DR. K. N. MODI UNIVERSITY

DEPARTMENT
OF
CIVIL ENGINEERING

STUDY AND EVALUATION SCHEME (2017-18)

M-TECH (STRUCTURE ENGINEERING)

DR. K. N. MODI UNIVERSITY
Study and Evaluation Scheme
M.Tech. (Structure Engineering) I semester
Effective from session 2017-18

S. No.	Sub Code	Subject Name	Period			Evaluation Scheme			Credit
						Continuous Assessment	Final Exam	Total	
			L	T	P				
1	01MTSE101	Advanced Structural Analysis	3	1	0	40	60	100	4
2	01MTSE102	Structural Dynamics	3	1	0	40	60	100	4
3	01MTSE103/05/06	Elective-I	3	1	0	40	60	100	4
4	01MTSE104	Concrete Technology	3	1	0	40	60	100	4
LAB									
1	01MPSE101	Concrete Technology Lab	0	0	2	50	50	100	1
2	01MPSE102	Structure Lab-I	0	0	2	50	50	100	1
3	01MP1010	Seamless Learning	0	0	2	100		100	1
4	01MP1011	Co-Curricular Activities	0	0	2	100		100	1
	Total		**12**	**4**	**8**			**800**	**20**

Elective – I

01 MTSE103 Pre-stressed concrete
01 MTSE105 Computer oriented numerical methods
01 MTSE106 Experimental stress analysis

DR. K. N. MODI UNIVERSITY
Study and Evaluation Scheme
M.Tech. (Structure Engineering) II Semester
Effective from session 2017-18

S. No.	Sub Code	Subject Name	Period			Evaluation Scheme			Credit
						Continuous Assessment	Final Exam	Total	
			L	T	P				
1	01MTSE201	Design of Advanced Concrete Structures	3	1	0	40	60	100	4
2	01MTSE202/05/06	Elective-II	3	1	0	40	60	100	4
3	01MTSE203	Tall Buildings	3	1	0	40	60	100	4
4	01MTSE204	Plates and Shells	3	1	0	40	60	100	4
LAB									
1	01MPSE201	Structure Lab-II	0	0	2	50	50	100	1
2	01MPSE202	Case Study	0	0	2	50	50	100	1
2	01MP2010	Seamless Learning	0	0	2	100		100	1
3	01MP2011	Co-Curricular Activities	0	0	2	100		100	1
	Total		**12**	**4**	**8**			**800**	**20**

Elective-II

01MTSE202 Bridge Engineering
01MTSE205 Composite materials
01MTSE206 Finite Element Methods

DR. K. N. MODI UNIVERSITY
Study and Evaluation Scheme
M. Tech. (Structure Engineering) III Semester
Effective from session 2017-18

S. No.	Sub Code	Subject Name	Period			Evaluation Scheme			Credit
						Continuous Assessment	Final Exam	Total	
			L	T	P				
1	02MTSE301	Ground Improvement Techniques	3	1	0	40	60	100	4
2	02MTSE303-02MTSE305	Elective-III	3	1	0	40	60	100	4
LAB									
1	02MPSE301	Seminar	0	0	2	50	50	100	2
1	02MPSE302	Minor Project	0	0	2	50	50	100	6
2	02MP3010	Seamless Learning	0	0	2	100		100	1
3	02MP3011	Co-Curricular Activities	0	0	2	100		100	1
		Total	**6**	**2**	**08**			**600**	**18**

Elective-III

02MTSE303 Design of Composite Structures

02MTSE304 Theory of Elasticity and Plasticity

02MTSE305 Advanced Steel Design

DR. K. N. MODI UNIVERSITY

Study and Evaluation Scheme
M. Tech. (Structure Engineering) IV Semester
Effective from session 2017-18

S. No	Subject Code	Name of the Subject	Periods			Evaluation Scheme			Credit
			L	T	P	Continuous Assessment	Final Exam	Total	
1	02MPSE401	Dissertation (Final)	0	0	36	200	400	600	18
		TOTAL							

