

**Scheme of Teaching & Examination
VIIth Semester
B.Tech in Civil Engineering**

S.N.	code	Subject	Periods per week			Scheme of marks		Total Credit
			L	T	P	ESE	IM	
1.	BT740	Advance Design of Structure – I	4	0	-	70	30	4
2.	BT741	Water Resources Engineering	4	0	-	70	30	4
3.	BT742	Quantity Surveying and Cost Evaluation	4	0	-	70	30	4
4.	BT743	Foundation Engineering	4	0	-	70	30	4
5.	BT744x	Professional Elective – II	4	0	-	70	30	4
6.	BT745	Advance Structural Engineering design Lab	-	-	2	30	20	1
7.	BT746	Water Resources Engineering Lab	-	-	2	30	20	1
8.	BT747	Computer Aided Drafting Lab	-	-	2	30	20	1
9.	BT748	Structural Analysis & Programming Lab	-	-	2	30	20	1
Total			20	0	8	470	230	24

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

Subject Code	Subject Name
BT7441	Construction Equipment & Techniques
BT7442	Building Maintenance & Repairs
BT7443	Solid & Hazardous Waste Management
BT7444	Environmental Impact Assessment & Audit
BT7445	FEM Application in Civil Engineering

**MATS UNIVERSITY
GULLU, ARANG, RAIPUR**

Semester: B.Tech 7th Sem

Branch:- Civil Engineering

Subject:- Advance Design of Structure – I Code:-BT740

Total Theory Periods: - **40**

Total Tutorial Periods: **10**

Total marks in end semester Exam: **100**

Minimum Number of Class test to be conducted: **02**

Objectives of the Subject:

1. Understand the behavior of plate girders.
2. Understand the behavior of members subjected to combined forces.
3. Understand the behavior of column bases and gantry girders.
4. Understand the behavior of eccentric and moment connections.
5. Understand the behavior of roof trusses under different loads.

UNIT-1:

Plate Girders with solid webs Components of a Plate Girder, Typical sections, Proportioning of the section, Design bending strength, Design shear strength, Stiffened Web panels, minimum web thickness, bearing stiffeners, load carrying stiffeners, intermediate stiffeners, stiffener design, Design of beams and plate girders with solid webs.

UNIT-2:

Members subjected to combined forces Combined shear & bending, combined axial force & bending moment, section strength, over all member strength, Design of members subjected to combined forces.

UNIT-3:

Column Bases and Gantry Girders Types of column bases, slab base, gusset base, moment resisting base plates. Loads and load combinations, Typical sections, Design of gantry girders.

UNIT-4:

Eccentric and Moment Connections Analysis of Bolt / Weld Group, Connection Configurations, Beam to Column connections, Beam to Beam connections, web splice and its connections, column splice and its connections.

UNIT-5:

Roof Trusses Types of roof trusses, Loads - Dead , Imposed and wind loads, load combinations, Design of Purlins, Analysis & Design of roof trusses (with angle sections).

TEXT BOOKS:

1. Design of Steel Structures - N. Subramanian (Oxford University Press)
2. Limit State Design of Steel Structures – S. K. Duggal (Tata McGraw Hill)

REFERENCE BOOKS:

1. Indian Standard – General Construction in Steel –Code of Practice (3rd Revision) (IS:800 – 2007)
2. Design of Steel Structures – K. S. Sai Ram (Pearson Education)
3. Structural Steel Design : LRFD Method – J. C. McCormac, J. K. Nelson (Pearson Education)
4. Limit State design in Structural Steel – M. R. Shiyekar (PHI Learning)
5. Limit State Design of Steel Structures (IS:800-2007) – V. L. Shah, V. Gore (Structures Publications)
6. Design Manual for Designing Steel Structures according to New IS:800, Publication Number INS/PUB/114 – Institute for Steel Development and Growth, Kolkata

Outcomes of the Subject:

1. Capable of designing Plate Girders.
2. Capable of designing members subjected to combined forces.
3. Capable of designing Column bases & Gantry Girders.
4. Capable of designing eccentric and Moment connections.
5. Capable of designing Roof trusses.

