JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.TECH. CIVIL ENGINEERING

IV YEAR II SEMESTER **COURSE STRUCTURE**

Code	Subject	L	T/P/D	C
	Elective-IV			
58001	Ground Improvement Techniques	3	1	3
58002	Design and Drawing of Irrigation Structures			
58003	Airport Planning and Design			
58004	Prestressed Concrete Structures			
58005	Data Base Management Systems			
58006	Rehabilitation and Retrofitting of Structures	3	1	3
58007	Management Science	3	–	3
58601	Industrial Training	–	–	2
58602	Seminar	–	6	2
58603	Project	–	15	10
58604	Comprehensive viva	–	–	2
	Total	**9**	**23**	**25**

Note : All End Examinations (Theory and Practical) are of three hours duration.

T-Tutorial **L – Theory** **P – Practical** **D-Drawing** **C – Credits**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

III Year B.Tech. C.E. I –Sem **L** 3 **T/P/D** 1/-/- **C** 3

(55001) CONCRETE TECHNOLOGY

UNIT I

CEMENT : Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrate cement – Test on physical properties – Different grades of cement.

UNIT – II

ADMIXTURES : Types of admixtures – mineral and chemical admixtures – properties – dosages – effects - usage.

UNIT - III

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

UNIT – IV

FRESH CONCRETE: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.

UNIT - V

HARDENED CONCRETE : Water / Cement ratio – Abram's Law – Gelspaoe ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength - Curing.

UNIT – VI

TESTING OF HARDENED CONCRETE: Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Pull-out test, Non-destructive testing methods – codal provisions for NDT.

ELASTICITY, CREEP & SHRINKAGE – Modulus of elasticity – Dynamic modulus of elasticity – Posisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

UNIT – VII

MIX DESIGN : Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design.

UNIT – VIII

SPECIAL CONCRETES: Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Polymer concrete – Types of Polymer concrete – High performance concrete – Self compacting concrete.

TEXT BOOKS:

1. Properties of Concrete by A.M.Neville – Low priced Edition – 4th edition
2. Concrete Technology by M.S.Shetty. – S.Chand & Co. ; 2004

REFERENCES:

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
2. Concrete Technology by A.R. Santha Kumar, Oxford university Press, New Delhi
3. Concrete: Micro structure, Properties and Materials – P.K.Mehta and J.M.Monteiro, Mc-Graw Hill Publishers

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III Year B.Tech. C.E. I –Sem	L	T/P/D	C
	3	-/2/-	4

(55002) DESIGN OF REINFORCED CONCRETE STRUCTURES

UNIT –I

Concepts of RC. Design – Limit State method – Material Stress- Strain Curves – Safety factors – Characteristic values. Stress Block parameters – IS – 456 – 2000 – Working Stress Method.

UNIT –II

Beams : Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.

UNIT – III

Shear, Torsion and Bond : Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing.

UNIT - IV

Design of Two-way slabs, one way slab, continuous slab Using I S Coefficients

UNIT – V

Footings : Different types of footings – Design of isolated, square, rectangular, circular footings and Combined footings.

UNIT – VI

Short and Long columns – under axial loads , uniaxial bending and biaxial bending – I S Code provisions.

UNIT –VII

Limit state design for serviceability for deflection, cracking and codal provision.

UNIT – VIII

Miscellaneous design stair case design – Design of Canopy (Portico)

TEXT BOOKS:

1. Limit state designed of reinforced concrete – P.C.Varghese, Prentice Hall of India, New Delhi.
2. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishers, New Delhi
3. Reinforced concrete design by S.Unnikrishna Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi.
4. Fundamentals of reinforced concrete by N.C. Sinha and S.K Roy, S. Chand publishers

REFERENCES :

1. Fundamentals of Reinforced concrete design by M.L. Gambhir, Printice Hall of India Private Ltd., New Delhi.
2. Reinforced concrete structural elements – behaviour, Analysis and design by P.Purushotham, Tata Mc.Graw-Hill, 1994.
3. Design of concrete structures – Arthus H.Nilson, David Darwin, and Chorles W. Dolar, Tata Mc.Graw-Hill, 3rd Edition, 2005.
4. Design of Reinforced Concrete Foundations – P.C. Varghese Prentice Hall of India, New Delhi.
5. Reinforced concrete structures, Vol.1, by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
6. Reinforced concrete structures – I.C. Syal & A.K.Goel, S.Chand Publishers
7. Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

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III Year B.Tech. C.E. I –Sem	L	T/P/D	C
	4	1/-/-	4

(55003) ENGINEERING GEOLOGY

UNIT – I INTRODUCTION: Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

WEATHERING OF ROCKS : Its effect over the properties of rocks importance of weathering with REFERENCE to dams, reservoirs and tunnels weathering of common rock like "Granite"

UNIT – II MINERALOGY : Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties.Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldsper , Quartz , Flint , Jasper, Olivine , Augite , Hornblende , Muscovite , Biotite , Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite , Magnetite, Chrorite , Galena , Pyrolusite , Graphite, Magnesite, and Bauxite.

