

## Semester-VII

**Course Title: Transportation Engineering-II**

**Course Code: CE-721**

**Duration of Exams: 3 hours**

**Max. Marks: 100**

**External Examination: 60**

**Internal Assessment: 40**

**Objective:** The objective of this course is to provide basic knowledge to the students pertaining to railways, harbors, docks and airports.

### UNIT-I

**Railways-I:** Importance of transportation system. History of railways and It's development, development of Indian railways. Surveys for Route location. Permanent way and its component parts formation, Ballast Sleepers & Rails. Creep and Tilt in Rails.

### UNIT-II

**Railways-II:** Track fittings and fastenings. Points and crossings. Track resistance and tractive effort. Gauge problem, super elevation near branching of curves. Gradients. Station platforms-Variety types of yards and sidings. Signals.

### UNIT-III

**Harbours:** Various types of natural and artificial Harbours. Break water various types of their methods of construction.

### UNIT-IV

**Docks:** Various types-Dry and wet docks, floating docks and spillways. Transit sheds and ware houses: Light house, Navigation aids.

### UNIT-V

**Airport Engineering:** Introduction, Classification of airports: planning, Surveys and site selection of airports. Airport Geometrics: Runway length, Patterns and orientation-wind rose diagram. Design of Airport Pavement ,Run Way and taxiway. Terminal requirements. Design-Difference between highway and airport pavements. Introduction to Airport Drainage and Air Traffic Control.

**Course outcome:** After successfully studying this course student will:

1. Understand the importance of transportation system and permanent way and its various components.
2. Understand track resistance and tractive efforts and super elevation of curves.
3. Understand various types of harbours and their method of construction.
4. Understand various types of dry and wet docks, spillway and transit sheds.
5. Understand planning, survey and site selection of airport and able to design airport pavement and taxiway.

### Books Recommended:

1. **B L Gupta**, Roads, railways, bridge & Tunnels.
2. **Rangawala**, Docks & Harbours.
3. **legot & Dvnn**, Concrete Bridge.

4. **Birdi & Ahuja**, Railway bridges & Tunnels.
5. **N.K.Naswani**, Railway Engineering.
6. **K.F.Antia**, Railways.
7. **Mundery**, Railways track Engineering.
8. **Khanna**, Highway Engineering.

**Note for Paper Setter:** The question paper shall comprise of 10 questions. Two questions will be set from each Unit. The student has to attempt five questions at least one from each Unit

## Semester-VII

**Course Title: Irrigation & Flood Control**  
**Course Code: CE-722**  
**Duration of Exams: 3 hours**

**Max. Marks: 100**  
**University Examination: 60**  
**Sessional Assessment: 40**

**Objective:** This course is meant to provide an understanding to the students about water requirements in irrigation, canal design, diversion works, cross drainage works and measures for flood control.

### UNIT-I

**Introduction:** Present status of irrigation in India, Advantages of irrigation, brief of Gravity, Lift and sprinkler irrigation. Soil moisture and crop water relationships, duty, delta, consumptive use, irrigation requirements, principal Indian crops, multiple cropping, etc.

### UNIT-II

**Canal Irrigation:** Types of canals, parts of canal irrigation systems, channel alignment, assessment of water requirements, estimation of channel losses, Design of Channels, Regime and semi-theoretical approaches; canal lining, facts affecting choice of various types of canal lining.

### UNIT-III

**Diversion Headwork:** Selection of sites and layout, parts of diversion head works, types of weirs/Barrages, design of weirs' on permeable foundations, silt excluders and silt ejectors.

### UNIT-IV

**Cross Drainage Works:** Necessity of cross drainage works, their types and selection; design of various types of cross drainage works such as aqueduct, siphon, super passage, load.

### UNIT-V

**Flood Control:** Flood problem, types of flood control measures, drainage of irrigation lands both saline and alkaline lands.

**Course Outcomes:** After the completion of the course the students will be able to:

1. Understand the basic requirements of irrigation and various irrigation techniques, requirements of the crops
2. Design irrigation canals and canal network
3. Plan and design diversion head works
4. Design irrigation canal structures
5. Analyze the flood control measures

**Text Books:**

1. **Bharat Singh**, Fundamentals of irrigation engineering.
2. **Varshney, Gupta & Gupta**, Theory and design of irrigation structures Vol. I & II

**Note for Paper Setter:** The question paper shall comprise of 10 questions. Two questions will be set from each Unit. The student has to attempt five questions at least one from each Unit.

**Semester-VII**

**Course Title: Design of Structures-III**

**Course Code: CE-723**

**Duration of Exams: 3 hours**

**Max. Marks: 100**

**University Examination: 60**

**Sessional Assessment: 40**

**Objective:** This course aims to strengthen the design skills in foundations, R Walls, domes and Pre stressed structures.