SEMESTER- I

01MTSE101 ADVANCED STRUCTURAL ANALYSIS

Course Objective
To develop a computer program for structural analysis based on the matrix stiffness ,the effects of moving loads on indeterminate structures, plastic analysis of beams and frames ,virtual work method the basics of finite element method and application to structural analysis

Unit 1
Matrix methods in skeletal structural analysis, Flexibility Matrix, Stiffness Matrix, Relationship between Flexibility Matrix & Stiffness Matrix, Introduction of Force & Displacement Method

Unit 2
Shear Equations for Rigid jointed Frames, Stiffness of a Rigid Joint, Stiffness matrix for Rectangular frames, Displacement method for Non Rectangular Frames

Unit 3
Displacement of a pin jointed plane frame, Stiffness of a pin Joint, Force method for pin jointed frame,Member Forces, Displacement method for pin jointed frame, Comparison of both methods for Pin jointSpace Frame

Unit 4
Stiffness of a Rectangular Frames, Stiffness of a Grid Structures, Force method for Rigid jointed Space frame, Displacement method for Rigid jointed Space frame, Comparison of both methods for Rigid joint Space Frame

Unit 5
Tension Coefficient method, Displacement of a Pin jointed Space Frames, Force method for Pin jointed Frame, Displacement method for Pin jointed Space frame

Reference:
Structural Analysis: A Matrix Approach by G. Pandit , S. Gupta

01MTSE102 STRUCTURAL DYNAMICS

Course Objective This Unit introduces the fundamental concepts and theory of dynamic analysis. In a first step, free vibrations are studied and the problem of determining the natural frequency of a system is addressed. This is followed by the study of harmonically excited vibrations.

Unit 1
Single degree of freedom System, Force –Displacement Relation, Damping Force, Equation of Motion: External Force, Mass Spring Damper System

Unit 2
Undamped Free Vibration, Viscously Damped Free Vibration, Energy in Free Vibration,Coulmb – Damped Free Vibration

Unit 3
Harmonic Vibration of Undamped System, Harmonic Vibration with Viscous Damping, Natural Frequency and Damping from harmonic Tests

Unit 4
Time Stepping Methods, Methods Based on Interpolation of Excitation, Central Difference Method, Newmark's method , Central Difference Method

Unit 5
Equation of Motion: Earthquake Excitation, Response Quantities, Response History, Response Spectrum Concept, Pseudo Velocity, Pseudo Acceleration, Comparison of Design & Response Spectra

Elective-I
01MTSE103 PRE-STRESSED STRUCTURES

Course Objective - Valuate the behavior and design of pres tressed concrete beams and slabs (including statically indeterminate beams and slabs) and design tendon layout, which satisfy the strength and serviceability limit states as required by design standards; analyze the stresses in anchorage zones and design end anchorages for prestressed concrete beams and slabs; evaluate the short-term and long-term losses in prestressing and design prestressed structures considering these losses; discuss and appraise the recent advances in the prestressed concrete technology including the use of advanced materials and application of new technologies.

Unit 1
Basic philosophy of prestressing, Various techniques of prestressing with and without prestressing cables,

Unit 2
Different systems of prestressing, materials and design concepts,

Unit 3
Prestressing of concrete structures, Analysis and design of beams, Design of end blocks,

Unit 4
Ultimate strength in flexure and shear, Statically indeterminate structures, Tension members, tanks, compression members

Unit 5
Partial prestressing, composite construction, precast prestressed elements.

01 MTSE105 COMPUTER ORIENTED NUMERICAL METHODS

Unit I:

Solutions of linear equations: Direct method – Cramer's rule, Guass – Elimination method- Gauss – Jordan elimination – Triangulation (LU Decomposition) method – Iterative methods Jacobi – Iteration method – Gauss – Siedel iteration, Successive over – relaxation method.

Eigen values and eigen vectors: Jacobi method for symmetric matrices- Given's method for symmetric matrices-Householder's method for symmetric matrices-Rutishauser method of arbitrary matrices – Power method.

