



MATS School of Engineering & I.T
MATS University, Raipur
Scheme of Teaching & Examination
VIth Semester
B.Tech in Civil Engineering



S.N.	code	Subject	Periods per week			Scheme of marks		Total Credit
			L	T	P	ESE	IM	
1.	BT640	Design of Steel Structures	4	0	-	70	30	4
2.	BT641	Railway, Harbor & Tunnel Engineering	4	0	-	70	30	4
3.	BT642	Sewage & Sanitary Engineering	4	0	-	70	30	4
4.	BT643	Foundation Engineering	3	0	-	70	30	3
5.	BT644	Construction Planning & Management	3	0	-	70	30	3
6.	BT645x	Professional Elective – I	3	0	-	70	30	3
7.	BT646	Minor Project	-	-	3	30	20	2
8.	BT647	Design of Steel Structures Laboratory	-	-	2	30	20	1
9.	BT648	Concrete Testing laboratory	-	-	2	30	20	1
10.	BT649	Geo-tech Engineering Lab	-	-	2	30	20	1
Total			21	0	09	540	260	26

L-Lecturer, P-Practical, ESE- End Semester Examination, IM-Internal Marks, T-Tutorial

Subject Code	Subject Name
BT6751	Concrete Technology
BT6752	Composite Materials
BT6753	Water Power Engineering
BT6754	Structural Dynamics
BT6755	Architecture and Town Planning

MATS UNIVERSITY

GULLU, ARANG, RAIPUR

Semester: B.Tech 6th Sem

Subject:- Design of Steel Structures

Total Theory Periods: - **40**

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

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

Branch:- Civil Engineering

Code:-BT640

Total Tutorial Periods: **10**

Objectives of the Subject:

1. To know about the merits of steel structures.
2. To know about shapes and grades of structural steel available.
3. To know about the different methods of design and the advantages of limit state design over other methods.
4. To understand the behavior of structural steel under tension, compression and flexure.

UNIT 1 MATERIALS AND METHODS

Types of Structural Steel, Physical and Mechanical Properties, Advantages of steel as a structural material, Rolled Sections - Tapered Flange and Parallel Flange, Built up sections, Convention for Member Axes. Plastic Theory, Shape factor, Methods of design, Limitations of Working stress and Plastic design methods, Advantages of Limit State Design, Limit States of Strength and Serviceability, Partial Safety Factors, Loads and Load Combinations, Geometrical Properties, Classification of Cross Sections, Maximum effective slenderness ratio.

UNIT 2 FASTENERS

Location details of fasteners, Bearing type bolts, Friction Grip type Bolting, Welds and Welding, Advantages and Disadvantages of Welded Connections, Lap and Butt Joints, Truss Joint Connections by bolts and welds.

UNIT 3 TENSION MEMBERS

Design Strength due to Yielding of Gross Section, Rupture of Critical Section, Block Shear, Design of Axially Loaded Tension Members, Steel Angles under Tension.

UNIT 4 COMPRESSION MEMBERS

Design Strength, Effective length of compression members, Design of Axially loaded compression members, Steel Angles under Compression, Design of Column bases under axial load, Laced Columns, Battered columns.

UNIT 5 FLEXURAL MEMBERS

Design Strength in Bending (Flexure), Effective length for lateral torsional buckling, Shear, Design of Laterally Supported and Laterally Unsupported Beams with unstiffened webs.

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. To develop ability to select adequate shape and grade of structural steel.
2. To understand the basis of economical and safe design of steel structures.
3. To develop ability of choosing proper fastener for a particular joint.
4. To develop the ability to design structural steel elements by Limit State Method.

GULLU, ARANG, RAIPUR

Semester: B.Tech 6th Sem

Branch:- Civil Engineering

Subject:- Railway Harbour & Tunnel Engineering

Code:-BT641

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 educate the students on the various means of transportation i.e., Railway Engineering, Bridge Engineering, Tunnel Engineering and Harbour Engineering.
2. To expose the students to the concepts of Geometric design of Railway Engineering.
3. To expose the students to the concepts of Bridge Engineering.
4. To educate the students to the concepts of Tunnel and Harbour Engineering.