**UNIT-I**

**Foundations:** Various types of RCC footings, Design of isolated and combined footings. Introduction to Raft foundation.

**UNIT-II**

**Retaining Walls:** Stability analysis of retaining walls, design of cantilever and counter for type RCC retaining walls.

**UNIT-III**

**Water Retaining Structures:** Design of underground, circular and rectangular water tanks-reference to IS:3370

**UNIT-IV**

**Shell Structures:** Membrane analysis of spherical and conical domes by statical methods. Design of domes and ring beams.

## **UNIT-V**

**Pre Stressed Concrete:** General principles, Methods of pre stressing, pre-tensioning and post-tensioning, losses in pre stress. Design of rectangular, T and I section beams.

**Course Outcomes:** After studying the course student will:

1. Able to design the isolated and combined footing.
2. Able to design the retaining walls and analyse them for stability.
3. Capable of designing the different water tanks.
4. Able to do the membrane analysis of domes and design them.
5. Understand the methods of pre-stressing and able to calculate losses in pre-stress member.

**Text Books:**

1. **Bowels**, Foundation Engineering.
2. **Jain & Jaikrishen**, Design of R.C.C Structures Vol.-II.
3. **Krishnarayan**, Prestress Concrete Structures.

**Books Recommended:**

1. **Kong & Evans**, Design of reinforced and pre stressed concrete Structures.
2. **A.K. Jain**, Design of R.C.C.-Limit state Method.

**Note for Paper Setter:** The question paper shall comprise of 10 questions. Two questions will be set from each Unit. The student has to attempt five questions at least one from each Unit.

## Semester-VII

**Course Title: Major Project-I**

**Course Code: CE-724**

**Duration of Exams: 3 hours**

**Max. Marks: 100**

**University Examination: Nil**

**Internal Assessment: 100**

During semester VI every student shall be allotted a Major Project-I pertaining to his/her stream under the supervision of an allotted mentor. Students are required to report in their respective departments to do preliminary exercise of survey of literature and preparation of a road map of the selected Major Project-I under the supervision of an allotted mentor. Students are required to complete the Major Project-I during semester VII. Major Project-I shall be evaluated internally as per university statutes by a committee consisting of:

- i) Head of the Department
- ii) One member nominated by Principal
- iii) Coordinator(s)/Supervisor(s) of minor project/training

**Course Outcomes:** At the end of the course, the student will be able to:

1. Work in a team to select a problem for project work
2. Review and evaluate the available literature on the chosen problem
3. Formulate the methodology to solve the identified problem
4. Apply the principles, tools and techniques to solve the problem
5. Prepare and present project report

## Semester-VII

### Elective-I

**Course Title: Rock Mechanics**

**Course Code: CE-741**

**Duration of Exams: 3 hours**

**Max. Marks: 100**

**University Examination: 60**

**Sessional Assessment: 40**

#### UNIT-I

**Classification and Index Properties of Rocks:** Genesis & Geological classification of rocks- Engineering classification of rocks masses, Index properties of rock systems

#### UNIT-II

**Rock Strength and Failure Criteria:** Modes of rock failures, strength of rock, Laboratory and field measurement of shear, tensile and compressive strength, stress strain behaviour in compression, Mohr, coulomb failure criteria and empirical criteria for failure, Deformability of rocks.

#### UNIT-III

**Initial Stress and Their Measurements:** Estimation of initial stresses in rocks, influence of joints and their orientation in distribution of stresses. Techniques for measurement of in-situ stresses

#### UNIT-IV

**Application of Rock Mechanics in Engineering:** Simple engineering application, underground opening, rock slopes, foundation and mining subsidence

#### UNIT-V

**Rock Bolting:** Introduction- rock bolt systems, rock bolt installation techniques, testing of rock bolts, choice of rock bolt based on rock mass condition.

**Course Outcomes:** At the end of the course, the student will be able to:

1. Understand Genesis & Geological classification of rocks and index properties of rock systems.
2. Understand rock Strength and Failure Criteria of rocks.
3. Understand estimation of initial stresses in rocks, influence of joints and their orientation in distribution of stresses in rocks.
4. Understand application of Rock Mechanics in Engineering such as foundation and mining subsidence.
5. Understand rock bolt installation techniques and testing of rock bolts.

#### Text Books:

1. **Goodman P.T.**, Introduction to rock mechanics, John and sons, 1999.
2. **Stillborg B.**, Professional user Handbook for rock bolting, Tran. Tech Publications.