UNIT II:

Interpolation: Linear Interpolation - Higher order Interpolation - Lagrange Interpolation – Interpolating polynomials using finites differences- Hermite Interpolation -piece-wise and spline Interpolation.

Unit III

Finite Difference and their Applications: Introduction- Differentiation formulas by Interpolating parabolas

Backward and forward and central differences- Derivation of Differentiation formulae using Taylor series- Boundary conditions- Beam deflection – Solution of characteristic value problems- Richardson's extrapolation- Use of unevenly spaced pivotal points- Integration formulae by interpolating parabolas-Numerical solution to spatial differential equations.

UNIT IV.

Numerical Differentiation: Difference methods based on undetermined coefficientsoptimum choice of step length– Partial differentiation. Numerical Integration: Method based on interpolation-method based on undetermined coefficient – Gauss – Lagrange interpolation method- Radaua integration methodcomposite integration method – Double integration using Trapezoidal and Simpson's method.

UNIT V

Ordinary Differential Equation: Euler's method – Backward Euler method – Mid point method – single step method, Taylor's series method- Boundary value problems.
(6L)

REFERENCES:

1. Numerical methods for scientific and engineering computations. M.K.Jain-S.R.K.Iyengar – R.K.Jain Willey Eastern Limited.
2. Numerical methods by S.S.Shastry.
3. Applied numerical analysis by – Curtis I.Gerala- Addission Wasley – published campus.
4. Numerical methods for Engineers Stevan C.Chopra, Raymond P.Canal Mc.

01 MTSE106 EXPERIMENTAL STRESS ANALYSIS

UNIT I

Basic equations and Plane Elasticity Theory: Introduction, Strain equations of Transformation, Compatibility, Stress-Strain Relations-Two dimensional State of Stress.

The Plane-Elastic problem, The Plane-Strain Approach, Plane Stress, Airy's Stress function-Cartesian Co-ordinates-Two dimensional problems in Polar Co-ordinates, Polar Components of Stress in terms of Airy's Stress function, Forms.

Principles of Experimental Approach: Merit of Experimental Analysis introduction, uses of experimental stress analysis-Advantages of experimental stress analysis, Different methods, Simplification of problems.

UNIT II

Strain Measurement using Strain Gauges: Definition of strain and its relation to Experimental Determinations, properties of strain-gauge systems, Types of strain gauges,Mechanical and Optical strain gauges. Electrical Strain Gauges - Introduction, LVDT -resistance strain gauge - various types - gauge factor, Materials for adhesion base, etc.

Strain Rosettes: Introduction, The three element rectangular Rosette - The delta rosette - Corrections for Transverse strain effects

UNIT III

Brittle Coating Method: Introduction, Coating stresses - Failure theories - Brittle coating Crack pattern - Crack detection - Types of Brittle coating - Test procedures for brittle coating analysis - Calibration procedures - Analysis of brittle coating data.

UNIT IV

Theory of Photo Elasticity: Introduction, Temporary double refraction - The stress optic law - Effects of stressed model in a Polaris cope for various arrangements – Fringe sharpening, Brewster stress optic law.

UNIT V

Two Dimensional Photo Elasticity: Introduction, Isochromatic Fringe patterns - Isoclinic fringe patterns, passage of light through plane Polaris cope and circular Polaris cope, Isoclinic fringe pattern - Compensation techniques - calibration methods, separation methods, scaling Model to Proto type stress- Materials for photo - elasticity, properties of photo elastic materials.

REFERENCES :

1. Experimental Stress Analysis by J.W.Dally and W.F.Riley
2. Experimental Stress Analysis by Dr. Sadhu Singh
3. Experimental Stress Analysis by Dove and Adams

01MTSE104 CONCRETE TECHNOLOGY

Course Objective

Keep abreast with the current reinforced concrete construction technologies in the industry. Perform and supervise effectively the various types of reinforced concrete works on site. Plan and schedule reinforced concrete works effectively to achieve high productivity and minimize delay. Perform simple designs relating to reinforced concrete construction. Manage the safety aspects of reinforced concrete construction Apply the management and financial know-how for business.