UNIT 1

RAILWAY ENGINEERING

Railway track cross-section, coning of wheels, rail cross-section, weight of rail, length of rail, wear of rails, creep of rails, rail joints and welding of rail, sleepers, various types, spacing and density fastenings, ballasts.

UNIT 2

RAILWAY GEOMETRICS

Grading, cant and cant deficiency, transition curves, widening of gauges on curves. Point and crossing, design of turn outs various types of track junctions, signaling and interlocking, signals, control of movements of trains.

UNIT 3

BRIDGE ENGINEERING

Bridge site investigation and planning, selection of bridge site, alignment, collection of bridge design data, economic span, scour depth, depth of foundation afflux, clearance, free board.

UNIT 4

TUNNEL ENGINEERING

Consideration in tunneling shape and size, methods of tunnel, constructions, tunneling in soft soil and rocks, lining of tunnels, ventilation, drainage of tunnels.

UNIT 5

HARBOUR ENGINEERING

Harbour layout, harbor works, break water jetties, wharves, piers and berthing facilities, port facilities, docks, transit shed and ware houses.

TEXT BOOKS:

1. Railway Engineering – S.C. Saxena and S.P. Arora, “A textbook of Railway Engineering”, (Dhanpat Rai Publications)
2. Railway Engineering – S.C. Rangwala, “Railway Engineering”, (Charotar Publishing House Pvt. Ltd.)
3. Bridge Engineering – S.P. Bindra, “Principles and practice of bridge engineering”, (Dhanpat Rai Publications)
4. Tunnel Engineering – S.C. Saxena (Dhanpat Rai Publications)
5. Harbour Engineering – R. Srinivasan (Charotar Publishing House Pvt. Ltd)

REFERENCE BOOKS:

1. Tunnel and Harbour – Seetharaman S. (Umesh Publication) 2. Harbour Engineering – R. Srinivasan (Charotar Publishing House Pvt. Ltd.)

Outcomes of the Subject:

1. A person with broad vision and knowledge of different means of Transportation Engineering.
2. The students will be able to make safe design for railway track with high speed.
3. The students will be able to know, what are the selection of site and collection of data for Bridge Design.
4. The students will be able to understand methods of construction of Tunnel and Harbour.

MATS UNIVERSITY
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Semester: B.Tech 6th Sem
Subject:-Sewage & Sanitary Engineering
Total Theory Periods: - **40**

Branch:- Civil Engineering
Code:-BT642
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 give an overview of importance of proper sewage disposal and various sewerage systems.
2. To introduce the students the estimation of domestic sewage and other sewer appurtenances.
3. To impart a detailed knowledge in the design of various sewage treatment processes.
4. To impart knowledge about the different industrial waste treatment technique.
5. To provide knowledge about the environmental social and health implications of solid waste and its management.

UNIT-1:

Estimation of Sewage Sewage and Sewerage, definitions and some common terms, object of sewage disposal. System of sanitation: Conservancy systems, Water system, sewage system-combined, separate and partially separate, patterns of collection system. Amount of sewage: Estimation of domestic and storm sewage, variations in the quantity of sewage, Design of sewers (Only circular sewer) Manholes, Pumping stations, Wet well capacity.

UNIT-2:

Sewage Treatment Characteristics of sewage: Physical, chemical and biological characteristics, fundamentals of aerobic & anaerobic process. Sewage treatment: Preliminary treatment systems, Racks and screens, comminute Grit chambers. Primary treatment systems: Plain sedimentation, detention time and over-flow rates, types of inlets and outlets, onsite wastewater treatment- septic tank, Imhoff tank, oxidation pond .