**Note for Paper Setter:** The question paper shall comprise of 10 questions. Two questions will be set from each Unit. The student has to attempt five questions at least one from each Unit.

## Semester-VII

### Elective-I

**Course Title: Advanced Geotechnical Engineering**

**Course Code: CE-742**

**Duration of Exams: 3 hours**

**Max. Marks: 100**

**University Examination: 60**

**Sessional Assessment: 40**

#### UNIT-I

**Flow through Porous Media:** Darcy's law and its limitation, general hydrodynamic equation for two dimensional flows. Anisotropy, seepage force and critical gradient, Flow net by graphical method and Laplace equation.

#### UNIT- II

**Soil Dynamics:** Nature of dynamics loads. Stress condition on soil element Seismic force for pseudo static analysis as per is code. Dynamic module, Dynamic constant Poissons' Ratio, damping ratio. Liquefaction parameters. Laboratory. Techniques and Field test .FacIDrs effecting shear modulus, Elastic modulus and 8astic constants.

#### UNIT-III

**Stability of Slops:** Introduction, planar failure, circular failure, topping failure, causes of landslides, methodology of landslides. Soil, Base Exchange mechanism. Pozzolanic reaction, lime -soil interaction, cements Stabilization soil bitumen Stabilization.

#### UNIT-IV

**Soil Exploration:** Planning for Geotechnical Exploration methods of exploration such as Electric resistivity and seismic retraction. Water table location .Processing of soil exploration data and its interpacketation, offshore Explorations

#### UNIT-V

**Geosynthetics:** Type, physical and engineering properties, testing functions and application of Geosynthetics. Designing of foundations, embankments and retaining walls with geosynthetics. Recent developments.

**Course Outcomes:** At the end of the course, the student will be able to:

1. Know Darcy's law and its limitation, general hydrodynamic equation for two dimensional flows.
2. Know the nature of dynamics loads in soil and stress condition on soil element Seismic force for pseudo static analysis as per is code.
3. Know the Stability of Slops and causes of landslides, methodology of landslides.
4. Understand the planning for geotechnical exploration methods of exploration such as electric resistivity and seismic retraction also know Water table location.
5. Design of foundations, embankments and retaining walls with geosynthetics.

#### Text Books:

1. **Murthy, Alp kart. Com**, Advanced foundation engineering.
2. **Alam Singh**, Soil mechanics.

#### Books Recommended:

1. **Butter Field R & Banerjee P.K**, Advanced geotechnical Analysis: development in soil mechanics and foundation engineering.

**Note for Paper Setter:** The question paper shall comprise of 10 questions. Two questions will be set from each Unit. The student has to attempt five questions at least one from each Unit.

## Semester-VII

### Elective-I

**Course Title: Tunnel Engineering**

**Course Code: CE-743**

**Duration of Exams: 3 hours**

**Max. Marks: 100**

**University Examination: 60**

**Sessional Assessment: 40**

#### UNIT-I

**Introduction:** History to tunneling, Situations for tunnels, Classification of tunnels on the basis of their use and alignment. Survey for a tunnel project. Including location, alignment and grade. Site investigations by surface, subsurface methods-and in-situ tests.

#### UNIT- II

**Tunnelling Through Rocks & Soft Grounds:** Tunneling in hard rocks. Methods of tunneling. Methods of rock blasting in tunnels including drilling, patterns of drill holes and explosive demand. Methods of tunneling through soft grounds

#### UNIT-III

**Mucking and Tunnel Support System:** Methods of mucking, Haulage systems: conveyer belt system, rail mounted haulage. Lining in tunnels-types, structural steel segments.

#### UNIT-IV

**Ventilation in Tunnels: Methods of ventilation during construction:** Case histories of a few important railways and road tunnels. Permanent ventilation-Natural and mechanical ventilation system, power requirements.

#### UNIT-V

**Hydropower Tunnels:** Alignment considerations, Main design and constructional considerations in hydro-power and sewer tunnels.

**Course Outcomes:** At the end of the course, the student will be able to:

1. Understand survey for a tunnel project including location, alignment and grade.
2. Know the methods of tunneling and methods of rock blasting in tunnels including drilling, patterns of drill holes and explosive demand.



3. Know the methods of mucking and tunnel support system.
4. Know the Methods of ventilation during construction.
5. Understand main design and constructional considerations in hydro-power and sewer tunnels.

**Text Books:**

1. **Singh Parbin**, Principles of Tunnelling, Ports & Harbours, S.K. Kataria & sons.

**Books Recommended:**

1. **Dr. Arora K**, Roads, Bridges, Tunnels & Airports.

**Note for Paper Setter:** The question paper shall comprise of 10 questions. Two questions will be set from each Unit. The student has to attempt five questions at least one from each Unit.

