**Semester-VIII**

**Course Title: Major Project-II** **Max. Marks: 450**
**Course Code: CE-821** **External Examination: 200**
**Duration of Exams: 3 hours** **Internal Assessment: 250**

After the university Exam of semester VII every student shall be allotted a Major Project-II 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-II under the supervision of an allotted mentor. Students are required to complete the Major Project-II during semester VIII. Depending upon the infrastructure, Computing and other laboratories facilities the students shall be offered in house project on campus are they can complete their project work in any organization/industry outside the campus. Major Project-II shall be evaluated externally as per university statues.

**Table 4** Distribution of Weightage for Major Project of 450 marks.

| Internal Component | Weightage | External Component | Weightage |
|---|---|---|---|
| Quality of work | 100 | Dissertation | 100 |
| Presentation | 50 | Presentation | 50 |
| Viva Voce | 100 | Viva Voce | 50 |
| Total | 250 | | 200 |

**Semester-VIII**

**Elective-III**

**Course Title: Architecture and Town Planning** **Max. Marks: 100**
**Course Code: CE-841** **University Examination: 60**
**Duration of Exam: 3 Hrs** **Sessional Assessment: 40**

**Objectives:** The objective of this subject is to study the principles of architecture design and functional planning of buildings. It also aims to realize the process of resource mobilization, organization of land-use, transportation and infrastructure networks both for efficient functioning and creation of pleasant and well ordered environment.

**UNIT–I**

**Introduction to Architecture:** Origin & definition, factors affecting Architecture, Aesthetics – Principles, Elements of Aesthetics point, Line, Plane, figure, form, shape, size, Background. Composition-focus, unity, balance, rhythm, harmony, discord, textures, contrast, scale, proportions and character. Colour-psychological impact and other fractures, Circulation.

**UNIT–II**

**Basic Principles:** Orientation of building, temperature, effect of sun and wind on orientation, climate- cool, temperate & arid season. Ventilation in buildings, space. Modern concept of building. Comfort, factors affecting planning. Vertical space and shelter, Landscape-architecture. Planning of Buildings – Aims, factors affecting, site selection.

**UNIT–III**

**Town Planning:** Introduction to town planning, evolution, objects, principles & importance of town planning. Origin & growth of towns, stages in town development, Planning of modern towns & military towns. Town planning in ancient India & present position. Zoning- Objects, Principles, importance and aspects.

**UNIT–IV**

**Slums, Parks and Industries**: Slums-Causes, Characteristics, effects, clearance, re-housing and prevention of slum formation. Parks- classification, park systems design, Park ways, Playgrounds, Industries- Classification, requirements and townships, Classification and principles of design of public buildings, objects of re-planning, garden city.

**UNIT–V**

**Building Bye-laws and Regulation:** Building bye-laws, underlying principles. Functions of local authority, applicability of bye-laws, set back, light plane, floor space off-street parking. Building bye-laws for residentional area of a town scheme. Master plan- objects, importance and features. Stages of preparation of development plan. Urban roads, street system and traffic management.

**Couse Outcome:** After completion of course students will be able to

1. Know about the history of Architecture.
2. Understand the basic principle of Architecture.
3. Understand the different phases in town planning.
4. Know about the different settlements.
5. Acquire knowledge about the building by law and regulations.

**Books Recommended:**


1. Satish Chandra Agarwala, Architecture &Town Planning, Dhanpat Rai & Co.
2. Gurcharan Singh and Jagdish Singh, Building Planning and Scheduling,
3. Standard Publishers and Distributers.
4. Lewis Keeble, Town Planning Made Plain & town & country planning association;London, 1983
5. Rangwala,S.C.,Town Planning, Charotar Publishing House, Anand India.
6. Hiraqskar, G.K., Fundamentals of Town Planning, Dhanpat Rai & Sons., Delhi Curriculum & Syllabi (B.tech Civil Engineering)
7. Pickering, E., Architecture Design, John Wiley and Sons, London.


**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-VIII**

**Elective-III**

**Course Title: Earthquake Resistant Design** **Max. Marks: 100**
**Course Code: CE-842** **University Examination: 60**
**Duration of Exams: 3 hours** **Sessional Assessment: 40**

**UNIT-I**

**Introduction:** Introduction to earthquake, characteristics of earthquake, acceleration & time history, Response spectrum, response of structures subjected to ground motion, seismic zones.

**UNIT-II**

**Earth Quake Resistant Design:** Significance of earthquake resistant design, seismic effects material behavior and general principles of earthquake resistant design of structures, ductile design, code provision.