UNIT-3:

Secondary treatment systems Attached growth process: Trickling filters, standard and high rates, efficiency (NRC) formula, and operational problems of trickling filters. Suspended growth process, principle of suspended growth process, Activated sludge process, Oxidation ditch aeration and mixing techniques, Operational problems of activated sludge systems, stabilisation tools aerobic, anaerobic and facultative lagoon.

UNIT-4:

Sewage Sludge Treatment and Sewage Disposal Importance, amount and characteristics of sludge, sludge digestion, Anaerobic digestion, aerobic digestion, sludge drying beds. Disposal by dilution, self purification of polluted streams, factors affecting self purification, Sag curve, disposal on land surfaces. Stream standards, Effluent standards, theories of waste treatment (Volume reduction, strength reduction, new Equalization and proportioning) Summary of Industrial waste, its origin, character and treatment.

UNIT-5:

Solid Waste Management Solid waste management, source and characteristics, environmental and health implications, refuse characteristics, collection methods, disposal of solid waste by land filling, composting and incineration methods. Collection and disposal of refuse, Composting of refuse.

TEXT BOOKS:

1. Environmental Engineering – Peavy & Rowe (Tata McGraw Hill, New Delhi).
2. Waster Water Engineering – S.K. Garg (Khanna Publication).
3. Waste Water Engineering – B.C. Punmia (Laxmi Publication, New Delhi)

REFERENCE BOOKS:

1. Environmental Science and Engineering – Henry and Heinke (Pearson Education).
2. Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi).
3. Introduction to Environmental Science – Y Anjaneyulu (B S Publications).
4. Environmental Science and Engineering – henry and heinke (Pearson Education).
5. Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi)

Outcomes of the Subject:

1. A student must be capable of designing a sewer system for a city taking into consideration the variations in flow.
2. The student should be capable of managing controlling the sewage treatment plant with complete knowledge of the design values and this functioning.
3. The student must be able to decide upon the quantum of treatment to be given to the wastewater from different sources before they are discharged

MATS UNIVERSITY
GULLU, ARANG, RAIPUR

Semester: B.Tech 6th 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:-BT643

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

UNIT 1 STABILITY OF SLOPES

Embankment slopes, examples of embankment, road and earth dams, stability analysis for finite and infinite slopes, Concept of factor of safety, friction circle method, method of slices, Bishop's simplified method, limiting values of factor of safety; critical conditions for the stability of earth dams.

UNIT 2 EARTH PRESSURE

Earth Pressure at rest, active and passive earth pressure, computations using Rankine's and Coulomb's earth pressure theories, Culmann's graphical method, additional earth pressure due to surcharge and earthquake loading.

UNIT 3 SHALLOW FOUNDATIONS AND SETTLEMENTS

Common types of foundations with examples, brief illustration of situations where each one of them is adopted, basis for design, review of major soil parameters used in proportioning of shallow foundations, types and their selection, Bearing Capacity, various method of determination of bearing capacity, computation of bearing capacity in cohesion less and cohesive soils, effect of various factors on bearing capacity, use of field test data, limits of settlement, differential and permissible settlement of footing, rafts on sand using penetration and load test data, estimation of settlement of footing for rigid and flexible, proportioning of footings.

UNIT 4 WELL AND PILE FOUNDATIONS

Various types of caissons situations where adopted, elements of wells, types, method of construction, Tilt and shift, remedial measures, bearing capacity and settlement, Terzaghi's lateral stability analysis, Pile Foundation, their types, criteria of selection of piles, outline of steps involved in proportioning, bearing capacity and settlement of single and group of piles, design of pile groups and settlement of pile group in clay, negative skin friction.