**Semester-VII**

**Elective-I**

**Course Title: Rural Water Supply & Sanitation**

**Course Code: CE-744**

**Duration of Exams: 3 hours**

**Max. Marks: 100**

**University Examination: 60**

**Sessional Assessment: 40**

**UNIT-I**

**Introduction to Technology/ Materials:**

Scope and concept of appropriate technology as applicable to civil engineering, importance of low cost construction in rural areas.

Materials: Importance of locally available material, bamboo, tree bushes, grass, mud, sand etc., treatment of materials for protection against termite, decay and for increasing their strength

**UNIT-II**

**Technology for Walls/Roofs:**

Construction of plane and block mud walls, bamboo/bush reinforced mud walls, water proofing of mud walls, thickness of mud walls, mud plaster. Use of hollow blocks in the construction of walls for insulation

Thatched Roofs: Constructional methods of thatched roofs, fire proofing of thatched roof, low cost treatment of thatched roof.

**UNIT-III**

**Low Cost Housing:**

Planning and construction of low cost houses cluster of houses, ventilation, low cost doors, construction of mud floors, construction of smokeless chullaha, construction of cement treated gunny bags – sheds and storage bins. Construction of sheds for animals

**UNIT-IV**

**Rural Water Supply and Sanitation**

Construction of open well, chlorination of open well, construction of hand pumps, constructions of bathing cubicals, construction of low cost drains.

Construction of low cost latrines, construction of pre-fabricated septic tanks, construction of soak pits.

## **UNIT-V**

### **Miscellaneous:**

Construction of fair weather roads, construction of bunds. Low lift pumps, Ferro-cement storage tanks, Ferro-cement grain bins, red clay tiles for roof and floors, construction of rapid burning low cost brick kilns solar seasoning plants. Solar cookers, fiber corrugated sheets, individual and community biogas plants. Concrete blocks for wall construction, Brick, panels, precast lintels, slabs and beam, water harvesting techniques etc.

**Course Outcomes:** At the end of the course, the student will be able to:

1. Understand importance of low cost construction in rural areas and importance of locally available materials.
2. Understand different Technology for construction of Walls/Roofs.
3. Know the Planning and construction of low cost housing and various component like doors, window etc.
4. Understand the Rural Water Supply and Sanitation system completely.
5. Know the low lift pumps, Ferro-cement storage tanks, Ferro-cement grain bins and many other useful things for rural housing.

## **RECOMMENDED BOOKS**

1. "Building Construction" By: Arora, Dhanpat Rai and Sons'.
2. "A Text of Building Construction" By: SPD Suhil Kumar.
3. "Construction Technology" By: R. Choudary and R. Greano
4. "Rural Technology" By: R.D Punia, U.N. Roy and Sanjay Mahajan, Satya Prakashn
5. "Rural Education and Technology" By: Verma and S.K. Jolaha, Deep and Deep Publications

**Note for Paper Setter:** - The Question paper shall comprise 10 questions, two questions from each unit. The students are required to attempt five questions, one from each unit.

## **Semester-VII**

### **Elective-I**

**Course Title: Environmental Assessment & Modelling**

**Course Code: CE-745**

**Duration of Exams: 3 hours**

**Max. Marks: 100**

**University Examination: 60**

**Sessional Assessment: 40**

## **UNIT-I**

**Environmental assessment:** Evolution of environmental impact assessment (EIA), EIA at project, regional and policy level; strategic EIA, EIA process, screening and scoping criteria, rapid and comprehensive EIA, specialized areas like environmental health impact assessment, environmental risk analysis, economic valuation methods, cost benefit analysis, expert system and GIS applications, uncertainties.

## **UNIT-II**

**Environmental policies and legislation:** Legislative and environmental clearance procedures in India and other countries, sitting criteria, public participation, resettlement and rehabilitation.

## **UNIT-III**

**Methodologies:** Practical applications of EIA, EIA methodologies, baseline data collection, prediction and assessment of impacts on physical, biological and socio-economic environment, environmental management plan, post project monitoring, EIA report and EIS, review process.

## **UNIT-IV**

**Environmental systems Modelling:** Principles of modelling, classification; introduction to air quality models, meteorology, atmospheric stability and turbulence, Gaussian plume model and modification, numerical models.

## **UNIT-V**

**Transport and fate of pollutant in aquatic system:** introduction to river, estuarine and Lake Hydrodynamics, stratification and eutrophication of lakes, dissolved oxygen model for streams, temperature models.

