int. Founder, ND)
5. Entrepreneur, Banker & Small Scale Industries – Bhattacharya Hrisnikes.
6. Entrepreneurship & Growth of Enterprise in Industrial Estates – Rao Gangadhara N.

Note: Eight questions are to be set atleast one question from each unit and the students will have to attempt five questions in all.

HUM(W) – 457: BUSINESS COMMUNICATION
B. Tech. 4th Year (Semester – VII) Open Elective

L	T	P	Credits	Class Work	: 50 Marks
4	--	--	4	Examination	: 100 Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

The course proposes to help students develop business and technical communication competence. It focuses on writing skills and strategies for specific purposes. The inevitability of introducing this course to Engineering students is embodied in that it has comparatively a high concentration of certain complex writing techniques and procedures.

COURSE CONTENT:

- Unit-I Business correspondence:** Characteristics and Formats of Business letter; Quotations, Orders, Tenders, Sales letters, claim and adjustment letters, Credit and Collection letters, Application Letters for vacant situations with emphasis on Resumes and Curriculum Vitae; E-mail and Netiquette – format, style and tone.
- Unit-II Business Reports and Proposals:** Importance, Function, Pattern and formats of Reports, Typical Business Reports, Report Organisation and Presentation, and Formal Reports; Proposal Formats, Writing problem-Solving Proposals, Executive Summary Proposals and project Proposals.
- Unit-III Meetings:** Writing of Memorandum, Notes, Agenda and Minutes of Meeting.
- Unit-IV Public Relations and Advertising Documents:** Press Releases, Public Service Announcements, Advertising Strategy and its objective, Designing of Classified and Display Advertising copies.

SUGGESTED READING:

1. Business Communication: Process & Product by Hary Ellen Guffey, IV Edition, South-Western College Publishing, Cincinnati.
2. Business Correspondence and Report Writing by R.C. Sharma & Krishna Mohan, Tata Macgraw Hill Publication, New Delhi.
3. Effective Business English and Correspondence by M.S. Ramesh and C.C. Pattanshetti, R. Chand & Co., New Delhi.
4. Effective Letters in Business by Robert by C. Shrueter, Tata Macgraw Hill, New Delhi.
5. English Business Letters by F.W. Wing & D. Annecree, Orient Longman.
6. Written Communication in English by Sarah Freeman, Orient Longman.
7. International Business English by Leo Jones & Richard Alexander, Cambridge University Press.
8. General and Business English by Sweet Stephen, Sir Issac Pitman & Sons Ltd., London.
9. How to Write and Present Technical Information, Charles H. Sides, Cambridge University Press, U.K.
10. Strategies for Engineering communication, Susan Stevenson/Steve Whitmore, John Wiley and Sons, Inc. Printed in India by Replika Press Pvt. Ltd., Delhi.

Note: Eight questions will be set and students will be required to attempt five questions in all.

PHY(W) - 451: NANO - TECHNOLOGY
B. Tech. 4th Year (Semester - VII) Open Elective

L	T	P	Credits	Class Work	:	50 Marks
4	--	--	4	Examination	:	100 Marks
				Total	:	150 Marks
				Duration of Examination	:	3 Hours

UNIT- 1 INTRODUCTION TO NANOTECHNOLOGY

Crystalline-Non crystalline materials, Fundamental of Nanotechnology and Nano-materials in Metals, other Materials, & Bio-system, Molecular Recognition, Quantum Mechanics and Quantum Ideas in Nanotechnology. Semiconductor Nano-particles.

UNIT- 2 PREPARATION AND CHARACTERIZATION OF NANOPARTICLES

Nanoscale Lithography, Dip Pen Lithography, E-Beam Lithography, Nanosphere Lithography, Molecular Synthesis, Nanoscale Crystal Growth, Polymerization Nanobricks and Building blocks:

Tools for Measuring Nanostructures - Scanning Probe Instrument, Spectroscopy, Electrochemistry, Election Microscope Tools to Make Nanostructure.

UNIT - 3 PROPERTIES & APPLICATION OF NANO CRYSTALLINE MATERIALS

Application in Sensors, Nanoscale Biostructure Electronics, Magnets, Optics, Fabrication Biomedical Applications, Smart Materials - Self Healing Structures, Heterogenous Nanostructure and composites Encapsulation, Carbon Nanotubes.

