WITH EFFECT FROM THE ACADEMIC YEAR 2008-2009

CE 382

ENVIRONMENTAL ENGINEERING LABORATORY

Instruction	3 Periods
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

1. Determination of alkalinity
2. Determination of hardness.
3. Determination of chlorides.
4. Determination of calcium.
5. Determination of variation of PH.
6. Determination of B.O.D.
7. Determination of total solids, total inorganic solids & total volatile solids.
8. Determination of residual chlorine.
9. Determination of turbidity.
10. Determination of coagulant dose - jar test.
11. Determination of D.O.
12. Determination of Sodium & Potassium present in water using flame photometer.

WITH EFFECT FROM THE ACADEMIC YEAR 2008-2009

CE 383

INDUSTRIAL VISIT / STUDY

Instruction **4 x 6 = 24 hours**

Sessional **Grade***

Students are expected to visit at least two works of Civil Engineering importance in and around Hyderabad and submit a detail report on the same to the department. . The Department should evaluate the reports through a Committee consisting of Head of the Department and two more members of the senior faculty.

***Excellent / Very Good / Good / Satisfactory / Unsatisfactory.**

WITH EFFECT FROM THE ACADEMIC YEAR 2009-2010

SCHEME OF INSTRUCTION AND EXAMINATION

B.E. IV/IV (REGULAR)

CIVIL ENGINEERING

SEMESTER - I

Sl. No.	Syllabus Ref. No.	Subject	Scheme of Instructions: Periods per Week L/T	Scheme of Instructions: Periods per Week D/P	Scheme of Examination: Duration in Hrs	Scheme of Examination: Maximum Marks Univ. Exam	Scheme of Examination: Maximum Marks Sessionals
		THEORY					
1.	CE 401	Structural Engineering Design and Detailing - II (Steel)	4	2	3	75	25
2.	CE 402	Matrix Methods and Numerical Techniques	4	--	3	75	25
3.	CE 403	Foundation Engineering	4	--	3	75	25
4.	CE 404	Water Resources Engg., & Management - II	4	--	3	75	25
5.	CE 405	Concrete Technology	4	--	3	75	25
6.		ELECTIVE - I	4	--	3	75	25
		PRACTICALS					
1.	CE 431	Concrete Laboratory	--	3	3	50	25
2.	CE 432	Computer Applications Laboratory	--	3	3	50	25
3.	CE 433	Project Seminar	--	3	--	--	25
		Total	**24**	**11**	--	**550**	**225**
		Total		**35**			**775**

Elective - I

CE 406 Elements of Earthquake Engineering
CE 407 Surface & Ground Water Management
CE 408 Pre-Stressed Concrete
CE 409 Geographical Information Systems
CE 410 Operation Research in Civil Engineering
ME 411 Entrepreneurship

CE 401

STRUCTURAL ENGINEERING DESIGN AND DETAILING - II (STEEL)

Instruction	6 Periods per week (4 Theory+ 2 Drawing)
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT - I

Plate Girders : Design of riveted and welded plate girder for static loads - including flange curtailment, connections, intermediate and bearing stiffeners, web and flange splice.

UNIT - II

Crane and Gantry girder : Basic Principles, codal provisions, single bay portal with and without crane design and detailing.

Bearings : Types - Rocker and Roller - Detailed design of bearings for bridges.

UNIT - III

Bridges : Deck and through type bridges - Economical span - Indian standard railway broad gauge train loadings - permissible stresses - Detailed design and drawing of plate girder and truss bridges.

Suggested Reading :

1. Arya A.S. and Ajmani J.L. *Steel Structures*, Nem Chand & Bros. 1992.
2. P. Dayaratnam, *Design of Steel Structures*, S. Chand Publishers, 2003.
3. Dr. B.C. Punmia, *Comprehensive Design of Steel Structures*, Laxmi Publishers, 2001.
4. Krishna Raju, *Design of Bridges*, Oxford and IBH Publishers, 1998.

CE 402

MATRIX METHODS AND NUMERICAL TECHNIQUES

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT - I

Concepts of equilibrium, compatibility and constitutive relations. Static and kinematic inderminacies. Introduction of flexibility and stiffness methods. Comparison of methods. Solution of simultaneous equations of the type A X = B by Gauss elimination, Gauss Jordan and Cholesky methods when A is symmetric. Iterative methods of solutions - Gauss siedel and Zacobi methods - Convergence of iterative methods.

UNIT - II

Flexibility method : Analysis of continuous beams, pin jointed plane trusses and plane frames with static indeterminacy not exceeding two.

UNIT - III

Stiffness methods : Analysis of continuous beams, pin jointed plane trusses and portal frames with kinematic indeterminancy not exceeding three. Element stiffness matrix for six degrees of freedom beam element (two displacements and 1 rotation per node). Formulation of stiffness matrix for multi-storeyed portal frames not exceeding two - bay and two storeys.

UNIT - IV

Numerical Techniques : Solution and roots of non-linear equations - Bisection method, Newton - Raphson method. Integration of functions - Rectangular, Trapezoidal and simpsons rule - Solution of ordinary differential equations - Runge Kutta method, Euler's method and Euler's modified method.

UNIT - IV

Numerical Methods for Partial Differential Equation : General approach, discretization in space leading to a system of ODE in time;

Finite difference formulation of parabolic, elliptical and Hyperbolic equations.

Suggested Reading :

1. Gere and Weaver, *Matrix Methods of Analysis*, CBS Publishers.
2. Ranjaraman, V. *Numerical Methods*, PHI, 2000.
3. Pandit G.S. and Gupta S.P., *Structural Analysis*, Tata Mc Graw Hill Co., 2002.
4. S. Rajasekaran, Et al, *Computational Structural Mechanics*, PHI, 2001.

CE 403

FOUNDATION ENGINEERING

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT - I

Stress Distribution in Soils : Boussinesq's and Westerguard's equations for point loads. Application of point load formulae for uniformly distributed load on circular and rectangular areas. Use of New Mark's chart (for Boussineq's eq). Validity of Elastic theory for soils. Contact pressure distribution.