**Course outcome:** After successfully studying this course student will:

1. Understand evolution of environmental impact assessment and EIA at project.
2. Understand legislative & environmental clearance procedures in India and other countries.
3. Understand EIA methodologies, base line data collection & post project monitoring.
4. Understand principle of modelling airquality models and Gaussian plume models.
5. Understand dissolved oxygen model for streams and tempreture models.

### **Text Books**

1. Environmental Impact Assessment for Developing Countries: Asit K. Biswas
2. Environmental Impact Analysis Handbook : G.J. Rau and C.D. Wooten
3. Environmental Impact Assessment : L. Canter

### **Reference Books**

1. Air Pollution : J.H. Seinfeld
2. Principles of Surface Water Quality Modelling and Control : R.V. Thomann and J. A. Muller

**Note for Paper Setter:** - The Question paper shall comprise 10 questions, two questions from each unit. The students are required to attempt five questions, one from each unit.

## Semester-VII

### Elective-II

**Course Title: Applied Hydrology**

**Course Code: CE-746**

**Duration of Exams: 3 hours**

**Max. Marks: 100**

**University Examination: 60**

**Sessional Assessment: 40**

#### **UNIT-I**

**Precipitation:** Selection of precipitation networks, Storm analysis, Storm selection, DAD Analysis, Depth-area frequency. Curve, Concept of probable maximum precipitation and effective rainfall.

#### **UNIT-II**

**Evaporation and Evapo-Transpiration:** Measurement, factors affecting evaporation and evapo-transpiration, evaporation reduction. Factors affecting measurement, infiltration, infiltration capacity, infiltration indices.

#### **UNIT-III**

**Runoff:** Determination of available flow, derivation of Unit graph from complex storm hydrograph, S-curve hydrograph, IUH and its determination, elementary idea of conceptual models, Synthetic Unit graphs

#### **UNIT-IV**

**Extreme Flows:** Estimation of design flood, flood frequency analysis, factors affecting droughts, analysis of droughts.

#### **UNIT-V**

**Regression and Correlation:** Elementary treatment with two variables and application to hydrologic problems.

**Course outcome:** After successfully studying this course student will:

1. Understand selection of precipitation networks, Storm analysis, Storm selection and Concept of probable maximum precipitation and effective rainfall.
2. Understand evaporation and evapo-Transpiration and factors affecting measurement, infiltration, infiltration capacity, infiltration indices.
3. Understand determination of available flow, derivation of Unit graph from complex storm hydrograph, S-curve hydrograph etc.
4. Understand estimation of design flood, flood frequency and drought analysis.
5. Know elementary treatment with two variables and application to hydrologic problems.

#### **Text Books:**

1. **Subramanya K**, Applied Hydrology.

#### **Books Recommended:**

1. **Chow, Ven Te, Maidment David, R. Mays Lary Woo**, Applied Hydrology, McGraw Hill Publications,1995

2. **Viessmann, Warren, etal**, Introduction to Hydrology, IEP: A Dun-Donnelley Publisher, New York.
3. **Wilson, E.M**, Engineering Hydrology,
4. **Linsely K, Kohler A and Paulhus L.H**, Hydrology for Engineers, McGraw Hill, New York, 1975.

**Note for Paper Setter:** The question paper shall comprise of 10 questions. Two questions will be set from each Unit. The student has to attempt five questions at least one from each Unit.

## **Semester-VII**

### **Elective-II**

**Course Title: Design of Hydraulic Structures**

**Course Code: CE-747**

**Duration of Exams: 3 hours**

**Max. Marks: 100**

**University Examination: 60**

**Sessional Assessment: 40**

#### **UNIT-I**

**Canal Structures :** Canal alignment and layout, Design of Canals, Head regulator and cross regulator, Canal falls, hydraulic jump, cross drainage works such as level crossing, aquaduct and hyphen aquaduct, general design consideration.

#### **UNIT-II**

**Diversion Structures :** Design of barrages and weirs, weirs on permeable foundation, effect of surface and sub surface flow, Retrogression, & flow concentration effects on barrage design, Glacis, rigid apron, End sills, Energy dissipation for Weirs and under sluice sections, Divide wall, guide bund, afflux bund

#### **UNIT-III**

**Design of Bridges:** Hydraulic capacity, frequency-discharge and stage discharge relationship, Design discharge determination Backwater and surface profile analysis, maximum allowable velocity consistent with abutment material and scour potential, Transition bends & confluences, Design of waterway, Drainage of rainfall on bridge deck, Rip rap

#### **UNIT-IV**

**Dam Design:** Site selection, Forces acting on Dam, stability analysis, Design of non-over flow and over flow section seismic coefficient and response spectrum, typical section of earth and rock fill dams. Principles of design and construction of gravity arch and Buttress dams.