UNIT- 4 Synthesis of semiconductor Nanoclusters, Processing of Nanomaterials, Nanobusiness - Boom, Bust and Nano Tech., Nano-ethics

Reference Books:

1. Camarata, R.C. Nanomaterials synthesis, properties and application Institute of Physics Publication
2. Madou, Fundamentals of microfabrication, Mcgraw Hill.
3. Sibelia, J.P., A Guide to material characterization, Prentice Hall.
4. Mark Ratner, Daniel Ratner - NanoTechnology - A Gentle Introduction to the Next Big Idea.

Note: The question paper will contain 8 questions in all. The student will be required to answer any five. At the most one question will be set from each section.

PHY(W) - 453: LASER TECHNOLOGY
B. Tech. 4th Year (Semester - VII) Open Elective

L	T	P	Credits
4	--	--	4

Class Work	: 50 Marks
Examination	: 100 Marks
Total	: 150 Marks
Duration of Examination	: 3 Hours

Conditions for Producing Laser, Concept of coherence – Special and temporal, Population Inversions, Einstein coefficient, Gain and Gain saturation, Saturation intensity, Development and Growth of a Laser Beam, Exponential Growth factor, Threshold Requirement for a Laser.

Inversions and two-level systems, steady-state inversions and three and four-level systems. Transient Population Inversions, Factors effecting population inversion, Laser Amplifiers.

Excitation or Pumping Threshold Requirements, Pumping Pathways, Specific Excitation Parameters Associated with Optical and particle Pumping.

Helium-Neon Laser, Co₂ Laser, Ruby Laser, Semiconductor Diode Laser.

Recommended Books:

1. Laser Fundamentals by William T. Silfvast Cambridge University, Press.
2. Introductory University Optics by John Beynon, (PHI)
3. Laser – B.B. Laud.
4. Optics – A.K. Ghatak (TMH)

Note: Eight questions will be set and students will be required to attempt any five questions in all. All questions will carry equal marks.

ME(W) – 451: MECHATRONIC SYSTEMS
B. Tech. 4th Year (Semester – VII) Open Elective

L	T	P	Credits		
4	--	--	4	Class Work	: 50 Marks
				Examination	: 100 Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

- UNIT 1** Introduction to Mechatronics. Integrated design issues in Mechatronics, Conceptual design. Possible design solutions. Integrated approach for combining sensors, actuators, computer and the product. Some examples - like auto focus camera, engine combustion control, washing machine, vehicle suspensions, electro-mechanical brakes, manufacturing machine, industrial robots, air conditioning systems, etc..
- UNIT 2** Classification of sensors of various type, resistive, strain gage, themistor, inductive, capacitive, piezoelectric, optical, photodetectors, encoders, ultrasonic types Silicon sensors, Micro-sensors for various measurements. Consideration for choice of sensors for a given application.
- UNIT 3** Signal conditioning and data acquisition using computers. AD and DA converters. Use of plus-in-cards and software for acquiring data from several sensors.
- UNIT 4** Mechanical actuation systems – kinematic chains, cams, gear trains, belt and chains drive, ratchet and pawl, bearing, guideways, ball screw and nut, etc. Electrical actuation systems: Operational characteristic and application of electrical actuation components for application like, AC/DC motors, stepper motors, relays, push buttons, switches, solenoids etc.
- UNIT 5** Introduction to semiconductor electronics, junction diode, bipolar junction transistor, field effect transistors, digital logic. Number systems. Logic gates Boolean algebra. Application of logic gates. Combinational and sequential logic.
- UNIT 6** Sequence control, relay ladder diagrams for sequence control in processes and machines. Programmable Logic Controllers and applications: PLC structures, PLC languages, programming of PLC using Mnemonics, Interfacing PLC with actuators, Sequencing of cylinders. Timers, internal relays and counters. Open loop and closed loop control using PLC.
- UNIT 7** Architecture of microprocessors and microcontrollers. Use of suitable software languages for micro controllers and their applications in mechatronic systems. Real time interfacing between computers and measurement or control systems. Introduction to modeling and computer control of process and mechanical systems.
- UNIT 8** Communication systems Protocols, Open systems interconnection models. Smart transducers and transmitters. Field buses.