UNIT - II

Bearing Capacity of Soils : Terzaghi's equation for bearing capacity in soils - its modification for continuous, square, rectangular and circular footings, general and local shear failure conditions. Plate load test as per IS specifications. Allowable bearing capacity. Standard penetration test and use of N values for estimating soil conditions and bearing capacity. Proportioning of footings and rafts.

Settlement Analysis : Computation of pressures before loading and after loading. Estimation of settlement - ultimate and after any given period. Correction for construction period.

UNIT - III

Pile Foundations : Types of piles - timber, steel, concrete, cast-in situ, precast piles, bearing piles, friction piles, compaction piles, large diameter piles. Pile capacity - static formulae, dynamic formulae, pile load test, determination of point resistance and skin friction as per IS code. Bearing capacity of pile groups, negative skin friction.

UNIT - IV

Coffer Dams : Earth embankments, cantilever sheet piles, braced coffer, dams, double wall coffer dams, cellular dams - circular, diaphragm type, general description and construction methods.

Caissons : Types of caissons - Open, pneumatic and box caissons (floating caissons). General description and construction methods. Dewatering Techniques - Sumps, ditches, well points, deep wells. Geo-textile methods -Types and uses.

UNIT - V

Timbering of Excavation : Bracings for shallow and deep excavations. Computation of lateral earth pressure. Reaction of struts.

Underpinning : Preliminary support - shoring, needling and their combination. Plain Pier underpinning, precast cylinders, grouting, chemical stabilization.

Site Investigation : Principles of exploration, sampling methods, transportation and storage of samples, boring and drilling methods, log of bore holes, sampling tubes and samplers. Sampling records.

Machine Foundations : Types, frequency, Amplitude and Resonance.

Suggested Reading :

1. Prakash Shamsher, Ranjan T. Saran S., *Analysis and Design of Foundations* and Retaining Structure, Sarita Prakashan, Merrut, 1979.
2. Bowles Joseph E., *Foundation Analysis and Design,* Mc Graw Hill Publishers, 2000.
3. Swami Saran, *Analysis and Design of Sub Structures,* Oxford 7 IBH, 1998.
4. Dr. K.R. Arora, *Soil Mechanics and Foundation Engg.,* Standard Publishers, 2002.

CE 404

WATER RESOURCES ENGINEERING AND MANAGEMENT - II

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT - I

Types of reservoirs, Selection of site, Storage capacity analysis, Reservoir sedimentation, Flood routing through retarding basin.

UNIT - II

Storage Head Works - Types of dams, advantages & disadvantages, selection criteria, Economical height of the dam, Gravity dams, Forces acting on dam, stability analysis, Principal stresses, Elementary profile and Practical profile, Low and high gravity dams.

UNIT - III

Earth Dams : Types, Methods of construction, Seepage analysis for homogenous and Zoned embankment dams, Drainage in embankment dams, Various types of filters, Failure of Earth dams & Design criteria.

UNIT - IV

Spill Ways & Energy Dissipation : Types of Spill ways, Ogee Spill Ways, Design of Ogeee profile, Fixation of levels, Syphon Spill Way & Chute Spill Way. Energy Dissipaters, Hydraulic Jump & Bucket type dissipators, Tail water rating curve & Jump height curve.

UNIT - V

Water Power Engineering : History, demand and generation, flow duration curve, types of hydel Plants, Water conveyance, Penstocks & Surge tanks, power house layout and components-their functions.

Suggested Reading :

1. Modi, *Irrigation & Water Resources and Water Power,* Standard Publishers, New Delhi.
2. Ralph W. Warbs and W.P. James, *Water Resources Engineering,* Prentice Hall, New Delhi.
3. B.C. Punmiya & B.B. Lal, *Irrigation & Water Power Engineering,* Laxmi Publishers.
4. S.K. Garg, *Irrigation Engg., & Hydraulic Structures,* Khanna Publishers.
5. Dandekar & Sarma, *Water Power Engineering,* Vikas Publishers, New Delhi.

CE 405

CONCRETE TECHNOLOGY

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT - I

Constituents of Concrete : Types of cements and their composition. Properties of cement - Various tests. Aggregate - types, various properties of aggregate - Tests.

Properties of Fresh Concrete : Mixing and batching. Workability, factors effecting workability, various tests procedures. Segregation and bleeding. Vibration of concrete. Types of vibrators and their influence on composition, Analysis of fresh concrete.

UNIT - II

Properties of Hardened Concrete : Strength of concrete. Water cement ratio. Gel space ratio. Effective water in the mix. Short term and long term properties of concrete. Tests and procedure. Influence of various parameters on strength of concrete. Relationship between various mechanical strengths of concrete. Curing of concrete. Maturity concept. Influence of temperature on strength of concrete and construction joint. Stress-Strain curves for concrete. Durability of concrete. Effect of Creep and Shrinkage in concrete.

UNIT - III

Mix Design of Concrete : Basic considerations, Process of mix design, Factors in the choice of mix proportions and their influence. Quality control. Various methods of mix design. I.S. code method. British, and ACI method.

UNIT - IV

Admixtures in Concrete : Classification of admixtures. Chemical and mineral admixtures. Influence of various admixtures on properties of concrete. Applications. Concept of ready mixed concrete. Fly ash concrete - properties and proportion of fly ash, applications; rice husk ash concrete.

UNIT - V

Special Concrete : High strength concrete, Ferro cement, Light weight concrete, High density concrete. Recyled aggregate concrete. Their specialities and applications. Fibre Reinforced Concrete-need for fibre reinforced concrete (FRC), mechanism of FRC, types of Fibres, fibre shoterete.

Suggested Reading :

1. Neville A.M., *Properties of Concrete,* English Language Book Society / Longman Publications, 1998.
2. Mehta P.K., Paulo J.M.M., *Concrete-Microstructure-Properties and Material,* Mc Graw Hill Publishers, 1997.
3. Krishnaraju N., *Design of Concrete Mix,* CBS Publishers, 1985.

CE 406

ELEMENTS OF EARTHQUAKE ENGINEERING
(Elective - I)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT - I

Engineering Seismology : Causes of earthquakes - Seismic waves - Magnitudes, Intensity and energy release - characteristics of strong earthquakes, ground motions, soils effects and liquefaction.