Unit 1

Review of constituent materials and mix design ACI method and IS, Admixture – plasticizers, Air entered Admixtures, Pozzolanic Admixtures, HVAF, Silica Flume etc.

Unit 2

Properties of concrete in fresh state and hardened state, special concretes, durability of concretes subjected to extreme environment, deterioration mechanisms, and assessment

Unit 3

Control of corrosion in concrete structures, in situ assessment of concrete structures,

Unit 4

Various NDT techniques and their applications, Rebound Hammer, Pullout Test, Vibration Method, Resonant Frequency Method, Electrical Method. etc

Unit 5

Repair of concrete structures.

Reference Author Name: M. S. Shetty

01MPSE101 CONCRETE TECHNOLOGY LAB

1. NDT on concrete by Rebound Hammer Test.
2. Flakiness and Elongation Test
3. Slump & compaction factor test
4. Crushing strength of concrete cube for different W/C ratio
5. Bulk density & voids of aggregate

01MPSE102 STRUCTURE LAB-I

1. To understand basics of Staad Pro
2. To generate Geometry (Multi-storey Structure in Staad Pro)
3. To learn to apply loads in Staad Pro
4. To learn to assign Supports in Staad Pro
5. To Design Multi-storey Structure in Staad Pro

SEMESTER –II

01MPSE201 DESIGN OF ADVANCED CONCRETE STRUCTURES

Course objective: Presents the planning, analysis, and design of shallow and deep foundations. Topics supporting course objectives include aspects of subsurface investigations, in-situ testing, factors of safety, margin of safety, reliability, and Load and Resistance Factor Design.

Unit 1:
Basic philosophy of concrete materials, Concrete Mix Design, Basic philosophy of Design of concrete structures,

Unit 2:
Design of single and multi-bay structures in concrete, Portal Frames, Space frames, large span roof structures, Bunkers and Silos,

Unit 3:
Pressure vessels and chimneys, Folded Plates, Reinforcement detailing for members and joints detailing; Codal provisions.

Unit 4:
Basic philosophy of foundation design, raft foundations, pile foundations & well foundations,

Unit 5:
Prestressing of concrete structures, Analysis and design of determinate & indeterminate beams, Concordant Cables, Design of end blocks.

Elective-II
01MTSE202 BRIDGE ENGINEERING

Course objective:-The main aim of this course is to enable students to choose the appropriate bridge type for a given project, and to analyze and design the main components of the chosen bridge. The course also provides students with fundamental knowledge in a wide range of state-of-the-art practices, including code specifications, in bridge engineering.
Unit 1:
Types of Bridges, choice of bridge type, criteria for selection of bridge site, economic span,
Unit 2:
Bridge loadings, slab bridges, effect of skew, load distribution theories for multi beam bridges
Unit 3:
Design of R.C. and prestressed T beam bridges, behavior and structural action of box girder Bridge
Unit 4:
Bridge bearings, methods of construction, inspection and maintenance procedures

Unit 5:

Rehabilitation of bridges

01MTSE205 COMPOSITE MATERIALS

UNIT - I

Introduction: Requirements of structural materials, influence of nature of materials in structural form, Nature of structural materials- Homogeneous materials, composite materials.

UNIT - II

Macro mechanical Properties of composite Laminae: Introduction, Assumptions and Idealizations, Stress Strain relationships for composite Laminae- Isotropic, Orthotropic laminae, Strength Characteristics- Basic concepts, Strength hypothesis for isotropic and Orthotropic laminae. Macro mechanical, Analysis of composite Laminae: Introduction, Assumptions and Limitations, Stiffness characteristics of glass reinforced laminae- Stress- Strain relationships in continuous, discontinuous fibre laminae, Strength characteristics of glass reinforced laminae-Strengths in continuous, discontinuous fibre laminae.

