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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., Act. No. 30 of 2008)
ANANTHAPURAMU – 515 002 (A.P.) INDIA.

Course Structure for B.Tech-R15 Regulations

Civil Engineering

B.Tech III-I Semester (C.E)

S. No.	Course Code	Subject	L	T	P	C
1.	15A01501	Design and Drawing of RCC Structures	3	1	-	3
2.	15A01502	Estimation, Costing and Valuation	3	1	-	3
3.	15A01503	Geotechnical Engineering – I	3	1	-	3
4.	15A01504	Engineering Geology	3	1	-	3
5.	15A01505	Structural Analysis – II	3	1	-	3
6.	15A01506 15A01507	MOOCS-I* 1. Cost Effective Housing Techniques 2. Water Harvesting and Conservation	3	1	-	3
7.	15A01508	Engineering Geology Laboratory	-	-	4	2
8.	15A01509	Geotechnical Engineering Laboratory	-	-	4	2
9.	15A99501	Audit course - Social Values & Ethics	2	0	2	0
Total:			20	6	10	22

R15**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR****B. Tech III-I Sem. (C.E)**

L	T	P	C
3	1	0	3

15A01501 DESIGN & DRAWING OF RCC STRUCTURES

Course Objective: To teach and familiarize the students with the design of various RCC structural elements and to draw them so that they can be implemented in field

UNIT –I

Concepts of RCC Design –Introduction to Working stress method - Limit State method – Material Stress- Strain Curves – Safety factors – Characteristic values. Stress Block parameters – IS: 456 – 2000.

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

UNIT – II

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

UNIT - III

Design of Two-way slabs, one way slab and continuous slab Using I S Coefficients, Cantilever slab /Canopy slab.

UNIT –IV

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

UNIT – V

Design of Footings - isolated (square, rectangular) and Combined footings. Design of Stair case – Dog legged and Open well.

NOTE : All the designs to be taught in Limit State Method

Following plates should be prepared by the students.

1. Reinforcement particulars of T-beams and L-beams.
2. Reinforcement detailing of continuous beams.
3. Reinforcement particulars of columns and footings.
4. Detailing of One way, two way and continuous slabs

R15**FINAL EXAMINATION PATTERN:**

The end examination paper should consist of Part A and Part B. Part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXT BOOKS:

1. Design of Reinforced Concrete Structures by K.Subramanian , Oxford University press India.
2. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishers, New Delhi
3. Limit State Design of Reinforced Concrete by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

REFERENCES :

1. Design of RCC Structures by M.L.Gambhir P.H.I. Publications, New Delhi.
2. Limit State Design of RCC Structures – P.C.Varghese, Printice Hall of India, New Delhi
3. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad
4. Reinforced Concrete Design by Pillai & Menon, TMH Publishers.
5. Analysis of Skeletal Structures by Seetharamulu Kaveti, TMH publications.

Codes/Tables: IS 456-2000 and IS-800 code books to be permitted into the examinations Hall.

Course Outcomes:

After completing the course, the student

1. *Will be able to understand the basic concepts of reinforced concrete analysis and design.*
2. *Will be able to understand the behavior and various modes of failure of reinforced concrete members.*
3. *Will be able to analyze and design various reinforced concrete members such as beams, columns, footings and slabs*

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	3	1	0	3
15A01502	ESTIMATION, COSTING AND VALUATION			

Course Objective: The objective of the course is to make the student to understand about estimation of quantities and valuations of different types of structures as per standard schedule of rates.

UNIT – I

INTRODUCTION : General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating. **STANDARDS SPECIFICATIONS :** Standard specifications for different items of building construction

UNIT – II

ESTIMATION OF BUILDINGS : Detailed Estimates of Buildings

UNIT – III

EARTHWORK ESTIMATION : Earthwork for roads and canals.

REINFORCEMENT ESTIMATION : Reinforcement bar bending and bar requirement schedules.