UNIT - II

Theory of Vibrations : Introduction, long and short period structure; single, two and multi-degree of freedom systems, damped and undamped variations, concepts of damped and undamped vibrations, response spectrum - Response spectrum analysis.

UNIT - III

Seismic Design Philosophy : Concept of Seismic resistant design, reduction factors - Over strength, Ductility and Redundancy - Determination of earthquake forces on structures. Seismic Design and detailing of Masonary, Reinforced Concrete, and Steel Buildings.

UNIT - IV

Seismic Performance of Buildings : Case Studies of few serious earthquakes in the country in the past, damages to buildings - Damage Patterns - Performance of Non-Engineered Buildings, Rural houses during the Earthquakes.

UNIT - IV

Seismic Resistant Design : Basic principles of Earthquake resistance. Concepts of earthquake resistant construction in rural areas. Base isolation and energy and dissipation devices. Seismic retrofitting - Repair, rehabilitation and retrofitting, retrofitting strategies - Importance of re-analysis. Case Studies.

Suggested Reading :

1. A.K. Chopra, *Dynamics of structures, Theory and Applications to Earthquake Engineering,* Pearson Education, 2004.
2. Pankaj Agarwal and Manish Shrikhande, *Earthquake Resistant Design of Structures,* Prentice Hall of India, 2006.
3. S.L. Kramer, *Geotechnical Earthquake Engineering,* Pearson Education, 2004.
4. Mario Paz, *International Handbook of Earthquake Engineering : Codes, Programs, and Examples,* Springer Verlag, 1995.
5. D.S. Prakash Rao, *Design Principles and Detailing of Concrete Structures,* Tata McGraw-Hill Publishing Company, 1995.

CE 407
SURFACE & GROUND WATER MANAGEMENT
(Elective - I)

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT - I

Planning and Analysis of Water Resource Systems : Introduction to water resource planning, water resource planning, water resource systems, characteristics of systems analysis and application.

UNIT - II

Identification and Evaluation of Water Management plans : Introduction, plan formulation, planning models and solution procedures, objective functions and constraint equations, Lagrange multipliers, slack and surplus variables, Dynamic programming, Recursive equations. Linear programming - General approach; Geometrical approach and interpretation, simulation - Definition, types of simulation models.

UNIT - III

Management of Ground Water : Introduction, concepts of basin management, equation of hydrologic equilibrium, ground water basin Investigations, data collection and field work, alternative basin yields, evaluation of perennial yield, salt balance, Basin management and conjugative use, example of ground water management. Salinity and water logging problems.

UNIT - IV

Artificial Recharge of Ground Water : Introduction, concept of artificial recharge, recharge methods, waste water recharge for reuse, Recharge mounds, induced recharge.

UNIT - V

Modelling Techniques and Applications : Introduction, porous media models - Sand tank model, analog models - Viscous fluid model,

membrance models. Thermal models, blotting paper models. Dynamic Programming - Application to reservoir operation and irrigation operation models. Linear programming - Application to water resource problems.

Suggested Reading :

1. Danierl P. Loucks. Jerry R. Stedinger. Douglas A. Haith, *Water Resource Planning and Analysis,* Prentice Hall, Inc. Eaglewood Cliffs, NY.
2. David Keith Todd, *Ground Water Hydrology,* John Wiley & Sons, NY.
3. Singiresu S Rao, *Engineering Optimisation - Theory and Practice,* New Age International (P) Ltd.
4. Hall. W.A., Dracup, J.A., *Water Resource Systems Engineering,* Mc Grawhill Book Co., NY.

CE 408

PRE-STRESSED CONCRETE
(Elective - I)

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT - I

Introduction : Basic concepts, materials, permissible stresses - systems of prestressing. Losses of prestress in pre-tensioned and post-tensioned members.

UNIT - II

Design : Analysis and Design of PSC beams for flexure using elastic analysis of simple and composite sections.

UNIT - III

Design of sections for flexure : Design of R.C. section by Elastic theory for flexure.

Design for Shear : Shear and principles stresses, Design of R.C. section for shear, cracked and uncracked sections - codal provisions.

UNIT - IV

Deflections : Importance of deflections, factors influencing deflections, codal provisions, short terms and long-term deflections - computation. Cable profiles, Kern points, limiting points - load balancing method - problems on load balancing method.

UNIT - V

End blocks : Nature of stresses, stress distribution - Magnel and Gauyon's Methods - codal provisions - Design by Guyon's method.

Continuous Beams : Advantages of continuous members - Codal provisions - Analysis of two span continuous beams - Concordant cable profiles.

Suggested Reading :

1. N. Krishna Raju, *Prestressed Concrete*, Tata McGraw Hill, 2001.
2. G.S. Pandit and S.P. Gupta, *Prestressed Concrete*, CBS Publications, 1995.
3. Dayarathnam, *Prestressed Concrete*, Oxford & IBH Publications.

CE 409

GEOGRAPHICAL INFORMATION SYSTEMS
(Elective - I)

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT - I

Introduction : Map, definitions, representations-Point, line, polygon, common coordinate systems, map projections-Transformations-Coordinate system - Map analysis. History of development of GIS - Standard GIS packages.

Applications of GIS : Soil and water resources, Agriculture, Land use planning, Geology and Municipal applications, Using GIS for decision making under uncertainty.

UNIT - II

Data Entry, Storage and Maintenance : Data types - spatial, non spatial (attribute data) Data structure, data format - Point line vector - Raster - Polygon - Object structural model - Filters and files data in computer-Keyboard entry, Manual Digitizing, Scanner, Remotely sensed data, Existing digital data Cartographic database, Digital elevation data, data compression.

UNIT - III

Data Analysis and Modelling : Spatial analysis, data retrieval query (SQL) - Simple analysis, Record overlay, Vector data analysis, Raster data analysis - Modeling in GIS - Digital elevation model-cost and path analysis - Knowledge based systems.