Text Books:

1. Mechatronics – Electronic control in mechanical & electrical engineering by W.Bolton, Longman Indian Edn. 1999.
2. Mechatronic system design, by D.Shetty and R.A. Kolk – Mechatronic system design, PWS Publ. Co., Boston, 1997.
3. Mechatronics and Measurement Systems by D.G.Alciatore and M.B. Histan, TMH Publ. 2nd Edn. 2003.

Note: In the semester examination, the examiner will set 8 questions in all, and students will be required to attempt only 5 questions.

CSE(W) - 409: ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

B. Tech. 4th Year (Semester - VII) Open Elective

L	T	P	Credits	Class Work	:	50 Marks
4	--	--	4	Examination	:	100 Marks
				Total	:	150 Marks
				Duration of Examination	:	3 Hours

-
1. Introduction to Artificial intelligence: Scope, history & applications: AI as representation and search the predicate calculus inference rules. Logic based financial advisor, structures and strategies for state space search graph theory, strategies for space search, using state space to represent reasoning with the predicate calculus.
 2. Heuristic Search: An algorithm for heuristic search, admissibility monotonicity and informed ness heuristics in games, complexity issues, control and implementation of state space search recursion based search, pattern directed search. Production systems, predicate calculus and planning the black board architecture for problems solving.
 3. LISP and PROLOG: Knowledge representation languages issues in knowledge representation, network representation language, structured representations, introduction to LISP, Search in LISP: a functional approach to the farmer, Wolf, Goat and cabbage problem, higher order functions & procedural abstraction, search strategies in LISP.
 4. Expert systems: Introduction, History basic concepts, structure of expert systems, the human element in ES how ES works, problem areas addressed by ES, ES success factors, types of expert systems, ES and the internet interacts web, knowledge engineering, scope of knowledge, difficulties, in knowledge acquisition methods of knowledge acquisition, machine learning, intelligent agents, selecting an appropriate knowledge acquisition method, knowledge acquisition form multiple experts validation and verification of the knowledge base, analyzing coding, documenting & diagramming.
 5. Expert systems- II, societal impacts reasoning in artificial intelligence, inference with rules, with frames: model based reasoning, case based reasoning, explanation & meta knowledge inference with uncertainty representing uncertainty probabilities and related approaches, theory of certainty (certainty factors) Qualitative reasoning, the development life cycle, phases I, II, III, IV, V, VI the future of expert system development process societal impacts.

Text Books:

1. Efrain Turban and Jay E Aranson: Decision support systems & intelligent systems (5th Edn.) Prentice hall, 1998.
2. Donald A Waterman: A Guide to expert Systems, Addison -Wesley 1995
3. G.F. Luger & W.A Stubble Field -Artificial Intelligence structures and Strategies for complex problem solving, 3rd Ed. Addison Wesley 1998.
4. E.Rich and Knight, Artificial Intelligence, Second Edn, Tata Mc. Graw Hill Publishing, 1981.

Note: Eight questions will be set and students will be required to attempt five questions in all.

CSE(W) - 301: PRINCIPLES OF OPERATING SYSTEMS

B. Tech. 4th Year (Semester - VII) Open Elective

L	T	P	Credits	Class Work	: 50 Marks
4	--	--	4	Examination	: 100 Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
- Unit-1:** **Introduction:** Introduction to Operating System Concepts (including Multitasking, multiprogramming, multi user, Multithreading etc)., Types of Operating Systems: Batch operating system, Time-sharing systems, Distributed OS, Network OS, Real Time OS; Various Operating system services, architecture, System programs and calls.
- Unit-2:** **Process Management:** Process concept, process scheduling, operation on processes; CPU scheduling, scheduling criteria, scheduling algorithms -First Come First Serve (FCFS), Shortest-Job-First (SJF), Priority Scheduling, Round Robin(RR), Multilevel Queue Scheduling.
- Unit-3:** **Memory Management:** Logical & Physical Address Space, swapping, contiguous memory allocation, non-contiguous memory allocation paging and segmentation techniques, segmentation with paging; virtual memory management - Demand Paging & Page-Replacement Algorithms; Demand Segmentation.
- Unit-4:** **File System:** Different types of files and their access methods, directory structures, various allocation methods, disk scheduling and management and its associated algorithms, Introduction to distributed file system.
- Unit-5:** **Process-Synchronization & Deadlocks:** Critical Section Problems, semaphores; methods for handling deadlocks-deadlock prevention, avoidance & detection; deadlock recovery.
- Unit-6:** **I/O Systems:** I/O Hardware, Application I/O Interface, Kernel, Transforming I/O requests, Performance Issues.
- Unit-7:** **Unix System And Windows NT Overview:** Unix system call for processes and file system management, Shell interpreter, Windows NT architecture overview, Windows NT file system.