UNIT – IV

CONTRACTS AND TENDERS : Contracts – Types of contracts – Contract Documents – Conditions of contract – Types of Tenders – Requirement of Tendering.

UNIT – V

RATE ANALYSIS : Working out data for various items of work over head and contingent charges.

VALUATION : Valuation of buildings.

TEXT BOOKS

1. Estimating and Costing, 27th revised edition by B.N. Dutta, UBS publishers, 2000.
2. Civil Engineering Contracts and Estimations, 4th edition by B.S.Patil, Universities Press, Hyderabad.

R15**REFERENCES :**

1. Engineering Construction Cost 6th edition by Peurifoy, TMH Publications
2. Estimation, Costing and Specifications by M. Chakraborti; Laxmi publications. Standard Schedule of Rates and Standard Data Book by Public Works Department.
3. I. S. 1200 (Parts I to XXV – 1974/ Method of Measurement of Building and Civil Engineering works – B.I.S.)
4. National Building Code

Note : Standard schedule of rates is permitted in the examination hall.

Course outcomes:

On completion of the course, the students will be able to:

1. *apply different types of estimates for different building elements*
2. *carry out analysis of rates and bill preparation different building elements*
3. *understand the concepts of specification writing*
4. *carry out valuation of assets*

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15A01503 GEOTECHNICAL ENGINEERING – I

Course Objective: The objective of this course is to make the student to understand the behaviour of soil under different loads and different conditions. This is necessary because the safety of any structure depends on soil on which it is going to be constructed.

UNIT – I

INTRODUCTION: Soil formation – Soil structure and clay mineralogy – Mass– volume relationship – Relative density.

INDEX PROPERTIES OF SOILS: Moisture Content, Specific Gravity, Insitu density, Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – I.S. Classification of soils

UNIT –II

PERMEABILITY: Soil water – capillary rise – Adsorbed water – flow of water through soils – Darcy's law- Permeability – Factors affecting permeability – laboratory determination of coefficient of permeability –Permeability of layered soils.

SEEPAGE THROUGH SOILS: Total, neutral and effective stresses –quick sand condition – Seepage through soils – Flow nets: Characteristics and Uses.

UNIT – III

STRESS DISTRIBUTION IN SOILS: Boussinesq's and Westergaard's theories for point loads and areas of different shapes – Newmark's influence chart.

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

UNIT – IV

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

R15**UNIT – V**

SHEAR STRENGTH OF SOILS : Importance of shear strength – Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelopes – Shear strength of sands - dilatancy – critical void ratio – Liquefaction- shear strength of clays.

TEXT BOOKS:

1. Soil Mechanics and Foundation Engineering By K.R. Arora, Standard Publishers and Distributors, Delhi.
2. Geotechnical Engineering by C. Venkataramiah, New Age International Pvt . Ltd, (2002).

REFERENCES:

1. Soil Mechanics and Foundations by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
2. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New Age International Pvt .Ltd, New Delhi.
3. Advanced Soil Mechanics by Braja M.Das, CRC press.
4. Geotechnical Engineering by Debashis Moitra, Universities press

Course Outcomes:

On completion of the course, the students will be able to:

1. *carry out soil classification*
2. *solve any practical problems related to soil stresses estimation, permeability and seepage including flow net diagram*
3. *estimate the stresses under any system of foundation loads solve practical problems related to consolidation settlement and time rate of settlement*

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15A01504 ENGINEERING GEOLOGY

Course Objectives: The objectives of this **course** is to give the basic knowledge of Geology that is required for construction of various Civil Engineering Structures. The syllabus includes the basics of Geology and gives a suitable picture on the Geological aspects that are to be considered for the planning and construction of major Civil Engineering projects.

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 drawbacks. 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"

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: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economic minerals such as Pyrite, Hematite, Magnetite, Chrochite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite.

UNIT – II
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 study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

R15**STRUCTURAL GEOLOGY :**

Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults un conformities, and joints – their important types. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India

UNIT – III**GROUND WATER ,EARTH QUAKE &LAND SLIDES:-**

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, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and land slides.