GIS Analysis : Organizing data for analysis, classification of GIS, analysis function, maintenance and analysis of spaital data - Transformations, conflation, edge matching and editing. Maintenance and analysis of non spatial attribute data-editing and query functions.

UNIT - IV

GIS Analysis Functions for Integrated Analysis of Spatial and Attribute Data : Retrieval and classification functions : Overlay operations, neighborhood operations, connectivity functions, output formatting, map annotations text pattern and line styles, graphic symbols, cartographic molding by GIS analysis procedure with an example.

Presentation of Geo-data and Analysis : Types of output data - Types of errors elimination and accuracies-sampling-Components of data quality.

UNIT - V

Introduction to Remote Sensing : Electro magnetic radiation, characteristics, interaction with earth surface, sensors types, satellite charateristics IRS series, data products interpretation of data.

Software Scenario Functions : Watershed modeling, environmental modelling and visibility analysis.

Suggested Reading :

1. Kang-Tsung Chang, *Introduction to GIS,* Tata McGraw Hill Edition.
2. Burrough P.A., *Principles of GIS for land resource assessment,* Oxford Publication.
3. Lilly and Johnweily, *Remote sensing and Image Interpretation.*
4. Stan, *Geographic Information Systems A management Perspective.*

CE 410

OPERATION RESEARCH IN CIVIL ENGINEERING

(Elective - I)

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT - I

Operation Research : Definition, historical development, engineering applications of optimisation, classification of optimisation problems, optimisation techniques, optimum design problem formulation.

UNIT - II

Linear Programme (LP) Methods for optimum design : Introduction, definition of standard LP problems - linear constraints, unrestricted variables, standard LP definition, basic concepts to LP problems, optimum solution for LP problems, duality in LP - standard primal LP and dual LP problems. The Simplex method - basic ideas and concepts of Simplex method, basic steps of Simplex method - application to Civil engineering problems.

UNIT - III

Non-Linear Programming : Introduction, definition and simple problems, Integer Programming, Branch and Bound method, Non-Linear Programming, Quadratic Programming, Separable programming.

UNIT - IV

Dynamic Programme : Introduction, definition, representation of a multistage decision process, conversion of non serial system to a serial system, applications to Civil engineering problems.

UNIT - V

Simulation : Introduction, definition, statistical aspects of simulations, Montecario method. Random number generation, advantages and limitations of simulation.

Reliability : Introduction, definition, Statistical concepts of reliability, uses of reliability.

Suggested Reading :

1. Singiresu. S., *Engineering Optimisation - Theory and Practice,* New Age International (P) Ltd.,
2. Jasbir, S. Arora, *Introduction to Optimum Design,* McGraw Hill Book Co.,
3. Shenov, G.V. Srivastava, U.K., Sharma, S.C., *Operation Research for Management,* New Age International (P) Ltd.,
4. Billy E. Gille, *Introduction to Operation Research - A Computer Oriented Algorithmic Approach,* Tata McGraw Hill.

ME 411

ENTREPRENEURSHIP

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT - I

Indian Industrial Environment : Competence, opportunities and challenges. Entrepreneurship and economic growth. Small scale industry in India, Objectives, Linkage among small, medium and heavy industries. Types and forms of enterprises.

UNIT - II

Identification and Characteristics of Entrepreneurs : Emergence of first generation entrepreneurs, environmental influence and women entrepreneurships. Conception and evaluation of ideas and their sources. Choice of technology - Collaborative interaction for technology development.

UNIT - III

Project Formulation : Analysis of market and demand. Financial and profitability analysis and Technical analysis. Project financing in India.

UNIT - IV

Project Management : Project organization, project planning and control using CPM, PERT techniques. Human aspects of project management. Assessment of tax burden.

UNIT - V

Behavior Aspects of Entrepreneurs : Personality - determinents, attributes and models. Leadership concept and models. Values and attitudes. Motivation aspects. Change behaviour. Time management. Various approaches of time management, their strengths and weaknesses. Urgency addition and time management matrix.

Suggested Reading :

1. Vasant Desai, *Dynamics of Entrepreneurial Development and Management,* Himalaya Publishing House, 1997.
2. Prasanna Chandra, *Projects-Planning. Analysis, Selection, Implementation and Review,* Tata McGraw Hill Publishing Company Ltd., 1995.
3. Stephen R. Covey and Roger Merrill A., *First Things First Simon , Schuster Publication, 1994.*
4. Sudha (G.S.) *Organizational Behaviour,* National Publishing House, 1996.

CE 431

CONCRETE LABORATORY

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

1. (a) Determination of specific gravity of cement.
   (b) Determination of unit weight or bulk density of cement.
2. Determination of normal consistency of cement.
3. (a) Determination of initial setting time of cement.
   (b) Determination of final setting time of cement.
4. (a) Preparation of mortar cubes for compressive strength
   (b) Test on mortar cubes for compressive strength.
5. To find fineness of cement by sieving and by air permeability method.
6. (a) Determination of specific gravity of fine aggregate.
   (b) Determination of bulk density of fine aggregate.
7. (a) Determination of specific gravity of coarse aggregate.
   (b) Determination of bulk density of coarse aggregate.
8. Test on bulking of sand.
   (a) Laboratory method
   (b) Field method
9. Determination of fineness modulus of fine aggregate.
10. Determination of fineness modulus of coarse aggregate.
11. Study on workability test
    (a) Slump
    (b) Compaction factor
12. Tests on hardened concrete
    (a) Compressive strength
    (b) Flexural Strength
13. Non-Destructive Testing of Concrete Structures (only demonstration)

CE 432

COMPUTER APPLICATIONS LABORATORY

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

1. Addition and Multiplication of Matrices.
2. Inverse of matrix and solution of linear simultaneous equations.
3. Cholesky method or Gauss Seidel method for solution of linear simultaneous equations.
4. Analysis of beam using flexibility method.
5. Analysis of truss using stiffness method.
6. Roots of non-linear algebraic equations.
7. Numerical Integration - Simpson's method.
8. Numerical Differentiation.
9. Iterative algorithm for optimum Pipe Diameter Selection.
10. Finite Difference algorithm for pressure beneath a footing.
11. Finite Difference algorithm for deflection of a simply supported beam.
12. Finite Difference algorithm for seepage analysis problems.