**UNIT-III**

**Earthquake Resistant Buildings:** Guideline and code provision for earthquake resistant buildings of different types such as earthen buildings, low strength masonry building .Masonry buildings, location of rooms openings, number of storey's, foundation aspects, modes of failure.

**UNIT-IV**

**RCC Buildings:** Material properties, lateral load analysis, design and detailing. Earthquake resistant design of shallow and pile foundations. Liquification and remedial measures. Repairs and seismic strengthening

**UNIT- V**

**Legal Financial Aspects:** Building bye-laws, country planning act. Legal frame work for safety of buildings & dams, strengthening of existing structures.

**Couse Outcome:** After completion of course students will be able to

1. Understand the characteristics of earthquake and response of structures to ground motion.
2. Know about the general principles of earthquake resistant design.
3. Acquire knowledge about the guideline and code provision for earthquake resistant design.
4. Understand the design philosophy of different components of earthquake resistant structure.
5. Know about the various Building bye-laws and legal framework for safety of structures.

**Text Books:**


1. **A. K. chopra**, Dynamic of structures.
2. **Clough and Ponzien**, Dynamic of structures.


**Books Recommended:**


1. **P. Aggraval P and kha Shri**, Seismic Design of structures.


**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-VIII**

**Elective-III**

**Course Title: Bridge Engineering** | **Max. Marks: 100**
**Course Code: CE-843** | **University Examination: 60**
**Duration of Exams: 3 hours** | **Sessional Assessment: 40**

**UNIT-I**

**Introduction** History of Bridges - Components of a Bridge and its definitions- Classification of Road Bridges - Selection of Site and Initial Decision Process - Survey and Alignment; Geotechnical Investigations and Interpretations. River Bridge: Selection of Bridge site and planning - Collection of Bridge design data - Hydrological calculation Road Bridges - IRC codes - Standard Loading for Bridge Design - Influence lines for statically determinate structures - I.L. for statically indeterminate structures - Transverse distribution of Live loads among deck longitudinal - Load combinations for different working state and limit state designs Railway Bridges.

**UNIT-II**

**Superstructures:** Selection of main bridge parameters, design methodologies -Choices of superstructure types, Different types of superstructure (RCC and PSC); Longitudinal Analysis of Bridge.- Transverse Analysis of Bridge- Temperature Analysis, Distortional Analysis, Effects of Differential settlement of supports Reinforced earth structures

**UNIT-III**

**Design Of Steel Bridges:** Design of Truss Bridges – Design of Plate girder bridges.

**UNIT-IV**

**Design of RCC and PSC Bridges:** Design of slab bridges – Girder bridges – PSC bridges

**UNIT-V**

**Substructure & Bearings:** Substructure - Pier; Abutment - Wing walls- Importance of Soil-Structure Interaction - Types of foundations - Open foundation- Pile foundation- Well foundation

**Course Outcomes:** On completion of this course, the students will

1. Have knowledge about the various code provisions related to design of bridges.
2. Know about the different design methodologies for designing the bridge.
3. Able to design the truss and plate girder bridges.
4. Able to design the different type of concrete bridges.
5. Have understanding of the different type of substructure provided for bridges

**Text Books**

1. Johnson Victor D., “Essentials of Bridge Engineering”, Oxford and IBH Publishing Co., New Delhi, 1990.
2. Jagadeesh .T.R. and Jayaram.M.A., "Design of Bridge Structures", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2013

**Reference Books**

1. Phatak D.R., “Bridge Engineering”, Satya Prakashan, New Delhi, 1990.
2. Ponnuswamy S., “Bridge Engineering”, Tata McGraw-Hill, New Delhi, 1996.
3. Rajagopalan. N. “Bridge Superstructure”, Alpha Science International, 2006

**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 u

**Semester-VIII**

**Elective-III**

**Course Title: Soil Chemistry** **Max. Marks: 100**
**Course Code: CE - 844** **University Examination: 60**
**Duration of Exams: 3 hours** **Sessional Assessment: 40**

**UNIT -I**
**Introduction to Geo-Sphere and Soil:** Major mineral groups in earth's crust, sediments and clays.

**UNIT-II**
**Geochemistry in Relation with Environment:** Weathering-physical aspect and chemical weathering (reactions involved in general).

**UNIT-III**
**Soil Structure and Soil Horizons:** Water and air in soil, inorganic components of soil, organic matter and major organic compounds in soil, humus. Etc.

**UNIT-IV**
**Soil Solutions:** Acid-base and ion exchange reactions in soils, production of mineral acids, adjustment of soil acidity (pH). Macronutrients and micronutrients in soil, N, P, K, in soil, common fertilizer.