Unit 5

MACHINE FOUNDATION, CONTAMINATED, EXPANSIVE SOIL, GROUND IMPROVEMENT TECHNIQUES AND INTRODUCTION OF ROCK MECHANICS

Introduction of machine foundation, types of machines and their foundations, Design criteria, Field methods of determining design Parameters, block vibration test, response of block foundations under vertical vibrations, I.S. code recommendations and foundation on expansive soil, identification of expansive soil, contaminated soil, problems associated with contaminated and expansive soil, design consideration of foundation on expansive soil, CNS soils. Various ground improvement techniques- grouting, stone piling, reinforced earth. 9 Introduction of Rock mechanics – RQD, Rock Properties related to design considerations

Name of Text Books: Basic and applied Soil Mechanics (Revised Edition) – Gopal Rajan and Rao A.S.R. (New Age, New Delhi. 1998) Soil Mechanics and Foundation Engineering – B.C. Punmia (Laxmi Publication) Name of Reference Books: Geotechnical Engineering : Gulhati S.K., Datta, M. (Tata McGraw-Hill Publishing Company Limited, New Delhi, 2005). Soil Engineering in Theory and Practice (Vol-II) – Alam Singh (Asia Publishing House, New Delhi) Foundation Engineering (2nd Edition) – Peck, R.B., Hanson (W.E. and Thornburn. W.H. Johan Wiley, New York 1976) Foundation design and Construction (5th Edition) – Tomlinson, M.J. (ELBS, Singapore. 1988) Foundation Analysis and Designing –

J.E. Bowles (McGraw Hill, New Delhi) Soil Engineering in Theory and Practice (Vol. - II) – Alam Singh (Asia Publishing House, New Delhi, 1981) Physical Methods of Soil Characterisation – J. Behari (Narosa Publishing Hall, New Delhi)

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 6th Sem

Subject:- Construction Planning & Management

Total Theory Periods: - **40**

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

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

Branch:- Civil Engineering

Code:-BT644

Total Tutorial Periods: **10**

Objective:

1. To develop fundamental knowledge of project management and cost control.
2. To learn about various techniques for project planning, scheduling and monitoring.
3. To develop awareness of safety and quality control.

UNIT 1 INTRODUCTION

Objectives and functions of construction management, stages in construction, stages of planning, bar charts and milestone charts, project feasibility reports, scheduling job layout and line of balance technique, applications.

UNIT 2 CONSTRUCTION SCHEDULING PERT

Necessity for good scheduling, Elements of Network, Development of Network, PERT: Time estimates, Time computation, Network Analysis – slack, critical path

UNIT 3 CONSTRUCTION SCHEDULING

CPM - Steps in CPM Project Planning, Network Analysis, Activity times and floats, Critical activities and Critical Path Determination

UNIT 4 COST CONTROL & RESOURCE ALLOCATION

Cost control in construction-importance, objectives of cost control, cost control systems. Economic analysis of engineering projects, economic studies, Resources allocation, Resources leveling, Project updating, Construction cost monitoring

UNIT 5 CONSTRUCTION SAFETY AND QUALITY CONTROL

Importance, Causes of Accidents, Safety measures, Responsibility for safety, Safety benefits to various parties, Safety clauses in contract, Safety policy, Safety hazards. Quality control in construction: Importance, Elements of Quality, Quality Assurance Techniques, Quality Control Circles.

TEXT BOOKS:

1. Project Planning and Control with PERT and CPM – B. C. Punmia, and K. K. Khandelwal (Laxmi Publications)
2. Construction Planning and Management – P. S.Gahlot and B. M. Dhir (New Age International)

REFERENCE BOOKS:

1. Construction Planning, Equipment and Methods – R. Peurify, C. J. Schexnayder, A. Shapira, R. Schmitt (Tata McGraw Hill)
2. PERT and CPM: Principles and Applications – L. S. Sreenath (Affiliated East West Press)
3. Construction Management and Accounts – V. N. Vazirani and S. P. Chandola (Khanna Publishers)
4. Construction Planning and Scheduling – J. W. Hinze (Pearson Education)
5. Construction Project Planning and Scheduling – W. C. Patrick (Pearson Education)
6. Construction Management and Planning – B. Sengupta and H. Guha (Tata McGraw Hill)
7. Construction Engineering and Management – S. Seetharaman (Umesh Publications)
8. Construction Project Management – Planning, Scheduling and Controlling – K. K. Chitkara (Tata McGraw Hill)

Outcome of the Subject:

1. To understand objective of construction planning.
2. Ability to develop construction schedule.
3. To understand the application of safety and quality control in construction.