UNIT – III PETROLOGY : Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of igneous. Sedimentary and metamorphic rocks. Their distinguishing features, Megascopic and microscopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate. Rock excavation, stone aggregates.

UNIT – IV STRUCTURAL GEOLOGY : Indian stratigraphy, and geological time scale, Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints - their important types.

UNIT – V Geophysical studies: Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal

method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc. Fundamental aspects of Rock mechanics and Environmental Geology.

UNIT – VI GEOLOGY OF DAMS AND RESERVOIRS : Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factors Contributing to the success of a reservoir. Geological factors influencing water tightness and life of reservoirs, Geo hazards, ground subsidence.

UNIT – VII Ground water: Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Land slides, land slides hazards, water in land slides their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, Earthquake and landslides.

UNIT – VIII TUNNELS : Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (lithological, structural and ground water) in tunneling over break and lining in tunnels, Tunnels in rock, subsidence over old mines , minining substances

TEXT BOOKS:

1) Principals of Engineering Geology by K.V.G.K. Gokhale – B.S publications
2) Engineering Geology by N.Chennkesavulu, Mac-Millan, Publishers 2nd Edition India Ltd. 2010.
3) Engineering Geology by D. Venkat Reddy, Vikas Publications

REFERENCES:

1. F.G. Bell, Fundamental of Engineering Geology Butterworths, Publications, New Delhi, 1992.
2. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution,
3. Fundations of Engineering Geology – Tony Waltham – Spon press/ Cry press Taylor & Francis.

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III Year B.Tech. C.E. I –Sem L T/P/D C 3 1/-/- 3

(55004) GEOTECHNICAL ENGINEERING - I

UNIT – I

INTRODUCTION: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship – Relative density.

UNIT - II

INDEX PROPERTIES OF SOILS: Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – I.S. Classification of soils.

UNIT –III

PERMEABILITY: Soil water – capillary rise – flow of water through soils – Darcy's law- permeability – Factors affecting permeability – laboratory determination of coefficient of permeability –Permeability of layered soils – Insitu permeability tests (Pumping in & Pumping out test).

UNIT - IV

EFFECTIVE STRESS & SEEPAGE THROUGH SOILS: Total, neutral and effective stress – principle of effective stress - quick sand condition – Seepage through soils – Flownets: Characteristics and Uses.

UNIT – V

STRESS DISTRIBUTION IN SOILS: Boussinesq's and Westergaard's theories for point load, uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under point load along the vertical and horizontal plane, and Newmark's influence chart for irregular areas.

UNIT – VI

COMPACTION: Mechanism of compaction – factors affecting compaction – effects of compaction on soil properties – Field compaction Equipment – compaction quality control.

UNIT - VII

CONSOLIDATION: Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log p curves – normally consolidated soil, over consolidated soil

and under consolidated soil - preconsolidation pressure and its determination - Terzaghi's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods.

UNIT - VIII

SHEAR STRENGTH OF SOILS: Importance of shear strength – Mohr's–Coulomb Failure theories – Types of laboratory strength tests – strength tests based on drainage conditions – Shear strength of sands - dilatancy – Critical Void Ratio – Liquefaction- shear strength of clays.

TEXT BOOKS:

1 Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt. Ltd, New Delhi

2. Principals of Geotechnical Engineering by Braja M.Das, Cengage Learning Publishers.

3. Geotechnical Engineering : Principles and practices of soil mechanics and foundation Engineering by VNS Murthy, Taylor & Francis Group.

REFERENCES:

1. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).

2. Soil Mechanics.– T.W. Lambe and Whitman, Mc-Graw Hill Publishing Company, Newyork.

3. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.

4. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.