MATS UNIVERSITY

GULLU, ARANG, RAIPUR

Semester: B.Tech 7th Sem

Subject:- Water Resources Engineering

Total Theory Periods: - **40**

Total marks in end semester Exam: **100**

Minimum Number of Class test to be conducted: **02**

Branch:- Civil Engineering

Code:-BT741

Total Tutorial Periods: **10**

Objectives of the Subject:

1. To understand basic concepts of irrigation and water requirements of crops.
2. To understand the concepts of design of canal.
3. To learn about water logging
4. Be familiar with the concepts of river training.
5. To understand the concepts of reservoir planning.

UNIT 1

INTRODUCTION

Need for Irrigation, Advantages and Disadvantages of irrigation, development of irrigation in India. Types of Irrigation systems –Soil-Water-Crop relationship

METHODS OF IRRIGATION

Surface and sub surface irrigation, sprinkler and drip irrigation.

WATER REQUIREMENT OF CROPS

Crop season and crops of India, crop period and base period, delta, duty of water, relationship between delta duty and base period, factors affecting duty, methods of improving duty, Intensity of irrigation, irrigation requirement of crops.

CROSS DRAINAGE WORKS

Introduction, types, suitability, design of various types of C-D Works, Aqueduct, Syphon Aqueduct, Super Passage, Syphon, level crossing, inlets and outlets.

UNIT 2

CANAL IRRIGATION

Classification of canal, parts of canal irrigation system, canal alignment, lay-out of canal system, typical canal cross section, command areas, losses in irrigation systems, water requirement of irrigation channels.

HYDRAULIC GATES

Control equipments for out-lets, spillway gates, types, design criteria for radial gates, air vents.

DIVERSION HEADWORKS

Introduction, Types of diversion works, location and components, Weir and Barrage, Effect of construction of weir on the river regime, Causes of failures of Weirs on permeable foundations, their remedies

UNIT 3

WATER LOGGING AND ITS CONTROL

Causes and ill effects of water logging, prevention and control, reclamation of water logged and saline lands, surface drainage.

DESIGN OF LINED CHANNELS

Introduction, benefits of lining, types of lining, economics of lining, procedure and design of lined canals.

WATER DISTRIBUTION SYSTEM

Rotational delivery (Warabandi), Continuous delivery and delivery on demand, Role of command area development authority, Functions and organisational structures.

UNIT 4

RIVER BEHAVIOUR, CONTROL AND TRAINING

Objects, river characteristics, river patterns, classification of river training works, methods of river training embankments, bank protection, spurs, cutoffs, pitched island, river diversion, meandering causes and parameters.

SPILLWAYS AND ENERGY DISSIPATERS

Introduction, essential requirements of a spillway, spillway capacity, components, Types of spillways, Design of Ogee Spillway, Energy Dissipation below spillways, Types of Energy dissipater,

UNIT 5 RESERVOIR PLANNING

Introduction, Type of reservoirs, storage zones of a reservoir, mass curve and demand curve, determination of reservoir capacity, safe field.

Types of Dams, Suitability of a type of dam, Gravity dams – Forces acting on dams, failure of dams and criteria for structural stability, Overturning, Compression or crushing, tension, sliding, principal and shear stress, stability analysis, Elementary profile of a gravity dam, High and low gravity dams, Profile from practical

NAME OF TEXT BOOKS:

Irrigation Engineering and Hydraulic Structures – S.K. Garg (Khanna Publications)

Irrigation Engineering – B.C. Punmia (Laxmi Publications)

NAME OF REFERENCE BOOKS:

Irrigation, Water Resources and Water Power Engineering – Dr. P.N. Modi (Standard Book House)

Theory and Design of Irrigation Structures (Volume – I & II) – Varshney (Nem Chand & Bros.)

Irrigation Engineering – Asawa G.L. (New Age International Publications)

Fundamentals of Irrigation Engineering – Bharat Singh (Nem Chand & Bros.)

Outcomes of the Subject:

1. Students are able to understand the different types of irrigation.
2. Students should be able to design the canal.
3. Students can explain the effects of water logging.
4. Students should be able to understand the behavior of river.
5. Students can plan the reservoir for different demands.

MATS UNIVERSITY

GULLU, ARANG, RAIPUR

Semester: B.Tech 7th Sem

Branch:- Civil Engineering

Subject:- Quantity Surveying & Cost Evaluation Code:-BT742

Total Theory Periods: - **40**

Total Tutorial Periods: **10**

Total marks in end semester Exam: **100**

Minimum Number of Class test to be conducted: **02**

Objectives of the Subject:

1. To provide an understanding of estimate, their types, items and units of work, and types of approximate estimate.
2. To provide an understanding of determining quantity estimate of civil engineering works.
3. To provide an understanding of rate analysis and its application to different items.
4. To provide an understanding of general requirements of contracts.
5. To provide an understanding of the concept of valuation of properties.