**UNIT-V**
**Preparation of Soil Samples for Analysis:** Reception at the laboratory, drying, grinding and sieving, and storage of samples, determination of moisture content and pH value.

**Course Outcomes:-**On completion of this course, the students will be able to

1. Understand the various minerals found in earth's crust.
2. Understand the principle of physical and chemical weathering.
3. Know about the organic and inorganic components of soil.
4. Know about the macronutrients and micronutrients in soil.
5. Prepare the soil samples for analysis.

**Recommended Books:**


1. A Text book of Soil chemical analysis by R.P. Hesse
2. Vogel's Quantitative inorganic analysis.
3. Soil Engineering Theory and Practice Vol. I & II by A. Singh and G.R. Chowdhary.
4. Environmental Chemistry by S.E. Manhan.


**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-VIII**

**Elective-III**

**Course Title: Tall Buildings** **Max. Marks: 100**
**Course Code: CE-845** **University Examination: 60**
**Duration of Exams: 3 hours** **Sessional Assessment: 40**

**Objective:** The design aspects and analysis methodologies of tall buildings will be introduced. The stability analysis of tall buildings is another important objective of this course.

**UNIT-I**

**Design Criteria and Materials:** Development of High Rise Structures, General Planning Considerations, Design philosophies, Materials used for Construction, High Strength Concrete, High Performance Concrete, Self Compacting Concrete, High Strength Steel

**UNIT-II**

**Loading:** Gravity Loading, Dead Load, Live Load, Live load reduction technique, Impact Load, Construction Load, Sequential Loading, Lateral Loading, Wind load, Earthquake Load, Combination of Loads.

**UNIT-III**

**Behaviour of Various Structural Systems:** Factors affecting growth, Height and Structural form. High rise behavior of Various structural systems, Rigid frames, braced frames, Infilled frames, shear walls, coupled shear walls, wall frames, tubular structures, cores, outrigger - braced and hybrid mega systems.

**UNIT-IV**

**Analysis and Design:** Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of buildings as total structural system considering overall integrity and major subsystem interaction, Analysis for member forces, drift and twist, computerised general three dimensional analysis.

**UNIT-V**

**Stability of Tall Buildings:** Overall buckling analysis of frames, wall-frames, Approximate methods, second order effects of gravity of loading, P-Delta analysis, simultaneous first-order and P-Delta analysis, Translational, Torsional instability, out of plumb effects, stiffness of member in stability, effect of foundation rotation.

**Course Outcomes:-**On completion of this course, the students will be able to

1. Understand the design philosophies of High rise structures.
2. Calculate the different type of loads on high rise buildings.
3. Understand the different structural elements of tall structures.
4. Calculate the forces on different structural systems.
5. Analyse the stability of tall buildings.

**Text Books**

1. Bryan Stafford Smith, Alex coull, “Tall Building Structures, Analysis and Design”, John Wiley and Sons, Inc., 1991.
2. Taranath B.S., “Structural Analysis and Design of Tall Buildings”, McGraw Hill, 2011.

**Reference Books**

1. Lin.T.Y, Stotes Burry.D, “Structural Concepts and systems for Architects and Engineers”, John Wiley, 1988.
2. Lynn S.Beedle, “Advances in Tall Buildings”, CBS Publishers and Distributors, Delhi, 1986.
3. Wolfgang Schueller "High Rise Building Structures", John Wiley and Sons, New York 1977.

**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-VIII**

**Elective-IV**

**Course Title: Hydropower Engineering** **Max. Marks: 100**
**Course Code: CE-846** **University Examination: 60**
**Duration of Exams: 3 hours** **Internal Assessment: 40**

**Objective:** The objective of this course is to acquaint the students about the various components of hydel projects like penstocks, spillways, dams.

**UNIT- I**

Introduction of water power, comparison of hydropower, thermal and nuclear power. Flow duration curves, firm power, secondary power, Load curves, Load duration curves, load factor. Classification of hydropower plants such as run-of-river plants, Valley dam plants, High head diversion plants, Pumped storage plants, Tidal power plants

**UNIT-II**

**Water Conveyance System:** Power Canal, alignment, design of power canals, Flumes, covered conduits, tunnels, penstocks, economic diameter of penstocks, anchor blocks. Spillways, spillway gates, design of stilling basins

**UNIT-III**

**Earthen Dams:** Introduction of earthen embankments, earthen dams, rockfill dams, Design consideration of earthen dams.

**UNIT-IV**

**Rigid Dams:** Types of rigid dams, Gravity dams, Arch dams, buttress dams. Basic principles of design and details of construction, Selection of site, Preliminary and final investigations.