UNIT - III

Behaviour of Glass Fibre-Reinforced laminates: Introduction, Stiffness characteristics of Laminated composites-Behaviour of Laminated beams and plates, Strength characteristics of Laminated composites- Strength analysis and failure criteria, Effect of inter laminar structures. Glass Reinforced Composites: Introduction, Continuously reinforced laminates- uni-directionally and multi directionally continuously reinforced laminates, Discontinuously reinforced laminates – Stiffness and Strength properties. (8L)

UNIT - IV

GRP properties relevant to structural Design: Introduction, Short-term strength and stiffness-Tensile,Compressive, Flexural and Shearing. Long term strength and stiffness properties, Temperature effects, Effect of fire, Structural joints-Adhesive, mechanical, Combinational, Transformed sections.

UNIT - V

Design of GRP Box Beams: Introduction, loading, span and cross-sectional shape, Selection of material, Beam manufacture, Beam stresses, Experimental Behaviour, Effect on Beam performance-Modulus of Elasticity, Compressive Strength, I value, prevention of compression buckling failure, Behaviour under long term loading.

Design of Stressed skinned roof structure: Introduction, loading and material properties, preliminary design, and computer analysis.

REFERENCE:

1. GRP in Structural Engineering M.Holmes and D.J.Just.
2. Mechanics of Composite materials and Structures by Manjunath Mukhopadhyay; Universities Press

01MTSE206 FINITE ELEMENT METHOD

UNIT I

Introduction: Concepts of FEM - steps involved - merits and demerits -energy principles – discrimination - Raleigh - Ritz method of functional approximation.

Principles of Elasticity: Stress equations - strain displacement relationships in matrix form plane stress, plane strain and axi-symmetric bodies of revolution with axisymmetric loading

UNIT II

One dimensional FEM: Stiffness matrix for beam and bar elements - shape functions foe ID elements. Two dimensional FEM: Different types of elements for plane stress and plane strain analysis - displacement models - generalized coordinates - shape functions - convergent and compatibility requirements - geometric invariance - natural coordinate system - area and volume coordinates - generation of element stiffness and nodal load matrices

UNIT III

Isoparametric formulation: Concept - different isoparametric elements for 2D analysis - formulation of 4-noded and 8-noded isoparametric quadrilateral elements - Lagrange elements - serendipity elements.

Axi Symmetric Analysis: bodies of revolution - axi symmetric modeling – strain displacement relationship - formulation of axi symmetric elements. Three dimensional FEM: Different 3-D elements-strain-displacement relationship– formulation of hexahedral and isoparametric solid element.

UNIT IV

Introduction to Finite Element Analysis of Plates: basic theory of plate bending – thin plate theory - stress resultants - Mindlin's approximations - formulation of 4-noded isoperimetric quadrilateral plate element – Shell Element.

UNIT V

Introduction to non – linear analysis – basic methods – application to Special structures.

REFERENCES:

1. Concepts and Applications of Finite Element Analysis by Robert D.Cook, David S. Malkus and Michael E. Plesha, John Wiley & Sons.
2. Finite element Methods by OC Zienkiewicz
3. Finite element analysis, theory and progarmming by GS Krishna Murthy.
4. Introduction to Finite element Method by Tirupathi Chandra Patila and Belugunudu.
5. Introduction to Finite element Method by JN Reddy

01MTSE202 TALL BUILDINGS

Course objective:-Tall buildings are a special class of structures with their own peculiar characteristics and requirements. Tall buildings are often occupied by a large number of people.

Therefore, their damage, loss of functionality, or collapse can have very severe and adverse consequences on the life and limb and on the economy of the affected regions. Each tall building represents a significant investment and as such tall building analysis and design is generally performed using more sophisticated techniques and methodologies.

Unit 1:
Structural systems of tall buildings

Unit 2:
Moment resistant frames, braced frames, eccentrically braced frames, shear walls,

Unit 3:
Coupled shear walls, frame shear wall interaction, tubular structures

Unit 4:
Approximate and matrix oriented methods of design of tall buildings

Unit 5:
Design of pile and raft foundation for tall buildings.