#### **UNIT-V**

**Design of Spillways:** Components of spillways, Types of spillways, Types of gates, spillway crest design, gradually-varied and spatially-varied flow calculation, Energy dissipation structures/Stilling basins.

**Course outcome:** After successfully studying this course student will:

1. Know canal Structures and design of Canals.
2. Understand design of barrages and weirs effect of surface and sub surface flow.
3. Know Design of Bridges and Drainage of rainfall on bridge deck, Rip rap.
4. Able to design of dam and principles of design and construction of gravity arch and Buttress dams.
5. Able to Design of Spillways and Energy dissipation structures/Stilling basin.

**Text Books:**

1. **S.K.Garg**, Irrigation Engineering and Hydraulic structures, Khanna pub!
2. **P. N. Modi**, Irrigation and Hydraulic structures.

**Books Recommended:**

1. **Vershney, Gupta &, Gupta Nam Chand Brothers**, Theory and Design of irrigation structures by
2. **Punmia, BC.and B.B.lal**, Irrigation Engineering and water power engineering by Laxami pub!

**Note for Paper Setter:** The question paper shall comprise of 10 questions. Two questions will be set from each Unit. The student has to attempt five questions at least one from each Unit.

**Semester-VII**

**Elective-II**

**Course Title: Remote Sensing & GIS**

**Course Code: CE-748**

**Duration of Exams: 3 hours**

**Max. Marks: 100**

**University Examination: 60**

**Sessional Assessment: 40**

**UNIT-I**

**Introduction:** Introduction to Remote Sensing, data acquisition and processing, sensor systems, applications, Electromagnetic Radiation (EMR) and its characteristics, Radiation principles, Planck's Law, Stefan's Law, Wein's Displacement law, Kirchoff's Law, prosperities of solar radiant energy, atmospheric windows.

**UNIT-II**

**Physical basis of remote sensing:** Interaction in the atmosphere, nature of atmospheric interaction, atmospheric effects of visible, near infrared thermal and microwave wavelengths, interaction at ground surface, interaction with soils and rocks, effects of soil moisture, organic matter, particles, size and texture, interaction with vegetation, spectral characteristics of individual leaf, vegetation canopies, effect of leaf pigments, cell structure, radiation geometry.

**UNIT-III**

**Platform and sensors:** Multi concept in remote sensing, general requirements of a platform, balloon aircraft, satellite platforms sun-synchronous orbits, sensors for visible

and near infrared wavelengths, profilers, images, scanners, radiometers, optical mechanical and push button scanners, spectral, spatial, radiometric and temporal resolution, IFOV, FOV, geometric characteristics of scanners, V/H ratio, comparison of some satellite/ aerial platforms and sensors and remote sensing data products, land sat

MSS and TM, SPOT, IRS, ERS etc.

#### **UNIT-IV**

**Geographical Concepts and Terminology:** Difference between image processing system and geographical system (GIS), utility of GIS, various GIS packages and their salient features, essential components of a GIS, scanners and digitisers

#### **UNIT-V**

**Data Base:** raster and vector data, data storage, hierarchical data, network systems, relational database, data management, conventional database management systems, spatial database management, data manipulation and analysis, reclassification and aggregation, geometric and spatial operation on data management and statistical modeling, applications of GIS in various natural resources and engineering applications.

**Course outcome:** After successfully studying this course student will:

1. Able to understand Remote Sensing and data acquisition and processing, sensor Systems and its applications.
2. Know the nature of atmospheric interaction, atmospheric effects of visibility and, interaction with soils and rocks etc.
3. Understand multi concept in remote sensing and balloon aircraft and comparison of some satellite/ aerial platforms and sensors and remote sensing data products.
4. Understand difference between image processing system and geographical system (GIS), utility of GIS and essential components of a GIS.
5. Know the raster and vector data, data storage, hierarchical data, network systems, relational database, data management, conventional database management systems and applications of GIS in various natural resources and engineering applications.

#### **Text Books**

1. Remote Sensing and Image Interpretation: T.M. Lillensand and R.W. Keifer
2. Principles of Remote Sensing : P.J. Curren
3. Principles of Geographical Information systems for land Resources Assessment : P.A. Baurrough

#### **Reference Books**

4. Manual of Remote Sensing, Vol.2 : American Society of Photogrammetry and Remote Sensing
5. Geographical Information systems- A Management Perspective : Stan Aromoff

**Note for Paper Setter:** - The Question paper shall comprise 10 questions, two questions from each unit. The students are required to attempt five questions, one from each unit.