UNIT 1

GENERAL

Introduction to quantity surveying, methods of measurements and units of measurements of various items of work, Principles of estimating, different types of estimates, procedure for computation of stage I estimate.

GENERAL TERMS

Administrative approval, technical sanction, Competent authority, Deposit works, suspense account, imprest account, indent of stores, muster roll. Measurement book, material at site account, stock account, establishment charges, contingencies.

UNIT 2

QUANTITY ESTIMATE

Types, data required for estimation detailed estimates of civil engineering works. Buildings, canals, roads steel works, water supply and sanitary works.

UNIT 3

ANALYSIS OF RATES

Purpose and principles factors affecting the rates of items of works, Analysis of rates of different items such as cement concrete of different proportions, brick masonry in different mortars, flooring (tiles, mosaic, cement concrete flooring). Use of Schedule of rates.

SPECIFICATIONS

Purpose and basic principles, types of specifications: brief and detailed specifications for various items of works.

UNIT 4

CONTRACTS

General requirements of contract, types of contract, conditions, termination of contract. Brief idea about types of tender, tender notice, earnest money, security deposit, liquidated damages, arbitration, escalation.

UNIT 5

VALUATION OF PROPERTY

General, object of valuation, definitions of terms related to valuation, methods of determining value of property, development method of valuation, concept of capitalized value and year purchase, depreciation, lease, mortgage, easement.

NAME OF TEXT BOOKS:

Estimating and Costing in Civil Engineering – B.N. Dutta (UBS Publishers, New Delhi)

Estimating and Costing and specifications – M. Chakrabarty (UBS Publishers, New Delhi)

NAME OF REFERENCE BOOKS:

Textbook of Estimating and Costing – G.S. Birdi (Dhanpat Rai Publications)

Valuation of real properties – S.C. Rangwala (Charotar Publication)

Outcomes of the Subject:

1. Students are expected to identify various items of building and able to determine approximate estimate of buildings.
2. Students are expected to determine quantities estimate of civil engineering works from given details.
3. Students are expected to know about determination of quantities of materials and rate analysis of any items in residential building works.
4. Students are expected to know contract and its types.
5. Students are expected to know concept of valuation.

MATS UNIVERSITY

GULLU, ARANG, RAIPUR

Semester: B.Tech 7th Sem

Subject:- FOUNDATION ENGINEERING

Total Theory Periods: - **40**

Total marks in end semester Exam: **100**

Minimum Number of Class test to be conducted: **02**

Branch:- Civil Engineering

Code:-BT743

Total Tutorial Periods: **10**

Objective of the Subject:

1. To know about the stability of slopes and stability analysis.
2. To study about the earth pressure in different condition of soil, Coulomb earth pressure theories, earthquake loading.
3. To study about the types of shallow foundation basic for design, bearing capacity of soil and settlement of foundation.
4. The knowledge about another types of foundation like well and pile foundation and their design criterion.
5. Know about problems associated with expansive soils and contaminated soils and their remedial measures.

UNIT-1

Site Investigation and Selection of Foundation Introduction, Scope and objectives,

Method of exploration boring, Sampling, disturbed and undisturbed sampling, sampling techniques, Bore log and report, Penetration tests (SPT and SCPT), Data

interpretation, Selection of foundation based on soil condition.

UNIT-2

Shallow Foundation Introduction, Location and depth of foundation, codal provisions, bearing capacity of shallow foundation on homogeneous deposits, bearing capacity from insitu tests, Factors influencing bearing capacity, codal provisions, Settlement, Components of settlement, Settlement of foundations on granular and clay deposits, Allowable and maximum differential settlements of buildings, Codal provision, Methods of minimising settlement.

UNIT-3

Footings and Rafts Types of foundation, structural design of spread footing, Design aspects of combined and mat foundation, Codal provisions.

UNIT-4:

Piles Types of piles, Factors influencing the selection of pile, Carrying capacity in granular and cohesive soils, Static and dynamic formulae, Capacity from insitu tests (SPT and SCPT), Piles subjected to uplift, Negative skin friction, Group capacity, Settlement of pile groups, Interpretation of pile load test, Pile caps, Codal provisions.