**UNIT-V**

**Power House Details:** General layout of power house, arrangement of power Units such as Forebay, intakes and penstocks/tunnels. Underground power stations, General introduction and finandal implications of Power plants.

**Course Outcomes:** On completion of this course, the students will be able to

1. Understand the different type of hydropower plants.
2. Understand the various systems for water conveyance.
3. Know about the construction of earthen dams and their design consideration.
4. Know about the basic principles of design and details of construction of rigid dams.
5. Understand the general layout of power plants.

**Text Books:**


1. **Dandekar M.M & Sharma K.N,** Water Power Engineering, Vikas Publishing House Ltd.
2. **Das M. Mohan, Saikia M Das,** Irrigation and Water Power Engineering, PHI Ltd, New Delhi


**Books Recommended:**


1. **Nigam P.S**, Hand book of Hydroelectric Engineering.
2. **Varshney R.S Nemchand Brothers**, Theory and Design of Irrigation Structures.
3. **H.K, Tata McGraw Hill**, Water Power Engineering by Barrows.
4. **Arora K.R,** Irrigation water power and water Resources Engineering by Standard Publishers.


**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-VIII**

**Elective-IV**

**Course Title: Ground Water Hydrology** **Max. Marks: 100**
**Course Code: CE-742** **University Examination: 60**
**Duration of Exams: 3 hours** **Sessional Assessment: 40**

**UNIT-I**

**Introduction:** Darcy's Law, Hydraulic Head, Hydraulic conduction and permeability, Heterogeneity and Anisotropy of Hydraulic conductivity, porosity and void ratio, unsaturated flow and water table , Transmissibility and storability, specific storage, specific yield.

**UNIT-II**

**Flow Nets:** Flow nets by Graphical construction, Homogenous, Isotropic System, Flow nets by numerical simulation, potential steam function, Flow nets by Laplace's equation solution in inhomogeneous and anisotropic aquifers.

**UNIT-III**

**Ground Water Occurrence:** Steady- State Regional ground water flow, Recharge area, Discharge areas, Ground water divide, Effect of topography on regional flow, Effect of Geology on Regional Flow, Fluctuation in Ground water Table.

**UNIT-IV**

**Ground Water Evaluation:** Well yield, Aquifer yield and Basin yield, Explorations for acquifers, by. Reflection & refraction seismic method, Electrical resistivity and magnetic methods, Ground penetrating radar Method.

**UNIT-V**

**Flow to Aquifers:** Types of aquifers. Aquitard and Aquiclude, confined and unconfined aquifer, steady state flow and transient. Flow, Equation of Ground water flow to aquifers, Radial flow. Their solution, Measurements of parameters pumping Tests, prediction of Aquifer yield by Numerical simulation, Finite difference method.

**Course Outcomes:** On completion of this course, the students will be able to

1. Understand the different principles in ground water hydrology.
2. Construct the flow net with different boundary conditions.
3. Understand the effect of different parameters on ground water flow.
4. Evaluate the ground water yield and exploration of ground water.
5. Know about the types of aquifers and measurement of different parameters related to ground water.

**Text Books:**

1. **David Keith Todd**, Ground water Hydrology.
2. **W.Fetter, Printice Hall**, Applied Hydrology.

**Books Recommended:**

1. **Fletcher G.D**, Ground water & Wells
2. **Rastogi,** Numerical Ground water Hydrology.

**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-VIII**

**Elective-IV**

**Course Title: Optimization in Civil Engineering** **Max. Marks: 100**
**Course Code: CE-744** **University Examination: 60**
**Duration of Exams: 3 hours** **Sessional Assessment: 40**

**UNIT-I**

**Introduction:** Introduction to optimization Techniques - Problem formulation and merit function. Linear optimization: Simplex Algorithm duality in linear programming.

**UNIT-II**

**Non-Linear Optimization-I:** Single and multiple variable Optimization Algorithms, Search methods, gradient methods.

**UNIT-III**

**Non-Linear Optimization –II:** Multi variable Optimization Algorithms constrained and unconstrained problem - search methods, gradient methods Kuhn tucker condition

**UNIT-IV**

**Dynamic Programming Concepts:** Backward recursion method - genetic programming, principle and concepts, simulated ANN, genetic, Algorithms.

**UNIT-V**

**Computer Application in Optimization:** Optimization software for various Civil Engineering problems.

**Course Outcomes:** On completion of this course, the students will be able to

1. Understand the different optimization techniques.
2. Understand the single and multiple variable Optimization Algorithms
3. Understand the multi variable Optimization Algorithms constrained and unconstrained.
4. Understand the various dynamic programming concepts.
5. Know about the computer aided application in optimization.