CE 433

PROJECT SEMINAR

Instruction	3 Periods per week
Sessional	25 Marks

Objective of the project seminar is to actively involve the students in preparation of the final year project with regard to following components.

1. Problem definition and specification.
2. Literature survey, familiarity with research journals.
3. Broad knowledge of available techniques to solve a particular problems.
4. Planning of the work, preparation of bar (activity) charts.
5. Presentation - oral and written.

The department can initiate the project allotment procedure at the end of III year 2nd semester and finalise it in the first two weeks of IV year Ist semester.

First 4 weeks of IV year Ist semester will be spent on special lectures by faculty members, research scholars, post graduate students of the Department and invited lectures by engineers from Industries and R & D Institutions. The objective of these preliminary talks will be to expose the students to real life practical problems and methodology to solve the technical problems.

Seminar schedule will be prepared by the co-ordinator for all the students from 5th week to the last week of the semester which would be strictly adhered to.

Each student will be required to :

1. Submit a one-page synopsis before the seminar for display on notice board.
2. Give a 20 minutes presentation followed by 10 minutes discussion.
3. Submit a technical write-up on the talk.

Atleast two teachers will be associated with the Project Seminar to evaluate students for the award of sessional marks which will be on the basis of performance in all the 3 items stated above.

WITH EFFECT FROM THE ACADEMIC YEAR 2009-2010

SCHEME OF INSTRUCTION AND EXAMINATION

B.E. IV/IV (REGULAR)

CIVIL ENGINEERING

SEMESTER - II

Sl. No.	Syllabus Ref. No.	Subject	Scheme of Instructions		Scheme of Examination		
			Periods per Week		Duration in Hrs	Maximum Marks	
			L/T	D/P		Univ. Exam	Sessionals
		THEORY					
1.	CE 451	Estimating & Specifications	4	2	3	75	25
2.	CE 452	Construction Management & Administration	4	--	3	75	25
3.		ELECTIVE - II	4	-	3	75	25
4.		ELECTIVE - III	4	-	3	75	25
		PRACTICALS					
5.	CE 481	Seminar	-	3	-	-	25
6.	CE 482	Project	-	6	viva	Gr*	50
		Total	22	9	-	375	200
		Total	-	31	-	-	575

ELECTIVE - II

CE 453 Health Monitoring & Retrofitting of Structures
CE 454 Ground Improvement Techniques
CE 455 Advanced Environmental Engineering
CE 456 Advanced Reinforced Concrete Desingn

ELECTIVE - III

CE 458 Advanced Transportation Engineering
CE 459 Ground Water Hydrology
CE 460 Finite Element Method
CE 461 Disaster Mitigation and Management
LA 454 Intellectual Property Rights

*Excellent/Good/Satisfactory/Unsatisfactory (E/G/S/US)

CE 451

ESTIMATING AND SPECIFICATIONS

Instruction — 6 Periods per week (4 Theory+ 2 Tutorials)
Duration of University Examination — 3 Hours
University Examination — 75 Marks
Sessional — 25 Marks

UNIT - I

Working out the detailed estimate for the following :

i) Flat roof building (load bearing, RCC & Steel framed structure)
ii) Bituminous and C.C. Road work including earthwork
iii) Single pipe culvert and single cell rectangular box culvert.
iv) Septic tank
v) Irrigation canal work including earthwork.

UNIT - II

Estimation of steel quantities for the following R.C. Works

i) Slabs, Beams and Columns
ii) Footings - Rectangular, isolated and combined
iii) Stair Case
iv) Overhead rectangular water tank

UNIT - III

Preparation of analysis of rates and theoretical requirements of materials as per the standard data of APDSS for the following :

i) Major items of works of a building
ii) All items of work of bituminous and concrete road works.

UNIT - IV

As per APDSS

i) General and detailed specification of works
ii) Departmental procedure for construction work
iii) Types of estimates

UNIT - V

i) Types of contracts, essentials of contract, condition of contract.

ii) Tender - Tender form, Tender documents, Tender notice, work order.

iii) Earnest money and Security deposit

iv) Measurement book and Muster roll.

Suggested Reading :

1. B.N. Dutta, *Estimating and Costing in Civil Engineering - Theory and Practice,* S. Dutta & Co., Lucknow, 2002.
2. M. Chakraborthi, *Estimating, Costing and Specifications in Civil Engineering,* (Published by Author), 2002.
3. Jagjit Singh, *Estimating and Costing in Civil Engineering,* Galgotia Publications, New Delhi, 1996.

CE 452

CONSTRUCTION MANAGEMENT AND ADMINISTRATION

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT - I

Significance of construction management, objectives and functions of construction management, construction management team, principles of organisation, types of organisation.

UNIT - II

Large scale production, economics of large scale production. Construction planning, bar charts, network techniques in construction management- CPM and PERT.

UNIT - III

Cost time analysis in network planning, updating, Rescheduling, simple problems of civil engineering works. Time estimate : Expected likely, pessimistic and optimistic time, normal distribution curve and network problems, schedule compressing.

UNIT - IV

Contracts : Introduction, types of construction contracts and their advantages and disadvantages, conditions of contracts, tender drafting and tender analysis, safety in construction and safety measures, workmen compensation act, contract labour act. Demolition of buildings.

UNIT - V

Optimisation : Optimisation through linear programming, need for linear programming, linear programming model, graphical method, simplex method and linear programming in construction.

Suggested Reading :

1. Srinath L.S., PERT and CPM : *Principles and Application,* East - West Press, 1975.
2. Punmia B.C., and Khandewal, *PERT and CPM,* Lakshmi Publications, 1990.
3. Gahloj. P.S. and Dhiv. B.M. *Construction and Management,* Wiley Eastern Ltd., 1992.
4. Mahesh Varma, *Construction Planning and Equipment,* Metropolitan Book Co. Pvt. Ltd., 1985.
5. Taha H., *Operations Research,* Wiley Int., 2002.