01MTSE204 PLATES AND SHELLS

Course Objective This course deals with the theory and design of thin shell structures, using the membrane and bending theories for of shells of revolution and translation, and their application to analysis of domes, hyperbolic, parabolic, elliptic and cylindrical shells. The course also introduces the finite element method for plate bending.

Unit 1
Plate equation and behaviour of thin plates in Cartesian, polar and skew coordinates; Curvilinear Coordinates and coordinate transformation

Unit 2
Isotropic and orthotropic plates, bending and twisting of plates; Navier and Levy solutions and energy methods; rectangular, circular plates and plates with variable rigidity in Cartesian and polar coordinates; Numerical solutions.

Unit 3
Shell behaviour, shell surfaces and characteristics, classifications of shells, equilibrium equations in curvilinear coordinates, force displacement relations

Unit 4
Membrane analysis of shells of revolution and cylindrical shells under different loads, shallow shells, concept of pseudo stresses, membrane solution of elliptic paraboloids and hyperboloids, solutions of typical problems

01MPSE101 STRUCTURE LAB-II

1. To understand basics of Sap
2. To generate Geometry (Multi-storey Structure in Sap)
3. To learn to apply loads in Sap
4. To learn to assign Supports in Sap
5. To Design Multi-storey Structure in Sap

SEMESTER-III

02MTSE301 GROUND IMPROVEMENT TECHNIQUES

Course Objective Delegates will gain an understanding of the concepts behind a range of Ground Improvement Techniques, and be able to identify appropriate techniques for a range of ground and site conditions.

Unit 1:
Ground improvement potential, drainage methods, precompression and vertical drains, vibration Methods, grouting and injection,

Unit 2:
Mechanical cementing and chemical stabilization; granular piles, stone columns, diaphragm walls,

Unit 3:
Soil reinforcement, Geosynthetics and their application cost effective design of retaining walls with geosynthetics

Unit 4:
Civil engineering applications of extruded polymer grids,

Unit 5:
Geomembranes with landfill closures, Thermal methods of ground improvement, Improving Rock stability and Quality

Elective-III

02MTSE303 DESIGN OF COMPOSITE STRUCTURES

Course objective:-The analysis and design procedures of composite material structures are considerably more complex than those of their metallic counterparts. This is due to the

anisotropic nature of typical laminated composite materials. To achieve safe and reliable structural systems, the composites designer/analyst needs to have a sound knowledge and firm grasp of the underlying principles of the structural response of composite materials. This course aims to provide the basic knowledge and understanding of the mechanics of composite materials utilized in the advanced engineering structures (aerospace, naval, automotive, etc.) in order to permit their efficient use in design applications.

Unit 1
Composite Systems: Materials, loadings, composite floor systems, composite building systems, methods of analysis.
Unit 2
Composite Beams: Components and systems, fundamentals of composites action, shear connection, design for flexure, serviceability, prestressed beams.
Unit 3
Composite Columns: Types of composite compression members, behavior of composite columns, special considerations.
Unit 4
Lateral Resisting System: Types of bracing, moment resisting frames, braced frames, shear-wall design and horizontal diaphragms, joints.
Unit 5
Time dependent effects: Creep, shrinkage, thermal effects.