**Text Books:**

1**. Ossenbruggen,** PJ. Systems analysis for civil; Engineering, John Wiley & Sons, 1984.
2. **Rao.** 5.5. Optimization theory and application, Wiley Eastern Ltd., New Delhi, 1985.
3. **Majid, K.I.,** Optimum Design of Structures, Butter - Worth and Co., Ltd., London 1974.

**Rererence Books:**

1. Kalyanmoy Deb, Optimization for Engineering Design, Prentice Hall of India private Ltd., New Delhi, 1996.

**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.

**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-VIII**

**Elective-IV**

**Course Title: Industrial Structures** **Max. Marks: 100**
**Course Code: CE-849** **University Examination: 60**
**Duration of Exams: 3 hours** **Sessional Assessment: 40**

**Objective:** This course deals with some of the special aspects with respect to Civil Engineering structures in industries.

**UNIT-I**
**Planning:** Classification of industries and industrial structures, General requirements of various industries, Planning and layout of buildings and components.

**UNIT-II**
**Functional Requirements:** Lighting, Ventilation, Acoustics, Fire safety, Guidelines from factories act.

**UNIT-III**
**Design Of Steel Structures:** Industrial roofs, Crane girders, Mills buildings, Bunkers and Silos, Chimney.

**UNIT-IV**
**Design Of R.C. Structures:** Corbels, Brackets and Nibs, Silos and bunkers, Chimney, Principles of folded plates and shell roofs

**UNIT-V**
**Prefabrication:** Principles of prefabrication, Prestressed precast roof trusses, Construction of roof and floor slabs , Wall panels

**Course Outcomes:** On completion of this course, the students will be able to

1. Know about the planning and layout of industrial buildings.
2. Understand the different acts for setup of industrial buildings.
3. Design the various components of steel structures.
4. Design the various components of concrete structures.
5. Understand the construction of prefabricated, roof and floor slabs.

**Text Books**


1. Ramamrutham.S., "Design of Reinforced Concrete Structures", Dhanpat Rai Publishing Company, 2007.
2. Varghese.P.C., " Limit State Design of Reinforced Concrete", Prentice Hall of India Eastern Economy Editions, 2nd Edition, 2003.
3. Bhavikatti.S.S., " Design of Steel Structures", J.K. International Publishing House Pvt.Ltd., 2009


**Reference Books**


1. Henn W. "Buildings for Industry", Vol.I and II, London Hill Books, 1995
2. SP32-1986, Handbook on Functional Requirements of Industrial buildings, Bureau of Indian Standards, 1990
3. Structural Engineering Research Centre,Course Notes on Modern Developments in the Design and Construction of Industrial Structures, Madras, 1982
4. Koncz.J., "Manual of Precast Construction", Vol.I and II, Bauverlay GMBH, 1971.


**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-VIII**

**Elective-IV**

**Course Title: Prefabricated Structures** **Max. Marks: 100**
**Course Code: CE-850** **University Examination: 60**
**Duration of Exams: 3 hours** **Sessional Assessment: 40**

**Objective:** To impart knowledge to students on modular construction, industrialised construction and design of prefabricated elements and construction methods.

**UNIT-I**

**Introduction:** Need for prefabrication, Principles, Materials, Modular coordination, Standardization, Systems, Production, Transportation, Erection.

**UNIT-II**

**Prefabricated Components:** Behaviour of structural components, Large panel constructions, Construction of roof and floor Slabs, Wall panels, Columns, Shear walls

**UNIT-III**

**Design Principles:** Disuniting of structures, Design of cross section based on efficiency of material used, Problems in design because of joint flexibility – Allowance for joint deformation**.**

**UNIT-IV**

**Joint in Structural Members:** Joints for different structural connections, Dimensions and detailing, Design of expansion joints

**UNIT-V**

**Design for Abnormal Loads:** Progressive collapse, Code provisions, Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc.,Importance of avoidance of progressive collapse

**Course Outcomes:** On completion of this course, the students will be able to

1. Understand the principles of pre-fabrication.
2. Understand the construction of different prefabricated components.
3. Know about the design philosophies for prefabrication.
4. Design the different type of joint.
5. Calculate the design loads and know about the codal provisions for prefabrication.

**Text Books**

1. CBRI, Building materials and components, India, 1990
2. Gerostiza C.Z., Hendrikson C. and Rehat D.R., "Knowledge based process planning for construction and manufacturing", Academic Press Inc., 1994

**Reference Books**

1. Koncz T., "Manual of precast concrete construction", Vol. I, II and III, Bauverlag, GMBH, 1976.
2. "Structural design manual", Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 2009

**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.