CE 453

HEALTH MONITORING AND RETROFITTING OF STRUCTURES (ELECTIVE - II)

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT - I

Introduction to Structural Health Monitoring (SHM) : Definition & motivation for SHM, SHM - a way for smart materials and structures, SHM and bio mimetic - analog between the nervous system of a man and a structure with SHM, SHM as a part of system management, Passive and Active SHM, NDE, SHM and NDECS, basic components of SHM, materials for sensor design.

UNIT - II

Application of SHM in Civil Engineering : Introduction to capacitive methods, capacitive probe for cover concrete, SHM of a bridge, applications for external post - tensioned cables, monitoring historical buildings.

UNIT - III

Non Destructive Testing of Concrete Structures : Introduction to NDT - Situations and contexts, where NDT is needed, classification of NDT procedures, visual Inspection, half-Cell electrical potential methods, Schmidt Rebound Hammer Test, resistivity measurement, electro magnetic methods, radiographic Testing, ultrasonic testing, Infra Red thermography, ground penetrating radar, radio isotope gauges, other methods.

UNIT - IV

Condition Survey & NDE of Concrete Structure : Definition and objective of Condition survey, stages of condition survey (Preliminary, Planning, Inspection and Testing stages), possible defects in concrete structures, quality control of concrete structures - Definition and need,

Quality control applications in concrete structures, NDT as an option for Non-Destructive Evaluation (NDE) of Concrete structures, case studies of a few NDT procedures on concrete structures.

UNIT - V

Rehabilitation and Retrofitting of Concrete Structure : Repair rehabilitation & retrofitting of structures, damage assessment of concrete structures, Materials and methods for repairs and rehabilitation, modeling of repaired composite structure, structural analysis and design - Importance of re-analysis, execution of rehabilitation strategy, Case studies.

Suggested Reading :

1. Daniel Balageas, Claus - Peter Fritzen and Alfredo Guemes, *Structural Health Monitoring,* Published by ISTE Ltd., U.K. 2006.
2. *Guide book on Non-destructive Testing of Concrete Structures, Training course series No. 17,* International Atomic Energy Agency, Vienna, 2002.
3. *Hand book on "Repair and Rehabilitation of RCC buildings",* Published by Director General, CPWD, Govt. of India, 2002.
4. Hand Book on Seismic Retrofitting of Buildings, Published by CPWD & Indian Building congress in association with IIT, Madras, Narosa Publishing House, 2008.

CE 454

GROUND IMPROVEMENT TECHNIQUES (ELECTIVE - II)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT - I

Introduction : Need for ground improvement, applications, factors affecting - different mechanical, chemical, static and dynamic techniques - mechanical stabilisation - blending of aggregate - Rothfunt's - Testing.

UNIT - II

Chemical Stabilisation : Lime, cement, bitumen, factors influencing - Design approach, construction procedure , laboratory testing , additives. Suspension and solution grouts, principles, methods, equipment, applications, compaction grouting, jet grouting.

UNIT - III

Cohesionless Soils - In situ densification, vibro techniques - Mechanisms. Factors affecting, suitability number, compacting piles. Vibro replacement process.

UNIT - IV

Cohesive Soils - In situ densification, Pre-loading - Dewatering - sand drains. Sandwicks, geodrains. ropedrains, banddrains-stone columns, lime piles - thermal and vacuum methods.

UNIT - V

Geotextiles - Woven and non-woven fabrics. Types, functions and application - Geotextiles, geogrides test on geotextiles. Reinforced earth - Principles and factors governing design.

Suggested Reading :

1. Hansmann, R., *Engineering Principles of Ground Modification,* McGraw Hill Publishing Co.,
2. Moseley, M.P., *Ground Improvement.*
3. Fang-Hsai - Yang, *Foundation Engineering Hand Book,* 2nd edition, CBS Publication, New Delhi.
4. Rao, G.V. and Raju, G.V.S.S., *Engineering with Geosynthesis.*

CE 455

ADVANCED ENVIRONMENTAL ENGINEERING (ELECTIVE - II)

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT - I

Industrial Waste Management - Types of industries, characteristics of Industrial wastes, effects of industrial effluents on streams, land and human health. Environmental legislation related to industrial effluents and hazardous wastes. Self-purification of water bodies, Streeter phelps equation.

UNIT - II

Industrial Waste Water Treatment : Manufacturing process, waste water characteristics and effluent of the following industries - Leather tanning, dairy, pulp and paper, pharmaceutical, textiles, steel plants, thermal power plants, fertilizer, cement, sugar and distilleries.

UNIT - III

Air Pollution : Sources, classification and effects of air pollutants, Meteorology of air pollution, wind rose diagrams, lapse rates, atmospheric stability and dispersion of air pollutants, stack height calculation, ambient air quality monitoring, stack sampling, analysis of air pollutants.

UNIT - IV

Air Pollution Control : Air quality standards, methods of air pollution control - zoning, source correction, control of suspended parciulate matter by equipment (gravitation, centrifugation, filtration, scrubbing, electrostatic precipitation), selection of proper equipment, gaseous pollutant control by absorption, condensation, combustion.

UNIT - V

Environmental Impact Assessment - Need for environmental impact assessment (EIA), objectives of EIA. EIA capabilities and limitations.

Legal provisions of EIA. Methods of EIA, base line data collection required for EIA, evaluation of impacts, prediction of impacts. Preparation of Environmental Management Plan, preparation of EIAs of road project, Industry, and dam. Issues related to rehabilitation of affected people, Preparation of Environment impact statement and Environment management plan.

Suggested Reading :

1. Rao M.N. and Dutt, *Waste Water Treatment,* Oxford and IBM Publications Ltd.,
2. Eckenfelder, W.W., *Industrial waste pollution control.* Mc Graw Hill Book Co.
3. C.S. Rao, *Environmental Pollution Control Engineering,* Wiley Eastern Ltd., New Delhi.
4. M.N. Rao, H.V.N. Rao, *Air Pollution Control,* Tata Mc Graw Hill.
5. Peavy and Rowe, *Environmental Engineering,* Mc Graw Hill Publications.
6. Keiley, *Environmental Engineering,* McGraw Hill Publishers, 2003.
7. Sincero and Sincere, *Environmental Engineering,* Prentice Hall of India.