Text Books:

1. Operating System Concepts by Silberchatz et al, 5th edition, 1998, Addison-Wesley.
2. Modern Operating Systems by A. Tanenbaum, 1992, Prentice-Hall.
3. Operating Systems Internals and Design Principles by William Stallings, 4th edition, 2001, Prentice-Hall

Reference Books:

1. Operating System by Peterson, 1985, AW.
2. Operating System by Milankovic, 1990, TMH.
3. Operating System Incorporating With Unix & Windows By Colin Ritchie, 1974, TMH.
4. Operating Systems by Mandrik & Donovan, TMH
5. Operating Systems By Deitel, 1990, AWL.

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.

EE(W) - 455: INTELLIGENT INSTRUMENTATION FOR ENGINEERS

B. Tech. 4th Year (Semester – VII) Open Elective

L	T	P	Credits	Class Work	: 50 Marks
4	--	--	4	Examination	: 100 Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

-
1. INTRODUCTION: Intelligence, features characterizing intelligence, intelligent instrumentation system; features of intelligent instrumentation; components of intelligent instrumentation system; Block diagram of an intelligent instrumentation system.
 2. SIGNAL PROCESSING, MANIPULATION AND TRANSMISSION: Signal amplification & attenuation (OP-AMP based); Instrumentation Amplifier (circuit diagram, high CMRR & other features); Signal Linearization (different types such as Diode-resistor combination, OP-AMP based, etc.); Bias Removal, Signal filtering (outputs from ideal filters, outputs from constant-k filters, matching of filter sections, active analog filters); OP-AMP based Voltage-to-current converter, Current-to-voltage conversion, Signal integration, Voltage follower (pre-amplifier), voltage comparator, Phase-locked loop, Signal addition, Signal multiplication, Signal Transmission (Signal amplification, Shielding, Current loop transmission, Voltage-to-frequency conversion, Fiber optic transmission); Description of Spike Filter (software-based).
 3. SMART SENSORS: Primary sensors; Excitation; Compensation (Nonlinearity: look up table method, polygon interpolation, polynomial interpolation, cubic spline interpolation, Approximation & regression; Noise & interference; Response time; Drift; Cross-sensitivity); Information Coding/ Processing; Data Communication; Standards for smart sensor interface..
 4. INTERFACING INSTRUMENTS & COMPUTERS: Basic issues of interfacing; Address decoding; Data transfer control; A/D converter; D/A converter; Sample & hold circuit; Other interface considerations.
 5. RECENT TRENDS IN SENSOR TECHNOLOGIES: Introduction; Film sensors (Thick film sensors, Thin film sensors); Semiconductor IC technology – standard methods; Microelectro-mechanical systems (Micro-machining, some application examples); Nano-sensors.

Text Books:

1. Barney, G.C., *Intelligent Instruments*. Hemel Hempstead: Prentice Hall, 1985.
2. Alan S. Morris, *Principles of Measurement & Instrumentation*. N. Delhi: PHI Pvt. Ltd., 1999..

Reference Books:

1. D. Patranabis, *Sensors & Transducers*. N. Delhi: PHI, 2003.
2. Roman Kuc, *Introduction to Digital Signal Processing*. N. York: McGraw-Hill Pub. Co.

- Notes:**
1. In the semester examination, the examiner will set 8 questions in all covering the entire syllabus. Students will be required to attempt any five questions.
 2. Use of scientific calculator will be allowed in the Exam. However, pager, programmable calculator & cellular phone etc. will not be allowed.