MATS UNIVERSITY
GULLU, ARANG, RAIPUR

Semester: B.Tech 6th Sem

Subject:- Concrete Technology

Total Theory Periods: - **40**

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

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

Branch:- Civil Engineering

Code:-BT6751

Total Tutorial Periods: **10**

Objective of the Subject:

1. To develop Fundamental knowledge of properties of concrete and its ingredients.
2. To acquire an interest in concrete technology and admixture and its filled requirements.
3. Developing a good skill of various methods of concrete making, placing and special formwork.
4. Developing a professional skill of concrete mix design by IS Code Method.

UNIT 1 CONCRETE MAKING MATERIALS

Hydration of cement, Structure of hydrated cement, General Purpose cements, Special purpose cements, Blended cements, Classification of Aggregates, Properties, Grading requirements, Methods of combining aggregates, Surface index, specified grading, Alkali aggregate reaction, Quality of mixing and curing water.

UNIT 2 ADMIXTURES AND FRESH CONCRETE

Chemical admixtures – Functions of Admixtures, Classification of Admixtures, Mineral Additives, effects on concrete properties. Workability, Factors affecting workability, Measurement of Workability, Requirements of Workability, Segregation, Bleeding

UNIT 3 HARDENED CONCRETE AND DURABILITY

Compressive strength and parameters affecting it, Gain of strength with age, Maturity Concept, Elasticity, Creep and shrinkage, Permeability of Concrete, Durability of Concrete, relation between durability and permeability, corrosion of steel rebars.

UNIT 4 CONCRETE MIX DESIGN

Principles of concrete mix design, Concrete mix design steps as per Indian, American & British methods, destructive and non-destructive tests on concrete.

UNIT 5 SPECIAL CONCRETE & CONCRETING METHODS

Need of special concrete, properties, ingredients, method of development and applications of Light weight concrete, Fibre reinforced concrete, Polymer Concrete, selfcompacted concrete, High performance concrete, Ready mix concrete, Extreme weather concreting, special concreting methods, Vacuum dewatering - underwater concrete, special form work.

TEXT BOOKS:

1. Concrete Technology – M.L. Gambhir (Tata McGraw Hill)
2. Concrete Technology Theory and Practice - M. S. Shetty, (S.Chand and Company Ltd. Delhi)

REFERENCE BOOKS:

1. Concrete Technology – A. M. Neville, J. J. Brooks, (Pearson Education)
2. Light Weight Concrete Academic Kiado – Rudhani G. (Publishing Home of Hungarian Academy of Sciences)
3. Concrete Technology – R.S. Varshney (Oxford, IBH Publishers)

Outcomes of the Subject:

1. Ability to measure quality of concrete making materials.
2. Ability to design concrete mixes according to IS, ACI, BS Code methods.
3. Capable of understanding field requirements of various types of concrete.
4. Understanding the process of selection of materials and testing, uses of admixtures, professional practices in ready mix concrete.

MATS UNIVERSITY
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Semester: B.Tech 6th Sem

Subject:- Composite Materials

Total Theory Periods: - **40**

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

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

Branch:- Civil Engineering

Code:-BT6752

Total Tutorial Periods: **10**

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

Introduction, Historical background, Technological Applications, Composites – various reinforcement and matrix materials, Classification of composites.

UNIT 2

Forms of fibre reinforcement, Comparisons of composites with R.C.C. and metals, Strength and stiffness properties, Effective moduli.

UNIT 3

Fibre reinforced composite materials, Manufacturing Technique, Cost and Weight advantages.

UNIT 4

Behaviour of uni-directional, cross-ply, angle-ply and other composites-strength and stiffness, anisotropy, Generalized Hooks law. Laminates-Laminated Plates, Analysis, Strength and design with composites, Fibre reinforced Pressure vessels.