UNIT –IV**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.

UNIT – V**GEOLOGY OF DAMS ,RESERVOIRS AND TUNNELS :**

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. Factor's Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs. Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (ie. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

TEXT BOOKS:

- 1) Engineering Geology by N.Chennkesavulu, Mc-Millan, India Ltd. 2005
- 2) Engineering Geology by Vasudev Kanthi, Universities Press, Hyderabad.

REFERENCES:

1. Engineering Geology by Duggal.S.K., TMH Publishers.
2. Engineering Geology by Subinoy Gangopadhyay, Oxford University Press.
3. Engineering Geology by Prabin Singh, Katson Pubilcations
4. Principls of Engineering Geology by K.V.G.K. Gokhale – B.S publications

R15**Course Outcomes: On completion of this course**

1. *The students will have the knowledge of principles of engineering geology.*
2. *The students will have the knowledge of properties of various rocks and minerals*
3. *The students will be able to judge the suitability of sites for various civil engineering structures.*
4. *The students will exhibit the ability to use the knowledge of geological strata in the analysis and design the civil engineering structures.*
5. *The students will have the knowledge for deciding the suitability of water and soil conservation projects.*

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15A01505 STRUCTURAL ANALYSIS – II

Course Objective: Indeterminate structures are subjected to different loadings with different support conditions; hence it is necessary to study the behaviour of the structures. This course teaches the student how to apply different analysis methods in determining the structural parameters in elements like beams and columns

UNIT I

ARCHES : Three hinged arches, Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature-Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, tied arches – fixed arches – (No analytical question).

UNIT-II

SLOPE-DEFLECTION & MOMENT DISTRIBUTION METHOD:- Analysis of single bay, single storey, portal frame including side sway– Stiffness and carry over factors – Distribution factors – Analysis of single storey portal frames – including Sway - Substitute frame analysis by two cycle method.

UNIT – III
KANI'S METHOD:-

Analysis of continuous beams – including settlement of supports and single bay, single storey portal frames with side sway by Kani's method.

UNIT – IV
FLEXIBILITY & STIFFNESS METHODS:-

Flexibility methods, Introduction, application to continuous beams including support settlements-Introduction to stiffness method and its application application to continuous beams including support settlements.

UNIT – V
PLASTIC ANALYSIS:

Introduction – Idealized stress – Strain diagram – shape factors for various sections – Moment curvature relationship – ultimate moment – Plastic hinge – lower and upper bound theorems – ultimate strength of fixed and continuous beams.

R15**TEXT BOOKS:**

1. Structural Analysis – I by Dr.Hemant Patil, Dr.Yogesh Patil and Jignesh Patil by Synergy Knowledge ware publications, Mumbai.
2. Structural Analysis , 5th Edition by Aslam Kassimali, Cengage Publishers.
3. Analysis of structures by Vazrani & Ratwani – Khanna Publications.

REFERENCES :

1. Structural Analysis – D.S.Prakasa rao - Univeristy Press, Hyderabad
2. Basic Structural Analysis by K.U.Muthu *et al.*, I.K.International Publishing House Pvt.Ltd
3. Theory of structures by Ramamuratam, Jain book depot , New Delhi.
4. Structural Analysis (Matrix Approach) by Pundit and Gupta – Tata Mc-Graw Hill publishers.
5. Structural Analysis by R.S.Khurmi, S.Chand Publications, New Delhi.

Course Outcomes:

On completion of the course, the students will be able to:

1. *Apply the methods of indeterminate truss analysis*
2. *Analyse the behaviour of arches through different methods of analysis*
3. *Use various classical methods for analysis of indeterminate structures*
4. *Determine the effect of support settlements for indeterminate structures*
5. *Able to analyze the beam and frames for vertical and horizontal loads and draw SFD and BMD.*
6. *Able to calculate forces in members of truss due to load by stiffness method.*

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**15A01506 COST EFFECTIVE HOUSING TECHNIQUES
(MOOCS – I)**

Course Objectives: The objective of the course is to train the students to have a comprehensive knowledge of planning, design, evaluation, construction and financing of housing projects. The course focuses on cost effective construction materials and methods. Emphasis is given on the principles of sustainable housing policies and programmes.