Unit-5:

Retaining Walls Earth pressure theory, Plastic equilibrium in soils, active and passive states, Rankine's theory, Coloumb's wedge theory, Classical and limit equilibrium solution, Earth pressure on retaining walls of simple configurations, pressure on the wall due to single line load alone, Graphical method (Culmann's method alone), Stability of retaining wall.

TEXT BOOKS:

1. Soil mechanics and foundations – Punmia, B.C. (Laxmi publications Pvt. Ltd., New Delhi, 1995).
2. Soil Mechanics and Foundation Engineering – Arora, K.R. (Standard publishers and distributors, New Delhi, 1997).

REFERENCE BOOKS:

1. A Textbook of Geotechnical Engineering – Khan, I.H., (Prentice Hall of India, New Delhi, 1999).
2. Basic and applied soil mechanics – Gopal Ranjan and Rao, A.S.R. (Wiley Eastern Ltd., New Delhi (India), 1997).
3. Foundation Analysis and Design – Bowles J.E. (McGraw Hill, 1994)

Outcomes of the Subject:

1. To know how to achieve stability of soil against gravitational force and seepage of water infinite slope concept of factor of safety.
2. Design of earth structure and their stability against soil pressure.
3. Design of shallow foundation and their failure how to measure bearing capacity of soil, effect of settlement of foundation.
4. Design of deep foundation selection of type of deep foundation design criterion for pile foundation.
5. To learn about the effects of expansive soils and contaminated soils on foundation.

MATS UNIVERSITY

GULLU, ARANG, RAIPUR

Semester: B.Tech 7th Sem

Branch:- Civil Engineering

Subject:- CONSTRUCTION EQUIPMENT & TECHNIQUES Code:-BT7441

Total Theory Periods: - **40**

Total Tutorial Periods: **10**

Total marks in end semester Exam: **100**

Minimum Number of Class test to be conducted: **02**

Objectives of the Subject:

1. To learn about various equipments for construction and the techniques for systematic construction using these equipments.

UNIT-1

Construction Equipments Fundamentals of earthwork operations - Earth moving operations -Types of Earthwork Equipment-Tractors, Motor Graders, Scrapers, Front end waders, Earth Movers. Equipment for Dredging, Trenching, Tunnelling, Drilling, Blasting-Equipment for compaction-Erection Equipment. Types of pumps used in construction - Equipment for Dewatering and Grouting - Foundation and Pile Driving Equipment. Forklifts and Related Equipment - Portable Material Bins - Conveyors - Hauling Equipment.

UNIT-2:

Equipment for Production of Aggregate and Concreting Crushers-Feeders-Screening Equipment-Handling Equipment-Batching and Mixing Equipment-Hauling, Pouring and Pumping Equipment-Transporters.

UNIT-3:

Sub-structure Construction Techniques Box jacking -Pipe Jacking-Under Water Construction of diaphragm walls and basement -Tunnelling techniques piling techniques driving well and caisson-sinking cofferdam-cable anchoring and grouting-driving diaphragm walls, sheet piles-laying operations for built up offshore system-shoring for deep cutting-Large reservoir, construction with membranes and Earth system-well points Dewatering and stand by Plant equipment for underground open excavation

UNIT-4:

Super Structure Construction Vacuum Dewatering of concrete flooring-Concrete paving technology-Techniques of construction for continuous concreting operation in Tall buildings of various shapes and Varying sections-Launching Techniques-Suspended from work-erection techniques of tall structures, Large span structures-Launching techniques for heavy decks in situ prestressing in high rise structures, aerial transporting handling erecting light weight components on tall structures-erection of lattice tower as and rigging of transmission line structures.

UNIT-5:

Repair Construction Mud jacking grout through slab foundation-micropiling for strengthening floor and shallow profile-pipeline laying protecting

sheet piles, screw anchors-sub grade water proofing under pining advanced techniques and sequence in demolition and dismantling.

TEXT BOOKS:

1. Construction Planning, Equipment and Methods (5th Edition) – Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C. (McGraw Hill, Singapore, 1995).
2. Construction Equipment and Management – Sharma S.C. (Khanna Publishers New Delhi, 1988).