UNIT 5

Laminates-Laminated Plates, Analysis, Strength and design with composites, Fibre reinforced Pressure vessels.

TEXT BOOKS:

1. Mechanics of Composite Materials – Robert M.Jones (Taylor & Francis, Philadelphia, 1998)
2. Fibre Reinforced Composites – P.K. Mallick (Marcel Dekker, Inc., New York, 1993)

REFERENCE BOOKS:

1. Introduction to Design and Analysis with Advanced Composite Materials – Stephen R. Swanson (Prentice Hall, New Jersey, 1997)
2. Stress Analysis of Fiber-Reinforced Composite Materials – M.W. Hyer (WCB McGraw Hill, New York, 1998) ♦

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 6th Sem

Subject:- Water Power 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:-BT6753

Total Tutorial Periods: **10**

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

Introduction Development of water power, hydroelectric power, power potential, important hydropower plant in India, comparison of hydro, thermal & nuclear powers, future of hydro power, relation of water power and hydrology.

UNIT 2

Water Power Estimate Estimate of stream flow for water power studies, flood formulae, rational method, unit hydrograph method, analysis of stream flow data, mass curve and determination of reservoir capacity, pondage, and estimation of available water power.

UNIT 3

Types of hydropower plant Classification of hydro power plants, run-off river plant, storage plants, diversion canal plants, pumped storage plants, hydro electric power from sea and oceans.

UNIT 4

Water conveyance Pen stocks, classification of pen stocks, design criteria for pen stocks, economical diameter of pen stock, water hammer, surg tank, intakes, canals.

UNIT 5

Power House Planning General layout of power house and arrangement of hydro power units, general arrangement of hydro electric unit, sub structure, super structure, abbreviated power houses, underground power house.

TEXT BOOKS:

1. Water Power Engineering – M.M. Dandekar, K.N. Sharma (Vikas Publishing House Pvt. Ltd.)
2. Water Power Engineering – Deshmukh (Dhanpat Rai & Sons)

REFERENCE BOOKS:

1. Irrigation and Water Power Engineering – B.C. Punmia (Laxmi Publication)
2. Hydro Electric Engineering – Creager and Justin (Willay Institutional)
3. Hydro Electric Engineering Practice – Brown, J.G. (Blackie and Sons Ltd., London)
4. Irrigation and Water Power Engineering – Dr. P.N. Modi (Standard Book House)

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 6th Sem

Subject:- Structural Dynamics

Total Theory Periods: - **40**

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

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

Branch:- Civil Engineering

Code:-BT6754

Total Tutorial Periods: **10**

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 CONCEPTS

Types and sources of dynamic loads, Methodology for dynamic analysis, Study of IS- 1893, fundamentals of rigid and deformable dynamics.

UNIT 2 **SINGLE DEGREE OF FREEDOM SYSTEMS**

Free and forced response, effect of damping, Analysis of undamped and viscously damped single degree of freedom. Response of single degree freedom systems to Harmonic loading, support motions and Transmissibility, Duhamel's integral.

UNIT 3 **MULTI –DEGREE OF FREEDOM SYSTEMS**

Free vibrations of lumped mass multi degree freedom systems, analysis of undamped and viscously damped multi degree of freedom. Rayleigh's method, Orthogonality criteria.

UNIT 4 **IDEALIZATION OF STRUCTURES**

Mathematical models, Mode superposition methods, Distributed mass properties.

UNIT 5 **APPLICATION TO EARTHQUAKE ENGINEERING**

Introduction to vibrations due to earthquake, Response spectra. Response spectrum method for seismic design of structures.

TEXT BOOKS:

1. Chopra, A. K., Dynamics of Structures - Theory and Applications to Earthquake Engineering, Second Edition, Prentice Hall, 2001.
2. Rao, S. S., Mechanical Vibrations, Third Edition, Addison-Wesley Publishing Co., 1995

REFERENCE BOOKS:

1. Clough, R. W., and J. Penzien, Dynamics of Structures, Second Edition, McGraw-Hill, 1993.
2. Mario Paz, Structural Dynamics – Theory and Computations, Third Edition, CBS publishers, 1990.