ECE(W) - 403: EMBEDDED SYSTEMS DESIGN
B. Tech. 4th Year (Semester - VII) Open Elective

L	T	P	Credits			
4	--	--	4	Class Work	:	50 Marks
				Examination	:	100 Marks
				Total	:	150 Marks
				Duration of Examination	:	3 Hours

- UNIT 1:** **INTRODUCTION:** Different types of microcontrollers: Embedded microcontrollers, External memory microcontrollers; Processor Architectures: Harvard V/S Princeton, CISC V/S RISC; microcontrollers memory types; microcontrollers features : clocking, i/o pins, interrupts, timers, peripherals.
- UNIT 2:** **MICROCONTROLLER ARCHITECTURE:** Introduction to PIC microcontrollers, Architecture and pipelining, program memory considerations, Addressing modes, CPU registers, Instruction set, simple operations.
- UNIT 3:** **INTERRUPTS AND I/O PORTS:** Interrupt logic, Timer2 scalar initialization, IntService Interrupt service routine, loop time subroutine, External interrupts and timers, Synchronous serial port module, Serial peripheral device, O/p port Expansion, I/p port expansion, UART.
- UNIT 4:** **SOFTWARE:** Development tools/ environments, Assembly language programming style, Interpreters, High level languages, Intel hex format object files, Debugging.
- UNIT 5:** **PROGRAMMING WITH MICROCONTROLLERS:** Arithmetic operations, Bit addressing, Loop control, Stack operation, Subroutines, RAM direct addressing, state machines, Oscillators, Timer Interrupts, Memory mapped I/O.
- UNIT 6:** **DESIGNING USING MICROCONTROLLERS:** Music box, Mouse wheel turning, PWM motor control, Aircraft Demonstration, ultra sonic distance measuring, Temperature Sensor, Pressure Sensor, Magnetic Field Sensor.

Text Books:

1. Design with PIC Microcontrollers by John B. Peatman , Pearson.

Reference Books:

1. Programming and Customizing the 8051 Microcontroller: Predko; TMH.
2. Designing Embedded Hardware: John Catsoulis ; SHROFF PUB. & DISTR. ND.
3. Programming Embedded Systems in C and C++ : Michael Barr; SHROFF PUB. & DISTR. ND.

Note: **Eight questions will be set and students will be required to attempt five questions in all.**

CH(W) - 453: POLLUTION AND CONTROL
B. Tech. 4th Year (Semester - VII) Open Elective

L	T	P	Credits
4	--	--	4

Class Work	:	50 Marks
Examination	:	100 Marks
Total	:	150 Marks
Duration of Examination	:	3 Hours

- 1 **Waste Water & its treatment Processes:** Waste - water characteristics, effluent standards, primary treatment, secondary treatment - aerobic (activated sludge, aerated lagoons, trickling filter, roughing filter, rotating biological contactor) anaerobic (contact process, UASB).

- 2 **Air Pollution:** Classification of air pollutants
Particulates: Physical characteristics, mode of formation, setting properties, Control measures.

- 3 **Hydrocarbons:** Nature; sources, control
Carbon Monoxide: Source, harmful effects on human health, control measures.
Oxides of Sulphur and Nitrogen Sources, effects on human health and plants. Control measure.

- 4 **Solid Waste:** Types, sources and properties of solid waste, solid waste management - Generation, Collection and techniques for ultimate disposal, Elementary discussion on resource and energy recovery.

- 5 Elementary treatment of nuclear pollution, metal pollution, noise pollution their effects & control.

Suggested Books:

1. Environmental Engg.: by Howard s. Peavy & Others, MGH International.
2. Metacaf - EDDY - Waste-water engineering revised by George Teholonobus (TMH)
3. Environmental Chemistry by B.K. Sharma, Goel Publishing, Meerut.
4. Environmental Chemistry, A.K.DE, Wiley Eastern.
5. Air Pollution: H.C. Perking - Mc Graw Hill.

Note: **Eight questions will be set and students will be required to attempt five questions in all.**

CSE(W) - 411: MANAGEMENT INFORMATION SYSTEM
B. Tech. 4th Year (Semester - VII) Open Elective

L	T	P	Credits	Class Work	: 50 Marks
4	--	--	4	Examination	: 100 Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

Unit-1: Foundation of Information System: Introduction to Information System and MIS, Decision support and decision making systems, systems approach, the systems view of business, MIS organization within company, Management information and the systems approach.

Unit-2: Information Technology: A manager's overview, managerial overviews, computer hardware & software, DBMS, RDBMS and Telecommunication.