REFERENCE BOOKS:

1. Construction Equipment and Job Planning – Deodhar, S.V. (Khanna Publishers, New Delhi, 1988).
2. Construction Equipment and its Planning and Application – Dr. Mahesh Varma (Metro-politan Book Company, New Delhi-, 1983).
3. Practical foundation engineering hand book – Robertwade Brown (McGraw Hill Publications, 1995).
4. Construction Dewatering: New Methods and Applications – Patrick Powers. J. (John Wiley and Sons, 1992).
5. Advanced Construction Techniques – Jerry Irvine (CA Rocketr,

Outcomes of the Subject:

1. To be able to plan and handle construction equipments and techniques related to construction.

MATS UNIVERSITY

GULLU, ARANG, RAIPUR

Semester: B.Tech 7th Sem

Branch:- Civil Engineering

Subject:- BUILDING MAINTENANCE & REPAIRS Code:-BT7442

Total Theory Periods: - **40**

Total Tutorial Periods: **10**

Total marks in end semester Exam: **100**

Minimum Number of Class test to be conducted: **02**

Course Objectives:

1. Make student understand the subject and its uses in engineering
2. To make students understand the basics and utilize them according to modern needs
3. To make students learn the problems faced while using this subject and how to prevent those problems

Unit-1

Maintenance of Buildings, Explain the requirement of Maintenance in building. , Explain various types of maintenance in building. Assess the quality aspects of existing building. Introduction Importance of maintenance Types of maintenance - daily, weekly, monthly, Annually General Maintenance - Painting of Buildings - Home Electricity System - House plumbing and sanitary system

Unit-2

Repair Strategies ,Explain distress diagnostic techniques ,Carry out inspection and evaluation of damaged structure. ,Causes of distress in structures ,Construction and design failures ,Condition assessment and distress-diagnostic techniques , Inspection and evaluating damaged structure.

Unit-3

Durability and Serviceability of Concrete ,Explain concrete properties required for construction work. ,Explain weather effect on structure. ,Quality assurance for concrete construction based on concrete properties like (a) strength (b) Permeability (c) Thermal properties (d) cracking ,Effects due to (a) climate (b) temperature (c) chemicals (d) corrosion Design and construction errors ,Effects of cover and cracks Maintenance & Rehabilitation of Structures Course code

UNIT-4

Materials and Techniques For Repair Identify materials for repair in building. ,Explain techniques for Repairs. ,Materials for Repair - Special concretes and mortar - concrete chemicals - construction chemicals - Expansive cement - polymer concrete - sulphur infiltrated concrete - Ferro cement - Fibre reinforced concrete - Rust eliminators and polymers coating for rebars - foamed concrete - dry pack - vacuum concrete - asphalt sheeting ,Techniques for Repairs -Guniting, grouting and Shotcrete - Epoxy injection - Mortar-repair for cracks Unit Major Learning Outcomes (in Cognitive Domain) Topics and Sub-topics - Jacketing - shoring and underpinning - Methods of corrosion protection (a) corrosion inhibitors (b) corrosion resistant steels (c) coating and cathodic protection

UNIT-5

Repair, Retrofitting and Rehabilitation , Explain the Repair work of various

component in existing masonry building ,Explain the Repair work of various component in existing concrete structure ,Discuss principles of Retrofitting and Rehabilitation. ,Repair of - stone, brick and block masonry (Cracks, dampness, efflorescence, joint separation, etc.) - Flooring - Roofs (sloping, flat, pitched, etc.) - Concrete members due to (i) Steel Corrosion (ii) Lack of Bond (iii) shear, tension, torsion, compression failure - Rainwater Leakage in Buildings - Leakage in Basement, toilet area ,Control on Termites (White Ants) in Buildings ,Fungus Decay of wood works.