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 6th Sem

Subject:-Architecture and Town Planning

Total Theory Periods: - **40**

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

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

Branch:- Civil Engineering

Code:-BT6755

Total Tutorial Periods: **10**

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 **INTRODUCTION**

Concept of computer aided drafting , Preliminary of CAD, Terminology, Advantages and disadvantages of CAD, Hardware and software of CAD, Graphical input devices, Menus, Input techniques, Output devices, Software, Shape and size description, Drawing primitives, Dimension, Delete and redraw, Window (Zoom), Text and editing (move, copy rotate, mirror), Scale, filters and round, Grouping of entities, Layers

UNIT -2 AUTO CAD FEATURES

Drawing primitives, Invoking and quitting AutoCAD, Grid, Snap Ortho, Arc, Circle, Poly line, polygon, Ellipse, Text, Edit (erase, copy move, rotate, arrays, mirrors, break, trims, change, fillet and chamfer), PEDIT, Scale, display and zoom, pan, fill redraw, region, Q Text, Dimensioning, Sectioning, hatching styles, Layer, Block and its creation

UNIT -3 APPLICATION OF AUTOCAD

Introduction, objection, Drawing, aids, Enquiry commands, Plotting of drawing, Uses of plotters, changing plot specification, Application of civil engineering

ADVANCE 3D DRAFTING

Extude, Subtract and union, 3D views, Shading, Rendering

UNIT -4 INTERACTION WITH DRAWING EDITOR AND DECISION MAKING

Get list, get angle, get orient, get string, Get real, SS Get, Tests for condition

WORKING WITH GEOMETRY AND TEXT

Find angles and distances, Angle, distance and polar function, String data type, Search for string, Conversion

UNIT -5 EDITING AND CHANGING PROPERTIES OF OBJECTS

Filtering, Selecting, Accessing, Improving speed, Understand the property list, Changing property list, Getting objects name and coordinate together

1. A course in Civil Engineering Drawing : V.B. Sikka (Katson Technical Publications)
2. Civil Engineering Drawing : Shah, Kala and Patki (Tata McGraw Hill)

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 6th Sem

Subject:- Design of Steel Structures Laboratory

Total Theory Periods: - **40**

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

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

Branch:- Civil Engineering

Code:-BT647

Total Tutorial Periods: **10**

Experiments to be performed (Min 10 experiments)

1. Introduction to latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
2. Geometrical Modelling of RCC Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
3. Modelling of loads and load combinations on RCC Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
4. Analysis and Interpretation of Results of Analysis of RCC Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
5. Design of RCC Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.

6. Interpretation of Results of Design of RCC Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
7. Geometrical Modelling of Steel Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
8. Modelling of loads and load combinations on Steel Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
9. Analysis and Interpretation of Results of Analysis of Steel Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
10. Design of Steel Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
11. Interpretation of Results of Design of Steel Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
12. Design of R.C.C. Column on latest version of a Standard Structural Engineering Design Package such as STAAD.etc
13. Design of R.C.C. Isolated Footing on latest version of a Standard Structural Engineering Design Package such as STAAD.etc
14. Case Study of design of a RCC Multistorey Building on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
15. Case Study of design of a Steel Industrial Building on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.

List of Equipments / Machine Required:

Latest Release of Software Package STAAD Pro (Research Engineers International, Kolkata)

Latest Release of Software Package STAAD.etc (Research Engineers International, Kolkata)

Recommended Books:

- (1) Reference Manual for Respective Software
- (2) Verification Manual of Respective Software

**MATS UNIVERSITY
GULLU, ARANG, RAIPUR**

Semester: B.Tech 6th Sem

Subject:- Concrete Testing laboratory

Total Theory Periods: - **40**

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

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

Branch:- Civil Engineering

Code:-BT648

Total Tutorial Periods: **10**

Experiments to be performed (Min 10 experiments)