5. Soil Mechanics and Foundation by by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

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III Year B.Tech. C.E. I –Sem	L	T/P/D	C
	3	1/-/-	3

(55005) WATER RESOURCES ENGINEERING-I

UNIT I

Introduction to engineering hydrology and its applications, Hydrologic cycle, types and forms of precipitation, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, processing of rainfall data - Adjustment of record -Rainfall Double Mass Curve. Runoff- Factors affecting Runoff – Runoff over a Catchment- Empirical and Rational Formulae.

UNIT-II

Abstraction from rainfall-evaporation, factors affecting evaporation, measurement of evaporation- Evapotranspiration- Penman and Blaney & Criddle Methods -Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices..

UNIT-III

Distribution of Runoff – Hydrograph Analysis Flood Hydrograph – Effective Rainfall – Base Flow- Base Flow Separation - Direct Runoff Hydrograph - Unit Hydrograph, definition, and limitations of applications of Unit hydrograph, derivation of Unit Hydrograph from Direct Runoff Hydrograph and vice versa - S-hydrograph, Synthetic Unit Hydrograph.

UNIT-IV

Ground water Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, Darcy's law, radial flow to wells in confined and unconfined aquifers. Types of wells,- Well Construction – Well Development.

UNIT-V

Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, Indian agricultural soils, methods of improving soil fertility –Crop Roation, preparation of land for Irrigation, standards of quality for Irrigation water.

UNIT-VI

Soil-water-plant relationship, vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, Duty and delta, factors affecting duty- Design discharge for a water course.Depth and frequency of Irrigation, irrigation efficiencies-Water Logging.

UNIT-VII

Classification of canals, Design of Irrigation canals by Kennedy's and Lacey's theories, balancing depth of cutting, IS standards for a canal design canal lining.

UNIT - VIII

Design Discharge over a catchment, Computation of design discharge-rational formula, SCS curve number method, flood frequency analysis-Introductory Part only. Stream Gauging – measurement and estimation of stream flow.

TEXT BOOKS:

1. Engineering Hydrology by Jayaram Reddy, Laxmi publications pvt. Ltd., New Delhi
2. Irrigation and water power engineering by Punmia & Lal, Laxmi publications pvt. Ltd., New Delhi

REFERENCES:

1. Elementary hydrology by V.P.Singh, PHI publications.
2. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House.
3. Irrigation Water Management by D.K. Majundar, Printice Hall of India.
4. Irrigation and Hydraulic structures by S.K.Grag.
5. Applied hydrology by Ven Te Chow, David R. Maidment larry W. Mays Tata MC. Graw Hill.
6. Introduction to hydrology by Warren Viessvann, Jr, Garyl. Lewis, PHI

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III Year B.Tech. C.E. I –Sem	L	T/P/D	C
	4	-/-/-	4

(55006) WASTE MANAGEMENT (ELECTIVE-I)

UNIT – I

Quality requirements of boiler and cooling waters – Quality requirements of process water for Textiles – Food processing and Brewery Industries – Boiler and Cooling water treatment methods.

UNIT – II

Basic Theories of Industrial Waste water Management – Volume reduction – Strength reduction – Neutralization – Equalization and proportioning. Joint treatment of industrial wastes and domestic sewage – consequent problems.

UNIT – III

Industrial waste water discharges into streams, Lakes and oceans and problems.

UNIT - IV

Recirculation of Industrial Wastes – Use of Municipal Waste Water in Industries.

UNIT – V

Manufacturing Process and design origin of liquid waste from Textiles, Paper and Pulp industries, Thermal Power Plants and Tanneries, Special Characteristics, Effects and treatment methods.

UNIT - VI

Manufacturing Process and design origin of liquid waste from Fertilizers, Distillers, and Dairy, Special Characteristics, Effects and treatment methods.

UNIT - VII

Manufacturing Process and design origin of liquid waste from Suger Mills, Steel Plants, Oil Refineries, and Pharmaceutical Plants, Special Characteristics, Effects and treatment methods.

UNIT – VIII

Common Effluent Treatment Plants – Advantages and Suitability, Limitations, Effluent Disposal Methods.

TEXT BOOK:

1. Waste Water Treatment by M.N. Rao and Dutta, Oxford & IBH, New Delhi.

REFERENCES:

1. Liquid waste of Industry by Newmerow.
2. Water and Waste Water technology by Mark J. Hammer and Mark J. Hammer (Jr).

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III Year B.Tech. C.E. I –Sem	L	T/P/D	C
	4	-/-/-	4

(55007) ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT (ELECTIVE-I)

UNIT – I

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

UNIT – II

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/ benefit Analysis.

UNIT – III

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives.

UNIT-IV

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

UNIT-V

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures.