Text Books:-

1. Maintenance & Repair Of Civil Structures B .L.Gupta STANDARD PUBLICATIONS-
2. Maintenance, Repair & DELHI Rehabilitation and Minor Works of Buildings P. C. Varghese PHI

Reference books:-

1. Concrete Structures, Materials, Maintenance and Repair Denison Campbell, Allen and Harold Roper Materials, Maintenance

Course Outcomes:

1. Students are expected to understand to learn the subject well and use it in practicality
2. Students are expected to understand the need of this subject and can manage to use it with other technology
3. Students are expected to understand the restrictions in use of this subject

MATS UNIVERSITY

GULLU, ARANG, RAIPUR

Semester: B.Tech 7th Sem

Branch:- Civil Engineering

Subject:- Solid & Hazardous Waste Management

Code:-BT7443

Total Theory Periods: - **40**

Total Tutorial Periods: **10**

Total marks in end semester Exam: **100**

Minimum Number of Class test to be conducted: **02**

Course Objectives:

1. Make student understand the subject and its uses in engineering
2. To make students understand the basics and utilize them according to modern needs
3. To make students learn the problems faced while using this subject and how to prevent those problems

Unit-1

Solid and hazardous waste are defined. Technology, health, and policy issues associated with solid waste and hazardous materials are examined. Methods of managing solid and hazardous waste are introduced and regulations presented where appropriate. The characteristics of hazardous and solid waste materials, health frameworks, and the distribution of contaminants in the environment.

Unit-2

Principles and Design of Transfer and Transport Facilities Objective of transfer stations Types, siting and design criteria of transfer stations Design cases Principles and Design of Sanitary Landfills Landfilling methods Design goals, basis, and variables Design of landfill cover and drainage/liner systems Design of landfill gas migration control and recovery systems Design of leachate control and treatment systems Principles and Design of Material Recovery Facilities .

Unit-3

HAZARDOUS WASTE ENGINEERING:-

Principles and Design of Waste Minimization Facilities (1 week) Principles and techniques of Waste minimization, Examples of waste types and phase separation processes, Principles and Design of Hazardous Waste Landfills (1 week) Design configurations and site selection, Design of final cover, intermediate cover and drain/liner systems Design of gas and leachate control and treatment systems Principles and Design of Hazardous Waste Storage Facilities Types and design criteria selection and design of storage facilities Design of containment, run-on/run-off management system

Unit-4

Principles and Design of Chemical/Physical/Biological Treatment Facilities Status, types, principles, equipment used, application ranges, and comparisons of different treatment facilities General design criteria and special requirements Principles and Design of Site remediation Facilities Status, types, principles, equipment used, application ranges, and comparisons of different site remediation technologies Remedial investigations and feasibility studies

Unit-5

Principles and Design of Radioactive Waste Treatment/Site Remediation Facilities (1 week) Status, Types, technologies, principles, applications Treatment Technologies Site Remediation Technologies

Course Outcomes:

1. Students are expected to understand to learn the subject well and use it in practicality
2. Students are expected to understand the need of this subject and can manage to use it with other technology
3. Students are expected to understand the restrictions in use of this subject

MATS UNIVERSITY
GULLU, ARANG, RAIPUR

Semester: B.Tech 7th Sem

Branch:- Civil Engineering

Subject:- Environmental Impact Assessment & Audit Code:-BT7444

Total Theory Periods: - 40

Total Tutorial Periods: 10

Total marks in end semester Exam: 100

Minimum Number of Class test to be conducted: 02

Course Objectives:

1. Make student understand the subject and its uses in engineering
2. To make students understand the basics and utilize them according to modern needs
3. To make students learn the problems faced while using this subject and how to prevent those problems

UNIT 1

Basic principles of environmental management, its Pollution and control, Environmental Policies and Legislation, Rules, acts, standards, criteria, specification, nature and scope of environmental problems.

UNIT 2

Ecology of population, population attributes, world population growth and the effect of overcrowding on ecology, economy and the future of man.

UNIT 3

Environmental Research Methodology, approaches, method of Data collection, sampling systems, approach to environmental problems, health and environmental implications of solid waste management, Fate of pollutants in air, water, soil and ground water.

UNIT 4

Management and handling of hazardous substances, Sanitary landfills, incineration, composting, hydropulping, pyrolysis. Environmental Audit, The Indian Scenario, definition of audit, procedure of auditing.

UNIT 5

Introduction to sustainable development, Definitions, strategies for sustainable development, environmental debts, appropriate technologies, related case studies.

Environmental inventory, Environmental Impact Assessment methods, Basic steps for prediction and assessment, water environment, air environment, noise environment.

NAME OF TEXT BOOKS:

Environmental Engineering – Peavy & Rowe (Tata McGraw Hill, New Delhi).
Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications)

NAME OF REFERENCE BOOKS:

Introduction to Environmental Engineering and Science – Masters, G.M. (Prentice Hall of India Pvt. Ltd., 1991)
Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi).
Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications).
Environmental Science and Engineering – Henry and Heinke (Pearson Education).
Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi).