1. Determination of Strength of concrete
2. Determination of Workability by compaction factor
3. Determination of Slump test for a concrete mix
4. Determination of workability by Veebee test
5. Determination of workability by Flow table test
6. Determination of Modulus of elasticity of concrete and strain measurement by longitudinal compressometer
7. Determination of Soundness test on aggregate
8. Determination of Deleterious materials in fine aggregate
9. Determination of flexural strength of concrete
10. Mix Design by I.S. Code method (with OPC Cement)
11. Mix Design by I.S. Code method (with Slag Cement)

12. Mix Design by I.S. Code method (with Admixtures Cement)
13. Determination of grading curve of Mix aggregate & sieve analysis
14. Determination of Compressive strength of concrete by non destructive test – Rebound Hammer

List of Equipments / Machine Required:

Slump Cone with Tamping Rod
Concrete Cubes (15 x 15 x 15) cm³
Tray (45 x 60) cm², (60 x 60) cm², (30 x 45) cm²
Trowel (6 Nos.)
I.S. Sieves for Coarse and Fine Aggregate
Compression Testing Machine (200 T)
Weighing Balance
Sieve Shaker
Compaction Factor Test Apparatus
Vee-Bee Consistometer
Flow Table
Longitudinal Compressometer
Cylindrical Mould
Concrete Test Hammer
Graduated Glass Cylinder (500 ml, 1000 ml)
Beaker (500 ml)
Rebound Hammer

Recommended Books:

Lab Manual Concrete – M.L. Gambhir (Tata McGraw Hill)
Concrete Technology – M.S. Shetty (S. Chand & Co.)
Concrete Technology – M.L. Gambhir (Tata McGraw Hill)

MATS UNIVERSITY
GULLU, ARANG, RAIPUR

Semester: B.Tech 6th Sem

Subject:- Foundation Engineering Lab

Total Theory Periods: - 40

Branch:- Civil Engineering

Code:-BT649

Total Tutorial Periods: 10

Experiments to be performed (Min 10 experiments)

1. Determination of water content dry density relation using light-compaction test.
2. Determination of water content dry density relation using heavy compaction test.
3. To determine California Bearing Ratio for the designing of pavements, laboratory determination of CBR test.
3. To determine in-situ bearing value of subgrade by North Dakota Cone Apparatus.
4. Direct Shear Test on the (1) Dry cohesionless / cohesive soil specimen remoulded / unremoulded (2) Direct shear test – undrained test, direct shear test-consolidated undrained.
5. Triaxial Compression Test (Triaxial compression test): (a) UU, (b) CU, (c) CC.
6. Determination of Unconfined Compression Strength of cohesive soils (Remoulded / Unremoulded)
7. Laboratory Vane Shear Test (Remoulded / Unremoulded)



8. To determine the mass density of soil by core cutter method.
9. To determine the specific gravity of soil sample by pycnometer method.
10. To determine the water content of soil (%) by oven dry method.
11. To determine in situ dry density of soil by sand replacement method.
12. To determine the particle size distribution of a soil by dry mechanical analysis (sieve analysis).
13. To determine the liquid limit, plastic limit, shrinkage limit of a soil sample.
14. Determination of bearing capacity of soil by plate load.

List of Equipments / Machine Required:

Light Compaction Mould
Heavy Compaction Mould
Oven
CBR Apparatus
North Dakota Cone Apparatus
Direct Shear Test Apparatus with full accessories
Triaxial Compression Test Apparatus with full accessories
Consolidometer Apparatus
Unconfined Compression Test Apparatus
Swell Pressure Test Apparatus
Standard Penetration Test Apparatus with full accessories
Plate Load Test Apparatus with full accessories
Soil Sampling Tube

Recommended Books:

Soil Mechanics and Foundation Engineering – B.C. Punmia (Laxmi Publication)
Soil Engineering in Theory and Practice (Vol-II) – Alam Singh (Asia Publishing House, New Delhi)

SEMESTER-VII