## Semester-VII

### **Elective-II**

**Course Title: Disaster Management**

**Course Code: CE - 749**

**Duration of Exams: 3 hours**

**Max. Marks: 100**

**University Examination: 60**

**Sessional Assessment: 40**

#### **UNIT -I**

**Introduction to Disaster:** Concept, and definition(Disaster, Hazards, Vulnerability, Resilience, Risk)

#### **UNIT-II**

**Disaster: Classification, Causes, impacts** (including social, economic, political, environmental, health etc).

Differential Impact- in term of caste, class, gender, age, location, disability. Global trends in disasters, urban disaster, pandemics, complex emergencies, Climate change

#### **UNIT-III**

**Approaches to Disaster Risk reduction:** Disaster cycle – its analysis, Phase, Culture of safety, prevention, mitigation and preparedness, community based DRR, Structural- nonstructural measures, roles and responsibilities of community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/URBs), state, Centre and other stake-holders.

#### **UNIT-IV**

**Inter- relationship between Disasters and Development:** Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land – use etc. Climate Adaption, Relevance of indigenous knowledge, appropriate technology and local recourses..

#### **UNIT-V**

**Disaster Risk Management in India:** Hazard and Vulnerability profile of India

Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management

Institution arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, Plans, programmes and legislation)

**Course outcome:** After successfully studying this course student will:

1. Understand concept and definition(Disaster, Hazards, Vulnerability, Resilience, Risk)
2. Understand Disaster: Classification, Causes, impacts (including social, economic, political, environmental, health etc).
3. Understand Disaster cycle – its analysis, Phase, Culture of safety, prevention, mitigation and preparedness etc.
4. Understand Inter- relationship between Disasters and Development.
5. Understand disaster risk management in india, hazard and vulnerability profile of india and component of disaster relief.

**Recommended Books:**



1. Kurowa, Julio “Disaster Management: Living with harmony with nature” Quebecor World Peru Publications.
2. Donal and David “Natural Hazards and Disasters" Thomas Brooks Publishers
3. 2. Risk Reduction & Emergency Preparedness” by WHO
4. Guide Book “Disaster Risk Management System Analysis” by FPO
5. Living with risk: A global revision of disaster reduction initiatives (Vol-1 & II), UN by ISDR 2004

**Note for Paper Setter:** - The Question paper shall comprise 10 questions, two questions from each unit. The students are required to attempt five questions, one from each unit.

## Semester-VII

### **Elective-II**

**Course Title: Maintenance Engineering**

**Course Code: CE-750**

**Duration of Exams: 3 hours**

**Max. Marks: 100**

**University Examination: 60**

**Sessional Assessment: 40**

#### **UNIT-I**

**Introduction:** Meaning and Objective of Maintenance of buildings, Factors influencing the repair and maintenance, factors causing deterioration such as human, Chemical, environmental and natural disaster, effects of various agencies causing disaster on bricks, timber, concrete paint, metals, plastics and stones. General aspects of maintenance planning, control, safety aspects and man power planning.

#### **UNIT-II**

**Investigation and Diagnosis:** Objective of investigation, Systematic procedure of investigation, Non-destructive tests on building elements and materials, main causes of building defects on various elements such as foundations, basements, DPC, Walls, Columns, beams, Roofs and terraces.

#### **UNIT-III**

**Repair Materials:** Basics Characteristics of repair materials, compatibility of repair materials, Characteristics of anti-corrosion coatings, adhesives mortars, curing compounds, joint sealants, water proofing compounds, protective coatings, selection of repair material for a specific job.

#### **UNIT-IV**

**Repair Building Defects:** Appraisal of damage and deterioration by non-destructive and other techniques, strengthening of Building Components. Such as walls, panel walls by grunting, guniting short getting and under pinning, prevention of water leakage.

Preventive maintenance consideration. Crack repair methods such as Epoxy injection, Growing and sealing, stitching, flexible sealing. Repair of joints, repair of surface defects by bug holes, tie holes, repair of honey comb and larger voids.

## **UNIT-V**

**Foundation and Plumbing Repairs:** Foundation repair methods such as poured concrete pairs or bell pair method, concrete pressed piling, concrete pressed piling with insert and steel pressed piling, comparison of foundation repair methods.

Trouble shooting toilet problems, defects in cisterns, blocked drains and damaged china wave, Maintenance of GI pipes, repair of traps, repair of **one** head and underground tanks.

**Course outcome:** After successfully studying this course student will:

1. Understand the meaning and objective of Maintenance of buildings, Factors influencing the repair and maintenance and effects of various agencies causing disaster on bricks, timber, concrete etc.
2. Know the Non-destructive tests on building elements and materials, main causes of building defects on various elements such as foundations, basements etc.
3. Know the repair materials for building such as anti-corrosion coatings, adhesives mortars, curing compounds, joint sealants, water proofing compounds, protective coatings.
4. Understand the repair building defects and crack repair methods such as Epoxy injection, Growing and sealing, stitching, flexible sealing etc.
5. Know various foundation repair methods such as poured concrete pairs or bell pair method and repair of one head and underground tanks.