UNIT – I:-
INTRODUCTION TO HOUSING

Definition of Basic Terms – House, Home, Household, Apartments, Multi storied Buildings, Special Buildings, Objectives and Strategies of National Housing Policies including Slum Housing Policy, Principle of Sustainable Housing – Integrated approach on arriving holding capacity and density norms - All basic infrastructure consideration - Institutions for Housing at National, State and Local levels.

UNIT – II:-
HOUSING PROGRAMMES

Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighborhoods- Plotted land development programs, Open Development Plots, Apartments, Gated communities, Townships, Rental Housing, Co-operative Housing, Slum Housing Programmes – Slum improvement – Slum redevelopment and Relocation – Use of GIS and MIS in Slum Housing Projects,, Role of Public housing agencies, and Private sector in supply , quality, infrastructure and pricing – Role of Non-Government Organizations in slum housing.

UNIT – III:-DEVELOPMENT AND ADOPTION OF LOW COST HOUSING
TECHNOLOGY:

Introduction - Adoption of innovative cost effective construction techniques - Adoption of precast elements - Adopting of total prefabrication of mass housing in India- General remarks on pre cast roofing/flooring systems -Economical wall system - Single Brick thick loading bearing wall - 19cm thick load bearing masonry walls - Half brick thick load bearing wall - Fly ash gypsum thick for masonry - Stone Block masonry - Adoption of precast R.C. plank and join system for roof/floor in the building

R15**UNIT – IV:-****ALTERNATIVE BUILDING MATERIALS FOR LOW COST HOUSING AND INFRASTRUCTURE SERVICES IN RURAL HOUSES:-**

Introduction - Substitute for scarce materials – Ferrocement - Gypsum boards - Timber substitutions - Industrial wastes - Agricultural wastes - Low cost Infrastructure services: Introduce - Present status - Technological options - Low cost sanitation - Domestic wall - Water supply, energy. Rural Housing: Introduction traditional practice of rural housing continuous - Mud Housing technology-Mud roofs - Characteristics of mud - Fire treatment for thatch roof - Soil stabilization - Rural Housing programs

UNIT – V:-**HOUSING IN DISASTER PRONE AREAS:**

Introduction – Earthquake - Damages to houses - Traditional prone areas - Type of Damages and Repairs of non-engineered buildings - Repair and restore action of earthquake Damaged non-engineered buildings recommendations for future constructions. Requirement's of structural safety of thin pre-cast roofing units against Earthquake forces -Status of R& D in earthquake strengthening measures - Floods, cyclone, future safety

TEXT BOOKS

1. Hand book of Low Cost Housing by A.K.Lal – New Age International publishers.
2. Low Cost Housing – G.C. Mathur, IBH Publishers.
3. Housing in India by Francis Cherunilam and Odeyar D Heggade, Himalaya Publishing House, Bombay, 1997.

REFERENCES:-

1. Disaster Management by Rajib Shaw, Universities Press, India.
2. Disaster Science and Management by Tushar Bhattacharya, TMH Publications.
3. Building Materials For Low –Income Houses – International Council For Building Research Studies And Documentation.
4. Modern Trends In Housing In Developing Countries – A.G. Madhava Rao, D.S. Ramachandra Murthy & G.Annamalai.
5. Properties of Concrete – Neville A.M. Pitman Publishing Limited, London.
6. Light Weight Concrete, Academic Kiado, Rudhai.G – Publishing home of Hungarian Academy of Sciences 1963.

R15**Course Outcomes:**

The students will have a comprehensive knowledge of planning, design, evaluation, construction and financing of housing projects with cost effective housing techniques. The student can be in a position to adopt the suitable techniques in rural and disaster prone areas by using locally available materials.