UNIT - VI

E I A of surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

UNIT – VII

Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocel, stages

of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report, Post Audit activities.

UNIT - VIII

The Environmental Protection Act, The water Act, The Air (Prevention & Control of pollution Act.), Motor Act, Wild life Act.

Case studies and preparation of Environmental Impact assessment statement for various Industries.

TEXT BOOKS:

1. Environmental Impact Assessment & Management . Publisher: Daya Author: B B Hosetti, A Kumar
2. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.
3. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers

REFERENCES:

1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katania & Sons Publication., New Delhi.
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi

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III Year B.Tech. C.E. I –Sem	L	T/P/D	C
	4	-/-/-	4

(55008) ADVANCED STRUCTURAL ANALYSIS (ELECTIVE-I)

UNIT – I
Moment distribution material – Application to the analysis of portal frames with inclined legs and gable frames.

UNIT – II
Kani's method – application to continuous beam – portal frames (upto single bay two storages)

UNIT – III
Plastic analysis – I – Ductility – ultimate load – plastic hinger – shape factor – moment curvature relations – upper and lover band the…

UNIT – IV
Plastic Analysis – II – Plastic Analysis beam – portal frames – mechanism – portat survey mechanics.

UNIT – V
Analysis of building frames by substitute frame – upto five bays method.

UNIT – VI
Analysis of frames for lateral force – portal and cantilever method.

UNIT – VII
Introduction to Finite Element method – Application to one dimensional elements – shape function – lagrangian serendipity elements.

UNIT – VIII
Introduction to Structural dynamics declaimer's principle – Free vibration – single degrtee of freedom – Eagleville – Eign veetour.

TEXT BOOKS
1. Theory of Structures by B.C. Punmia, Jain, Ashok Kumar Jain Arun Kumar Jain.
2. Finite Element Analysis – S. S. Bhavikathi, New age International Publication, 2010

REFERENCES
1. Analysis of Structures – T. S. Thandavamurthy, Oxford University Press – 2009.
2. Basic of Structural dynamics nad Seismic design/ S.R. Damodara swamy and S. Kavitha. – PHI, 2010

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III Year B.Tech. C.E. I –Sem	L	T/P/D	C
	0	-/3/-	2

(55600) FLUID MECHANICS & HYDRAULIC MACHINERY LAB

1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice / mouthpiece by constant head method.
3. Calibration of contracted Rectangular Notch and / Triangular Notch
4. Determination of friction factor of a pipe.
5. Determination of Coefficient for minor losses.
6. Verification of Bernoulli's equation.
7. Impact of jet on vanes
8. Study of Hydraulic jump.
9. Performance test on Pelton wheel turbine
10. Performance test on Francis turbine.
11. Performance characteristics of a single stage/ multi-stage centrifugal pump.
12. Performance characteristics of a reciprocating pump.

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III Year B.Tech. C.E. I –Sem	L	T/P/D	C
	0	-/3/-	2

(55601) ENGINEERING GEOLOGY LAB

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic and microscopic description and identification of rocks referred under theory.
3. Megascopic and microscopic identification of rocks & minerals.
4. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
5. Simple Structural Geology problems.

LAB EXAMINATION PATTERN:

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.

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III Year B.Tech. C.E. II –Sem	L	T/P/D	C
	3	-/2-/-	4

(56001) DESIGN OF STEEL STRUCTURES

UNIT – I

Materials – Making of iron and steel – types of structural steel – mechanical properties of steel – Concepts of plasticity – yield strength. Loads – and combinations local buckling behavior of steel. Concept of limit State Design – Limit States – Design Strengths- deflection limits – serviceability – stability check.

UNIT – II

Bolted connections – Riveted connections – IS – 800 – 2007 - specifications – Design strength – efficiency of joint – prying action. Welded connections – Types of welded joints – specifications - design requirements.

UNIT – III

Design of tension members– Design strength – Design procedure splice - lug angle.

UNIT – IV

Design of compress in members – Buckling class – slenderness ratio / strength design – laced – battened columns – splice – column base – slab /

UNIT – V

Design of Beamss – Plastic moment – Bending and shear strength / buckling – Builtup sections – laterally / supported beams.

UNIT – VI

Design of eccentric connections – Framed – stiffened / seat connection.

UNIT – VII

Design of plate girders – elements – economical depth – design of maint section – connections between web and flange – design of stiffness bearing – intermediate stiffeners – Design of Websplica & Flange splica.