### **Text Books:**

1. **A.P. Arora, Dhampat Rai & Sons**, A text of building construction.
2. **Ian Chander**, Repair & Renovation of Modern Buildings, McGraw-Hill Professional.

### **Books Recommended:**

1. **R. K. Dhir, R. M. Jones and Li Zheng, Thomas telford**, Repair and Renovation of Concrete structures.
2. **R.C. Mishra**, Maintenance Engineering and Management Prentice- Hall Pvt. Ltd.

**Note for Paper Setter:** The question paper shall comprise of 10 questions. Two questions will be set from each Unit. The student has to attempt five questions at least one from each Unit.

### Semester-VII

**Course Title: Industrial Training**  
**Course Code: CE-731**  
**Duration of Exams: 2 hours**

**Max. Marks: 50**  
**University Examination: Nil**  
**Internal Assessment: 50**

**Details:**

At the end of semester VI students are required to attend an Industrial Training for 6 weeks duration, during summer vacations. After the completion of training every student is required to prepare a detailed report of the training work which he/she has attended in an Organization/Industry/Company. Industrial Training shall be an essential component of curriculum to fulfill the eligibility criteria for appearing in semester VII university examination. The examination of Industrial Training shall be conducted during semester VII examination.

**Table 3** Distribution of Weightage for Minor project & Industrial Training of 50 marks.

<b>Component</b>	<b>Weightage</b>
Minor Project : Practical Work/Fabrication of Model/Drawing etc.	35
Industrial Training	15
<b>Total</b>	<b>50</b>

## **Semester-VII**

**Course Title: Seminar**  
**Course Code: CE-732**  
**Duration of Exams: 2 hours**

**Max. Marks: 50**  
**University Examination: Nil**  
**Internal Assessment: 50**

### **Details:**

During semester VI students are required to choose any topic that pertains to civil engineering and get the approval from the coordinator of the same semester or Head of the department. The date on which the seminar will be held will be decided by head after consulting the coordinator. The student has to give power point presentation before the students and the committee of the faculty members, framed by HoD and has to reply questions and queries asked by the faculty members of the committee. Marks will be given on overall performance in presentation and response to the queries asked to the student. The coordinator of the seventh semester will be overall in-charge.

## Semester-VII

**Course Title: STAAD Pro**  
**Course Code: CE-733**  
**Duration of Exams: 2 hours**

**Max. Marks: 50**  
**University Examination: Nil**  
**Internal Assessment: 50**

### List of Practicals:

1. Introduction to STAAD, its Components, structures and analytical models.  
Creating Basic Geometry (Beams/Columns), Architectural Drawing – Entering Coordinates.  
Creating some Geometry parts (Beams/Columns) in  
Architectural Drawing by Snap/Node Beam Command
2. Creating Geometry of Structures using Split Beam and Stretching of Members. Creating  
Geometry of Vertical and Horizontal Bracings in the Structure. Creating Geometry of Curved  
Beams/Solids in the Structure.
3. Selection of Members, Creating Group of Members, Assigning of Property to Members, For  
Steel Members – Using Section Database.
4. For Concrete Members – Using Define Tab. Creating User Table. Using Section Wizard
5. Using Specification Commands in members- beam. Using Specification Command as Truss,  
Tension and Compression members. Using Master/Slave Command in Staad. Creating  
Different types of Supports in Staad using Create Support Command.
6. Applying Different types of Loads – Dead, Live and Snow Load in Structure using Staad.  
Applying Different types of Loads-Seismic Load, Wind Load and Miscellaneous Load in  
Structure using Staad.
7. Creating Various Load Combinations in Staad. Pre-Print and Post-Print analysis command in  
Staad. Various types of Perform Analysis in Staad. Performing Analysis in Staad.
8. Assigning Code to Structure. 2 hours, Assigning Various Parameters to Structure.  
Slenderness and Unsupported Length Commands. Assigning Commands to Structure.  
Performing Analysis after Design.
9. Working with Editor Input file of Staad. Familiarity with Various Commands used in Staad  
Input File. Using Post Processing Command in the Structure. Analyzing various Analysis  
Results at various members and Joints.
10. Viewing Staad Output File – Design File of Structure, Generation of Project Report.  
Queries/Doubts

**Course Outcomes:** After the completion of the course the students will be able to:

1. Use software to model any type of structure.
2. Compute loads and use computer software to analyse a structure.
3. Use software to design a structure based on IS Codal provisions.