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	3	1	0	3
15A01507 WATER HARVESTING AND CONSERVATION				
(MOOCS – I)				

Course Objectives: The course aims at bringing awareness about the need for conservation of Water. The student will be taught different methods of Water Harvesting and also the methods of Water Conservation. He will also learn the principles of Watershed Management.

UNIT – I

Origin, Occurrence & Movement of Groundwater: -Introduction-sources of ground water – Hydro geological Cycle – Infiltration – natural openings in rocks – zones of aeration, saturation and water table – classification of ground water – laboratory and field methods of sampling ground water- aquifers – aquifuges- aquicludes – aquitards – ill effects due to lowering of water table -Artificial recharge.

UNIT – II

Water Harvesting: Principles of water harvesting-methods of rainwater harvesting-design of rainwater harvesting structures-Purification Techniques for direct use-Harvesting of surface runoff-on-site detention basin - ponds - types - Recycling of harvested water

UNIT – III

Water Recovery and Reuse: Perspective on recycle and reuse- factors affecting the development of water reclamation and reuse criteria- elements/components of water reclamation and reuse criteria / guidelines- sewage irrigation- Waste water reclamation-waste water recharge for reuse – Treatment Requirements for Water Reuse-methods.

UNIT – IV

Sustainable Watershed Approach & Watershed Management Practices: Concept of watershed-Introduction to watershed management- Integrated water resources management- natural resources management-agricultural practices-integrated farming-Conjunctive use of water resources-Community participation-Watershed Management Practices in Arid and Semiarid Regions-Case studies-Short term and long term strategic planning.

R15**UNIT – V**

Soil and Water Conservation: Scope of soil and water conservation-Mechanics and types of erosion-their causes-Soil erosion control measures - bank protection-vegetative barriers-contour bund- contour trenches-contour stone walls-contour ditches-terraces-outlets and grassed waterways-Gully control structures - temporary and permanent - design of permanent soil conservation structures-Design of farm ponds and percolation ponds.

Text books:

1. Watershed Management by Murty, J.V.S, New Age Intl., New Delhi .
2. Water Resources Conservation and Management by Chatterjee, S. N., Atlantic Publishers.
3. Ground Water by S.Ramakrishnan, SCITECH Publishers.

Reference books:

1. Advances in Soil and Water Conservation by Pierce, F.J. and Frye, W. W. (1998); Ann Arbor Press, Michigan.
2. Soil and Water Conservation Engineering, 4th Ed. By Schwab, G. O., Fangmeier, D. D., Elliot, W. J. and Frevert, R. K. (1993), John Wiley and Sons Inc., USA
3. Watershed Management in India by Murthy, J.V.S., Wiley Eastern, New Delhi, 1994 .
4. Irrigation Water Management - Principles and Practice by Dilip Kumar Majumdar,, PHI Pvt.Ltd.NewDelhi-1.
5. Irrigation and Water Power Engineering by Madan Mohan Das & Mimi Das Saikia, PHI learning Pvt. Ltd., NewDelhi-1

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

- a) *Appreciate the importance of Water Conservation*
- b) *Understand the methods of Water Harvesting*
- c) *Understand the principles of Watershed Management and its importance in sustainability*

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15A01508 ENGINEERING GEOLOGY LABORATORY

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

Text Books:-

1. Elementary Exercises in Geology by CVRK Prasad, Universities press.

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15A01509 GEOTECHNICAL ENGINEERING LABORATORY

Course Objective: To obtain the properties of soils by conducting experiments, it is necessary for students to understand the behavior of soil under various loads and conditions.

LIST OF EXPERIMENTS

1. Atterberg's Limits.
2. Field density-core cutter and sand replacement method
3. Grain size analysis
4. Permeability of soil, constant and variable head test
5. Compaction test
6. CBR Test
7. Consolidation test
8. Unconfined compression test
9. Tri-axial Compression test
10. Direct shear test.
11. Vane shear test

Any eight experiments may be completed.