Course Outcomes:

1. Students are expected to understand to learn the subject well and use it in practicality
2. Students are expected to understand the need of this subject and can manage to use it with other technology
3. Students are expected to understand the restrictions in use of this subject

MATS UNIVERSITY
GULLU, ARANG, RAIPUR

Semester: B.Tech 7th Sem

Branch:- Civil Engineering

Subject:- FEM APPLICATION IN CIVIL ENGINEERING Code:-BT7445

Total Theory Periods: - **40**

Total Tutorial Periods: **10**

Total marks in end semester Exam: **100**

Minimum Number of Class test to be conducted: **02**

Course Objectives:

1. Make student understand the subject and its uses in engineering
2. To make students understand the basics and utilize them according to modern needs
3. To make students learn the problems faced while using this subject and how to prevent those problems

UNIT I: BASIC CONCEPTS

Review of solid mechanics, Displacement model, shape functions, Lagrange and Serendipity elements. Element properties, isoperimetric elements, numerical integration technique assemblage of elements and solution technique for static analysis.

UNIT II: ANALYSIS OF BEAMS

Finite Element formulation and Analysis of beams by Finite Element method.

UNIT III: ANALYSIS OF RIGID JOINTED PLANE FRAME

Finite Element formulation and Analysis of rigid jointed plane frame by Finite Element method.

UNIT IV: ANALYSIS OF PIN JOINTED PLANE FRAME

Finite Element formulation and Analysis of pin jointed plane frame by Finite Element method.

UNIT V: INTRODUCTION TO PLATE AND SHELL ELEMENTS

Analysis of plane stress / strain and ax symmetric solids-triangular, quadrilateral and isoperametric elements, Analysis of plate bending, basic equations of thin plate theory, Reissner-Mindlin theory, plate elements and applications. Analysis of shells, degenerated shell elements.

Text Books:

1. Chandrupatla T.R., Belegundu A.D., Introduction to Finite Elements in Engineering, Prentice Hall of India Private Limited, New Delhi.
2. Desai C.S., Abel J.F., Introduction to the Finite Element Method, CBS Publishers & Distributors, Delhi.

Reference Books: 1. Krishanmurthy, C.S., Finite Element Analysis – Theory and Programming, Tata McGraw Hill Publishing Company Limited, New Delhi.

2. Finite Element Analysis – Theory and Programming by Cook R.D. et.al., Concepts and Applications of Finite Element Analysis, John Wiley

Course Outcomes:

1. Students are expected to understand to learn the subject well and use it in practicality
2. Students are expected to understand the need of this subject and can manage to use it with other technology
3. Students are expected to understand the restrictions in use of this subject

MATS UNIVERSITY GULLU, ARANG, RAIPUR

Semester: B.Tech 7th Sem

Branch:- Civil Engineering

Subject:-Advance Structural Engineering design Lab Code:-BT745

Total Theory Periods: - 40

Total Tutorial Periods: 10

Experiments to be performed (Min 10 experiments):

1. Drawing of plan and section of various types of bolted and welded joints.
2. Detailing of a Axially Loaded angle Tension Member
3. Detailing of an Axially Loaded Compression Member with base plate.
4. Detailing of an Axially Loaded Built up Laced Compression Member.
5. Detailing of an Axially Loaded Built up Battened Compression Member.
6. Detailing of a Riveted / Bolted Plate girder.
7. Detailing of a Welded Plate girder.
8. Detailing of flexible connections
9. Detailing of Semi – Rigid Connections

10. Detailing of Rigid Connections
11. Detailing of a Industrial shed
12. Detailing of a Truss Bridge Railway Bridge.
13. Preparation of Bill of Materials
14. Preparation of Fabrication drawings.
15. Preparation of Erection drawings.