CE 456

ADVANCED REINFORCED CONCRETE DESIGN (ELECTIVE - II)

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT - I

Beams curved in plan : Introduction , design principles, structural design of beams curved in plan of circular and rectangular types. Deep beams - Introduction - flexural and shear stresses in deep beams - I.S. Code provisions - Design of deep beams.

UNIT - II

Portal Frames : Introduction , Analysis and design of rectangular portal frames including hinges at the base.

Building Frames : Substitute frame method of analysis for building frames. Analysis and Design of frames with single bay two storeyed and two bay single storeyed.

UNIT - III

Flat slabs : Introduction, components - I.S. Code provisions, design methods, Design for flexure and shear, openings in Flat slabs.

Raft Foundations : Definitions, Types, structural analysis and design of raft foundation for buildings with column grids up to three by two.

Suggested Reading :

1. N. Krishn Raju, *Advanced Reinforced Concrete Design*, CBS Publishers.
2. H.J. Shah, Reinforced Concrete, Charotar Publishers.
3. P.C. Varghese, *Advanced Reinforced Concrete Design*, PHI, 2001.
4. Dr. B.C. Punmia, et al, *Comprehensive R.C.C. Designs*, Laxmi Publishers, 1998.

CE 458

ADVANCED TRANSPORTATION ENGINEERING (ELECTIVE - III)

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT - I

Soil - Stabilized Road : Preliminary investigation, materials, techniques of stabilizations, methods of stabilization, mechanical, Mehra's Method, Soil , cement, soil bitumen and soil lime stabilization.

UNIT - II

Flexible and Rigid Pavement Design : GI Method, IRC revised CBR, design of rigid pavement - Concepts of ESWL, stresses due to Loads, temperature, warping, friction & critical combination, IRC method.

UNIT - III

Pavement Distress and Evaluation : Skid resistance, structural evaluation, Benklemen beams method, overlays, highways drainage - Importance, requirements, surface drainage systems, sub-surface drainage system.

UNIT - IV

Highway Capacity & Economic Evaluation : Concept of passenger car units (IRC), Level of service - concept, factors, multilane capacities for rural, urban, and express ways, concept of transport cost & benefits : Benefit cost ratio, net present value, rate of return, and their relative comparison for evaluation. Accidents, causes, methodologies for accident causing precautions to minimize the accidents.

UNIT - V

Travel Demand Management : Traffic management systems (TMS) - Restrictions on turning movements, one way streets, tidel Flow - operations, exclusive bus lanes. Traffic relief at junctions, parking studies, parking inventories, types of parking service, parking analysis, bottle

necks. Nature and traffic problems in cities. Effect on environment due to traffic noise and air pollution, introduction to computer applications in traffic and transport planning.

Suggested Reading :

1. L.R. Kadiyali, *Principles and Practice of Highway Engineering,* Khanna Publications, New Delhi, 2000.
2. C.J. Khisty and B.K. Lal, *Transportation Engineering, An Introduction,* Prentice Hall of India, New Delhi, 2002.
3. Y.H. Huang, *Pavement Analysis and Design,* Prentice Hall, Englewood Cliffs, New Jersey, 2004.
4. C.S. Papcostas and P.D. Prevendouros, *Transportation Engineering and Planning,* Prentice Hall of India, New Delhi, 2002.
5. F.L. Mannering, W.P. Kilareski and S.S. Washburu, *Principles of Highway Engineering and Traffic Analysis,* John Wiley & Sons, 2005.

CE 459

GROUND WATER HYDROLOGY
(ELECTIVE - III)

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT - I

Introduction : Ground water in the hydrologic cycle, vertical distribution of ground water. Types of aquifers - unconfined, confined and leaky aquifers, porosity, void ratio, storage coefficient, permeability, Transmissivity, specific yield, safe yield. General equation of ground water flow, steady undirectional flow, steady radial flow to a well in unconfined and confined aquifiers. Steady flow with uniform recharge.

UNIT - II

Unsteady Radial Flow to a Well : Non equilibrium equation for pumping tests, Theis method of solution, Cooper Jacob method, Chow's methods of solution, law of times, well flow near acquifer boundaries. Image wells, multiple well systems, partially penetrating wells, steady radial flow in leaky artersion aquifer. Well completion and well development.

UNIT - III

Geophysical Exploration : Surface investigations of ground water - Electrical Resistivity method, seismic refraction method, gravity and magnetic methods, geologic methods, Dowsing. Subsurface Investigations - Test drilling, resistivity logging, potential logging, Temerature logging, calliper logging, Interpretation of logs and selection of site as a well.

UNIT - IV

Artificial Recharge of Ground Water : Methods of recharge, water spreading, sewage discharge, Recharge through pits and shafts, Recharge through well, Induced recharge. Sea water intrusion in coastal aquifers; occurrence, Ghyben - Herzberg relation, shape of fresh - salt water interface, length of the intreded sea water wedge, oceanic island aquifers, upcoming, prevention and control of sea water intrusion.

UNIT - V

Ground Water Basin Management : Conjuctive use of surface and ground waters, Hydrologic balance equation. Ground water analog models-Sand models, electric analog models, viscuous flow models, numerical analysis models - Finite difference method.

Suggested Reading :

1. D.K. Todd, *Ground Water Hydrology,* John Wiley & Sons, Inc., USA.
2. H.M. Ragunath, *Ground Water,* Wiley Eastern Limited, New Delhi.
3. K.P. Karnath, *Ground Water Ananment, Development and Management,* Tata McGraw Hill Publishing Company, New Delhi.
4. Walton, *Ground Evaluation and Management,* McGraw Hill.
5. Bouwer, *Ground Water Hydrology,* McGraw Hill.

CE 460

FINITE ELEMENT METHOD
(ELECTIVE - III)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT - I

Introduction to finite element method, variational approach, Rayleigh - Ritz, and Galerkin's methods. Stiffness matrix for two noded bar, truss, and beam elements, problems with 3 degrees of freedom.