LIST OF EQUIPMENT:

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and Shrinkage limits
3. Field Density apparatus for
 - a) Core cutter method
 - b) Sand Replacement method
4. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 0.15mm, and 0.075mm.
5. Hydrometer
6. Permeability Apparatus for
 - a) Constant Head test
 - b) Variable Head test
7. Universal Auto compactor for I.S light and heavy compaction tests.
8. Apparatus for CBR test
9. Sampling tubes and sample extractors.

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11. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
12. One dimensional consolidation test apparatus with all accessories.
13. Tri-axial cell with provision for accommodating 38 mm dia specimens.
14. Box shear test apparatus
15. Laboratory vane shear apparatus.
16. Hot Air ovens (Range of Temperature 50-150°C)
17. Moisture cans – 2 dozens.
18. Electronic balances of 500 g capacity with 0.01g least count and 5 kg capacity with least count of 1gm
19. Measuring Jars - 1000CC- 6
 - 100CC- 4
20. Mercury - 500 g
21. Rammers - 2
 Crow bars - 2

TEXT BOOKS:

1. Soil Testing Lab Manual by K.V.S. Appa Rao & V.C.C. Rao, University Science Press, Laxmi Publication.
2. Soil Testing for Engineers by S.Mittal and J.P.Shukla, Kahna Publishers, New Delhi.
3. Relevant IS Codes.

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15A99501 SOCIAL VALUES & ETHICS (AUDIT COURSE)
(Common to all Branches)
UNIT - I

Introduction and Basic Concepts of Society: Family and Society: Concept of family, community, PRIs and other community based organizations and society, growing up in the family – dynamics and impact, Human values, Gender Justice.

Channels of Youth Moments for National Building: NSS & NCC: History, philosophy, aims & objectives; Emblems, flags, mottos, songs, badge etc.; Organizational structure, roles and responsibilities of various NSS functionaries. **Nehru Yuva Kendra (NYK):** Activities – Socio Cultural and Sports.

UNIT – II

Activities of NSS, NCC, NYK:

Citizenship: Basic Features Constitution of India, Fundamental Rights and Fundamental Duties, Human Rights, Consumer awareness and the legal rights of the consumer, RTI.

Youth and Crime: Sociological and psychological Factors influencing youth crime, Peer Mentoring in preventing crimes, Awareness about Anti-Ragging, Cyber Crime and its prevention, Juvenile Justice

Social Harmony and National Integration: Indian history and culture, Role of youth in peace-building and conflict resolution, Role of youth in Nation building.

UNIT – III

Environment Issues: Environment conservation, enrichment and Sustainability, Climate change, Waste management, Natural resource management (Rain water harvesting, energy conservation, waste land development, soil conservations and afforestation).

Health, Hygiene & Sanitation: Definition, needs and scope of health education, Food and Nutrition, Safe drinking water, Sanitation, Swachh Bharat Abhiyan.

Disaster Management: Introduction to Disaster Management, classification of disasters, Role of youth in Disaster Management. Home Nursing, First Aid.

Civil/ Self Defense: Civil defense services, aims and objectives of civil defense, Need for self defense training – Teakwondo, Judo, karate etc.,

R15**UNIT – IV**

Gender Sensitization: Understanding Gender – Gender inequality – Role of Family, Society and State; Challenges – Declining Sex Ratio – Sexual Harassment – Domestic Violence; Gender Equality – Initiatives of Government – Schemes, Law; Initiatives of NGOs – Awareness, Movements;

UNIT - V

Physical Education : Games & Sports: Health and Recreation – Biological basis of Physical activity – benefits of exercise – Physical, Psychological, Social; Physiology of Muscular Activity, Respiration, Blood Circulation.

Yoga: Basics of Yoga – Yoga Protocol, Postures, Asanas, Pranayama: Introduction of Kriyas, Bandhas and Mudras.

TEXT BOOKS:

1. NSS MANUAL
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