Unit-3: Conceptual system design: Define the problems, set systems objective, establish system constraints, determine information needs determine information sources, develop alternative conceptual design and select one document the system concept, prepare the conceptual design report.

Unit-4: Detailed system design: Inform and involve the organization, aim of detailed design, project management of MIS detailed design , identify dominant and trade of criteria, define the sub systems, sketch the detailed operating sub systems and information flow, determine the degree of automation of each operation, inform and involve the organization again, inputs outputs and processing, early system testing, software, hardware and tools propose an organization to operate the system, document the detailed design revisit the manager user.

Unit-5: Implementation evaluation and maintenance of the MIS: Plan the implementation, acquire floor space and plan space layouts, organize for implementation, develop procedures for implementation, train the operating personnel, computer related acquisitions, develop forms for data collection and information dissemination, develop the files test the system, cut-over, document the system, evaluate the MIS control and maintain the system. Pitfalls in MIS development.

Unit-6: Advanced Concepts in Information Systems: Enterprise Resources Management (ERP), Supply Chain Management, C R M , Procurement Management System.

Text Books:

1. Management Information System by W. S. Jawadekar, 2002, Tata McGraw Hill.
2. Information System for Modern Management (3rd edition)- Robert G. Murdick, Loel E. Ross & James R. Claggett. PHI

Reference Books:

1. Management Information System; O Brian; TMH
2. Management Information System by Davis Olson Mac Graw Hill
3. Management Information System by Staslings,(Maxwell Mc Millman Publishers)
4. Information System; a Management Perspective; Alter Addison Wesley
5. Introduction to Information System; McGraw Hill

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.

CSE(W) – 308: MULTIMEDIA TECHNOLOGIES
B. Tech. 4th Year (Semester – VII) Open Elective

L	T	P	Credits	Class Work	: 50 Marks
4	--	--	4	Examination	: 100 Marks
				Total	: 150 Marks
				Duration of Examination	: 3 Hours

Unit-1: Basics of Multimedia Technology: Computers, communication and entertainment; multimedia an introduction; framework for multimedia systems; multimedia devices; CD- Audio, CD-ROM, CD-I, presentation devices and the user interface; multimedia presentation and authoring; professional development tools; LANs and multimedia; internet, World Wide Web & multimedia distribution network-ATM & ADSL; multimedia servers & databases; vector graphics; 3D graphics programs; animation techniques; shading; anti aliasing; morphing; video on demand.

Unit-2: Image Compression & Standards: Making still images; editing and capturing images; scanning images; computer color models; color palettes; vector drawing; 3D drawing and rendering; JPEG-objectives and architecture; JPEG-DCT encoding and quantization, JPEG statistical coding, JPEG predictive lossless coding; JPEG performance; overview of other image file formats as GIF, TIFF, BMP, PNG etc.

Unit-3: Audio & Video: Digital representation of sound; time domain sampled representation; method of encoding the analog signals; subband coding; fourier method; transmission of digital sound; digital audio signal processing; stereophonic & quadrasonic signal processing; editing sampled sound; MPEG Audio; audio compression & decompression; brief survey of speech recognition and generation; audio synthesis; musical instrument digital interface; digital video and image compression; MPEG motion video compression standard; DVI technology; time base media representation and delivery.

Unit-4: Virtual Reality: Applications of multimedia, intelligent multimedia system, desktop virtual reality, VR operating system, virtual environment displays and orientation making; visually coupled system requirements; intelligent VR software systems. Applications of environment in various fields.

Text Books:

1. An introduction, Villamil & Molina, Multimedia Mc Milan, 1997
2. multimedia: Sound & Video, Lozano, 1997, PHI, (Que)

Reference Books:

1. Multimedia: Production, planning and delivery, Villamil & Molina, Que, 1997
2. Multimedia on the PC, Sinclair, BPB
3. Multimedia: Making it work, Tay Vaughan, fifth edition, 1994, TMH.
4. Multimedia in Action by James E Shuman, 1997, Wadsworth Publ.,
5. Multimedia in Practice by Jeff coate Judith, 1995, PHI.
6. Multimedia Systems by Koegel, AWL
7. Multimedia Making it Work by Vaughar, etl.
8. Multimedia Systems by John .F. Koegel, 2001, Buford.
9. Multimedia Communications by Halsall & Fred, 2001, AW.

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.