UNIT - II

Stiffness matrix for two noded beam element with 3 degrees of freedom per node. Transformation, generation of stiffness matrix for frames. Strain displacement and stress - strain relationship in an elastic continuum (linear problems). Equations of equilibrium, and boundry conditions. Plane stress and plane strain problems.

UNIT - III

Formulation of finite element method using principle of virtual displacement. Determination of stiffness matrix for three noded triangular element (constant strain triangle), and 4 noded rectangular element for plane stress and plane strain problems. Convergence criteria for selection of displacement models. Discretisation of continuum. Assembly of global stiffness and load matrices. Displacement boundry conditions.

UNIT - IV

Isoparametric finite elements. Direct construction of shape functions for higher order elements using natural co-ordinate system. Shape functions for eight roded parabolic curved isoparametric element. Determination of element stiffness matrix for four noded quadrilateral element. Use of Jacobian, and Gauss quadrature techniques. Load matrix for eight moded rectangular isoparametric element (for body forces and surface traction).

UNIT - V

Strain displacement and stress - strain relation for axisymmetric problems. Stiffness matrix for three noded ring element. Volume co-ordinates and stiffness matrix for four noded tetrahedron element.

Suggested Reading :

1. O.C. Zienkiewicz and R.L. Taylor, *The Finite Element Method,* Vol. I, McGraw Hill, 1989.
2. C.S. Krishna Moorthy, *Finite Element Analysis,* McGraw Hill, 1991.
3. C.S. Desai and J.F. Abel, *Introduction to the Finite Method,* Van Nostrand, 2002.
4. T.R. Chandrupatla, *Finite Element Analysis for Engineering and Technology,* Universities Press, 2004.

CE 461

DISASTER MITIGATION AND MANAGEMENT (ELECTIVE - III)

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT - I

Introduction - Natural, human induced and human made disasters - international decade of disaster reduction.

UNIT - II

Natural Disasters - Hydrometereological based disasters - Trophical cyclones, floods, drought and desertification - Zones Geographical based disasters - Earth quake, Tsunammis, Landslides and avalanches.

UNIT - III

Human induced hazards - chemical industrial hazards, major power breakdowns, traffic accidents, etc.

UNIT - IV

Use of remote sensing and GISI disaster mitigation and management.

UNIT - V

Rich and vulnerability to disaster - mitigation and management options - warning and forecasting.

Suggested Reading :

1. Notes / Reading material published by National Disaster Management Institute, Ministry of Home Affairs, Govt. of India.

LA 454

INTELLECTUAL PROPERTY RIGHTS
(ELECTIVE - III)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT - I

Introduction : Meaning of intellectual property - Nature of I.P. - Protection of I.P. rights - Kinds of intellectual property rights - International Conventions of intellectual Property Rights - Patent treaty 1970. GATT 1994, TRIPS & TRIMS - Intellectual organization for Protection of IPR - WTO, WIPO, UNESCO.

UNIT - II

Patents : Meaning of patent - Commercial significance, obtaining of Patent , patentable subject , matter, rights and obligations of patentee. Specification - registration of patents , compulsory licensing and licenses of rights - Revocation.

UNIT - III

Industrial Design : Definition of Designs - Registration of designs, Rights and duties of properitor of design - Piracy of registered designs.

UNIT - IV

Trade Marks : Meaning of trademark , purpose of protecting trademarks, registered trade mark , procedure , passing off , assignment and licensing of trade marks, Infringement of trademarks.

UNIT - V

Copy Right : Nature, scope of copyright , subject matter of copyright,- rights conferred by copyright . Publication - Broadcasting, telecasting, computer programme, database right, assignment, transmission of copyright, Infringement of copy right.

Suggested Reading :

1. Cornish W.R., *Intellectual Property; Patents, Copyright, Trademarks and Allied Rights,* Sweet & Maxwell, 1993.
2. P. Narayanan, *Intellectual Property Law,* Eastern Law House, 2nd Edn., 1997.
3. Robin Jacob & Daniel Alexander, *A Guide Book to Intellectual Property Patents, Trademarks, Copyrights and Designs,* Sweet and Maxwell, 4th edition, 1993.

CE 481

SEMINAR

Instruction	3 Periods per week
Sessional	50 Marks

Oral presentation is an important aspect of engineering education. The objective of the seminar is to prepare the student for a systematic and independent study of the state of the art topics in a broad area of his / her specilisation.

Seminar topics may be choosen by the student with advice from the faculty members. Students are to be exposed to the following aspects of a seminar presentation.

1. Literature survey
2. Organisation of the material
3. Presenting of OHP slides / PPT presentation
4. Technical writing

Each student is required to :

1. Submit a one page synopsis before the seminar talk for display on the notice board.
2. Give a 20 minutes presentation through OHP, PPT followed by a 10 minute discussion.
3. Submit a report on the seminar topic with list of reference and slides used.

Seminars are to be scheduled from the 3rd week to the last week of the semester and any change in schedule should be discouraged.

For award of sessional marks students are to be judged by atleast two faculty members on the basis of an oral and a written presentation as well as their involvement in the discussion.

CE 482

PROJECT

Instruction	6	Periods per week
University Examination		Viva-voce-Grade*
Sessional	50	Marks

Solving a real life problem should be the focus of under graduate projects. Faculty members should prepare project briefs (giving scope and reference) well in advance which should be made available to the students at the departmental library. The project may be classified as hardware / software / modeling / simulation. It may comprise any elements such as analysis, design, synthesis.

The deparment will appoint a project coordinator who will coordinate the following.

1) Grouping of students (a maximum of 3 in a group)
2) Allotment of projects and project guides.
3) Project monitoring at regular intervals.

All projects allotments are to be completed by the 4th week of IV year Ist semester, so that students get sufficient time for completion of the project.

All projects will be monitored at least twice in a semester through students presentation. Sessional marks should be based on the grades / marks, awarded by a monitoring committee of faculty as also marks given by the supervisor.

Efforts be made that some of the projects are carried out in industries with the help of industry coordinators. Problems can also be invited from the industries to be worked out through undergraduate projects.

Common norms will be established for final documentation of the project report by the respective department.

*Excellent / Good / Satisfactory / Unsatisfactory (E / G / S /US)