02MTSE304 THEORY OF ELASTICITY AND PLASTICITY

UNIT-I
Introduction: Elasticity - notation for forces and stresses - components of stresses - components of strain - Hooks law. Plane stress and plane strain analysis - plane stress - plane strain - differential equations of equilibrium - boundary conditions - compatibility equations - stress function - boundary condition. (6L)
UNIT II.
Two dimensional problems in rectangular coordinates - solution by polynomials - Saint-Venant's principle - determination of displacements - bending of simple beams - application of corier series for two dimensional problems - gravity loading. Two dimensional problems in polar coordinates - stress distribution symmetrical about an axis - pure bending of curved bars - strain components in polar coordinates - displacements for symmetrical stress distributions - simple symmetric and asymmetric problems - general solution of two- dimensional problem in polar coordinates - application of general solution in polar coordinates. (10L)
UNIT III.
Analysis of stress and strain in three dimensions - principal stresses - stress ellipsoid - director surface - determination of principal stresses - max shear stresses – homogeneous deformation - principal axes of strain rotation. General Theorems: Differential equations of equilibrium - conditions of compatibility - determination of displacement - equations of equilibrium in terms of displacements - principle of super position - uniqueness of solution - the reciprocal theorem. (10L)

UNIT IV.

Torsion of Prismatic Bars - torsion of prismatic bars - bars with elliptical cross sections - other elementary solution - membrane analogy - torsion of rectangular bars - solution of torsion problems by energy method - use of soap films in solving torsion problems - hydro dynamical analogies - torsion of shafts, tubes , bars etc. Bending of Prismatic Bars: Stress function - bending of cantilever - circular cross section - elliptical cross section - rectangular cross section - bending problems by soap film method - displacements. (10L)

UNIT V.

Theory of Plasticity: Introduction - concepts and assumptions - yield criterions. (4L)

REFERENCES

1. Theory of Elasticity by Timeshanko, McGrawhill Publications.
2. Theory of Plasticity by J.Chakarbarthy, McGrawhill Publications.
3. Theory of Elasticity by Y.C.Fung.
4. Theory of Elasticity by Gurucharan Singh

02MTSE305 ADVANCED STEEL DESIGN

UNIT-I:

SIMPLE CONNECTIONS –RIVETED, BOLTED PINNED AND WELDED CONNECTIONS:

Riveted connections-Bolted Connections- Load Transfer Mechanism – Failure of Bolted Joints – Specifications for Bolted Joints – Bearing – Type Connections – Tensile Strength of Plate – Strength and Efficiency of the Joint – Combined Shear and Tension –Slip – Critical Connections – Praying Action – Combined Shear and Tension for Slip-Critical Connections. Design of Groove welds- Design of Fillet Welds- Design of Intermittent fillet welds- Failure of Welds.

UNIT –II

ECCENTRIC AND MOMENT CONNECTIONS:

Introduction – Beams – Column Connections- Connections Subjected to Eccentric Shear – Bolted Framed Connections- Bolted Seat Connections – Bolted Brackete Connections. Bolted Moment Connections – Welded Framed Connections – Welded Brackete Connections - Moment Resistant Connections.

UNIT III Analysis and Design of Industrial Buildings :

Dead loads, live loads and wind loads on roofs. Design wind speed and pressure, wind pressure on roofs; wind effect on cladding and louvers; Design of angular roof truss, tubular truss, truss for a railway platform. Design of purlins for roofs, design of built up purlins, design of knee braced trusses and stanchions. Design of bracings.

UNIT IV : DESIGN OF STEEL TRUSS GIRDER BRIDGES :

Types of truss bridges, component parts of a truss bridge, economic proportions of trusses, self weight of truss girders, design of bridge compression members, tension members; wind load on truss girder bridges; wind effect on top lateral bracing; bottom lateral bracing; portal Bracing; sway bracing.

UNIT V : Design of Steel Bunkers and Soils

Introduction – Janseen's Theory – Airy's Theory – Design of Parameters – Design Criteria – Analysis of Bins – Hopper Bottom –Design of Bins.

References:

1. Design of Steel Structures. P. Dayaratnam, Publisher : S. Chand, Edition 2011 – 12.
2. Design Steel Structures Volume – II, Dr. Ramachandra & Vivendra Gehlot Scientitic Publishes Journals Department.
3. Limit State Design of Steel Structures S.K. Duggal Mc Graw Hill Education Private Ltd. New Delhi.
4. Design of Steel Structures Galyord & Gaylord, Publisher ; Tata Mc Graw Hill, Education. Edition 2012.
5. Indian Standard Code – IS – 800-2007.