List of Equipments / Machine Required:

1. List of Equipments – Not Required.

Text and Reference Books:

1. Design of Steel Structures – K. S. Sai Ram (Pearson Education)
2. Structural Steel Design : LRFD Method – J. C. McCormac, J. K. Nelson (Pearson Education)
3. Limit State design in Structural Steel – M. R. Shiyekar (PHI Learning)
4. Limit State Design of Steel Structures (IS:800-2007) – V. L. Shah, V. Gore (Structures Publications)

**MATS UNIVERSITY
GULLU, ARANG, RAIPUR**

Semester: B.Tech 7th Sem

Subject:- Water Resources Engineering Lab

Total Theory Periods: - **40**

Branch:- Civil Engineering

Code:-BT746

Total Tutorial Periods: **10**

Experiments to be performed (Min 10 experiments):

1. Experimental investigation of relationship between specific energy and depth of flow.
2. To study the flow characteristics over the weirs in the Flume
3. To study the characteristics of hydraulic jump development in the Laboratory Flume.
4. Potential Estimation of a particular Dam Site.
5. To Develop Relationships between Surface Area, Capacity and Elevation of a Reservoir.
6. Estimation of Live Storage of a Reservoir and Hydropower Potential for the Site.
7. Estimation of Suspended Load, Bed Load and Total Load and Life of Reservoir.
8. Design of an Irrigation System for a particular Area including the Design of canal
9. Design of Outlets.
10. Design of Water Courses and schedule.

11. Study of various existing Barrages and Canals.
12. Comprehensive Design of a Barrage

**MATS UNIVERSITY
GULLU, ARANG, RAIPUR**

**Semester: B.E.7th Sem
Engineering**

Branch:- Civil

Subject: Computer Aided Drafting Laboratory Code:-BT747

- 1creation Of Simple Block
- 2 Creation Of Rectangle
- 3 Creation Of Cone
- 4 Creation Of Cylinder
- 5 Creation Of Hexagonal Prism
- 6 Creation Of Pentagonal Prism
- 7creation Of Title Block
- 8 Creation Of 3d Model Of V Block
- 9 Creation Of 3d Model Of Base Of Mixee
- 10 Creation Of Cubic Spline
- 11 Creation Of Parabola
- 12 Isometric Drawing
- 13 3d View Of Cone
- 14 3d View Of Cylinder
- 15 3d View Of Hexagonal Prism
- 16 Sectional View Of Cylinder
- 17 Sectional View Of Cone
- 18 2d View Of V Block

19 2d View Of Base Of Mixee
20 Creation Of Steel Truss
21 Residential Building Plan

MATS UNIVERSITY

GULLU, ARANG, RAIPUR

Semester: B.Tech 7th Sem

Branch:- Civil Engineering

Subject:- Structural Analysis & Programming Lab

Code:-BT748

Total Theory Periods: - **40**

Total Tutorial Periods: **10**

Experiments to be performed (Min 10 experiments)

1. To determine the flexural rigidity (EI) for a given beam
2. To verify the Maxwell's theorem of reciprocal deflection
3. To determine the vertical deflections of a variety of curved bars.
4. To obtain the horizontal deflection and deformed shape of portal frames with different end conditions.
5. To determine the strain in an externally loaded beam with the help of digital strain indicator.
6. Analysis of determinate beams on a Standard Structural Analysis Package such as SAP2000.
7. Analysis of indeterminate beams on a Standard Structural Analysis Package such as SAP2000.
8. Analysis of determinate pin-jointed frames on a Standard Structural Analysis Package such as SAP2000.
9. Analysis of indeterminate pin-jointed frames on latest version of a Standard Structural Analysis Package such as SAP2000.
10. Analysis of determinate rigid frames on latest version of a Standard Structural Analysis Package such as SAP2000.
11. Analysis of indeterminate rigid frames on latest version of a Standard Structural Analysis Package such as SAP2000.
12. To draw influence lines for determinate beams on latest version of a Standard Structural Analysis Package such as SAP2000.
13. To draw influence lines for indeterminate beams on latest version of a Standard Structural Analysis Package such as SAP2000.
14. Introduction to the latest version of a Standard Finite Element Analysis Package such as ANSYS.
15. Analysis of a plate with a hole on the latest version of a Standard Finite Element Analysis Package such as ANSYS.

List of Equipments / Machine Required:

Elastic properties of beam apparatus

Maxwell's law of reciprocal deflection apparatus

Universal frame with variety of curved bars

Universal frame with variety of portal frames

Digital Strain Indicator

Dial gauges for measuring deflections

Weights and hangers to apply loads

Latest Release of Software Package SAP2000 (Computers & Structures Inc., USA)

Latest Release of Software Package ANSYS (ANSYS Inc., USA)

Recommended Books:

Reference Manual of Respective Software

Verification Manual of Respective Software

SEMESTER-VIII