



MANIPAL UNIVERSITY JAIPUR
Department of Civil Engineering

ANNEXURE I

Vision

Global Competency in Civil Engineering Education and Research for Societal Development.

Mission

- i. Enhance the fundamental knowledge of Civil Engineering principles along with advance technologies to meet industry requirements.
- ii. Encourage experiential learning, inter-disciplinary research, and innovation to foster sustainable development.
- iii. Nurture leadership and entrepreneurship skills with professional ethics and good human values.



MANIPAL UNIVERSITY JAIPUR
Department of Civil Engineering

ANNEXURE II

Program Educational Objectives

- PEO 1 Graduates will apply scientific knowledge and civil engineering principles for analyzing, designing, and executing complex societal, cultural, and environmental problems.
- PEO 2 Graduates will manage projects using modern tools and techniques with effective communication skills and professional ethics for sustainable development.
- PEO 3 Graduates will exhibit entrepreneurship skills and engage in life-long learning.

Program Specific Outcomes

- PSO 1 Investigation, analysis, modeling, and management of complex civil engineering problems.
- PSO 2 Design and performance evaluation of civil engineering structures.
- PSO 3 Design and develop sustainable construction materials and waste management techniques.



PROGRAM OUTCOMES (PO) AND PROGRAM SPECIFIC OUTCOMES (PSO)

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

[PSO.1]. Design economic, environment friendly, sustainable civil engineering structures keeping in view national and social requirements.

[PSO.2]. Conduct investigation, analysis and interpretation of the results using modern scientific tools and technical skills for solving complex civil engineering problem.

[PSO.3]. Manage/ execute civil engineering projects effectively and ethically as a member or/and leader in diverse teams.

[PSO.4]. Communicate effectively with multidisciplinary members with discharge of social responsibilities as a civil engineer and engage in independent and lifelong learning for global betterment.



MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering Estimating, Costing and Valuation | CV1701 | 4 Credits | 3 1 0 4

Session: August 20 – December 20 | Faculty: Firoz Alam Faroque | Class: Core Course

A. Course Outcomes: At the end of the course, students will be able to:

- [1701.1] Apply the knowledge of mathematics and engineering fundamentals in estimation of a building
- [1701.2] Perform rate analysis under various existing conditions
- [1701.3] Understand the basics of Estimation and valuation and able to bid for tenders
- [1701.4] Analyse and understand various contracts documents and take decisions accordingly
- [1701.5] Estimate the value of property and formulate future investment plans which increase employability

E. Syllabus

Estimation :Introduction, Definition, Types of estimate, approximate estimate, Units of measurement :IS 1200, Work charged establishment, Plinth area, Carpet area. Estimate of building, doors and windows, RCC work, Different types of roof, Detailed specification for different components of the buildings. Rate Analysis :Purpose, Factors effecting, Overhead charges, Turn out of work, Rate analysis for different items of building; Contract-Functioning and organization of PWD; Tender and its notification, EMD and Security deposit; Contracts and Tenders:Contracts, Types of contract, Termination of contract, Work slip qualification of contractor, Responsibilities of engineer, owner, and contractor. Valuation : Purpose of valuation, Scrap value, Salvage value, Market value, Factors which affect the value, Sinking fund, Year's purchase, Depreciation, Calculation of standard rent.

F. Text Books

1. Dutta B.N., Estimating and Costing in Civil Engineering, UBS Publishers' Distributors Ltd. Sixteenth reprint, 2000.

G. Reference Books

1. Chakraborti M., Estimating, Costing, Specification & Valuation in Civil Engineering, Published by the Author, Sixteenth edition, 2003.

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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engg.

Engineering Course Hand-out

WATER RESOURCE ENGINEERING | CV 1702 | 4 Credits | 3 | 0 | 4

Session: 2020-21 (Odd) | Faculty: Dr. Parwez M. Akhtar | Class: B.Tech (VII)
(Semester)



A. Course Outcomes: At the end of the course, students will be able to:

[CV1702.1]. Apply knowledge of basic sciences and engineering to analyze water resources systems for socio-economic development articulating the professional solution

[CV1702.2]. Identify the sources of water and their characteristics for ensuring the sustainability pertaining to field application and inculcating employability skills

[CV1702.3]. Plan, design and compute different parameters for catchment and water resources system to provide real problem solution and contributing towards professional development and inculcating employability skills

[CV1702.4]. Analyze complex field situations and provide engineering solutions for water management and inculcating employability skills

[CV1702.5]. Analyze the planning, regulation and distribution of Catchment and water Resources System to simulate research and inculcating employability skills

B. SYLLABUS

Introduction: Scope and need of the subject, Available potential and present status of its utilization.

Hydrology: Definition and scope, Hydrologic cycle, Peak flows, rainfall and runoff process, infiltration, flood hydrograph, concept of unit hydrograph.

Irrigation Engineering: Necessity, benefits and ill effects of irrigation; soil water relationships; water requirements of crops; methods of irrigation; waterlogging and design of drainage system.

River Engineering: Basic concepts of resistance and sediment transport in rivers.

Canal Irrigation: Types of canals and their functions; parts of a canal system, preparation of canal project. Methods of design of stable channels – Lacey, Kennedy and Lane's methods; design of lined channel; L –sections and cross sections Types of structures on canal, design considerations from surface and sub-surface flows, Energy dissipation. Falls, cross- drainage works, cross and distributary head regulators.

Reservoir Planning: Purpose and types; investigations; reservoir capacity, reservoir sedimentation.

Design of Diversion and Storage works: Diversion head works; River training works; Dams- Gravity and earth dams their functions and basic principles of design.

C. TEXT BOOKS

1. Singh B., *Fundamentals of Irrigation Engineering*, Nem Chand & Bros, Roorkee, 9th Edn. 1997.

D. REFERENCE BOOKS

1. Modi P.N., *Water resources and Water Power Engineering*, Standard Book House Publications, Delhi 1988.
2. Varshney R.S., Gupta S.C. and Gupta R.L., *Theory and Design of Irrigation Structures, Vol. I, Channels and Tube Wells*, Nem Chand & Bros, 7 th Edn. 2000.
3. Varshney R.S., Gupta S.C. and Gupta R.L., *Theory and Design of Irrigation Structures, Vol.2, Canals and Storage Works*, Nem Chand & Bros, 6 th Edn. 1993.
4. Viessman and Knapp, *Introduction to Hydrology*, Harper and Row Publishers, Singapore 1989

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School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

Repair and Rehabilitation of Structures | CV1760| 3 Credits | 3 0 0 3

Session: August 2020 – December 2020 | Faculty: Mr. Raghuvesh Tiwari| Class: Department Elective

A. Course Outcomes: At the end of the course, students will be able to:

[CV 1760.1] Identify various type of flaws, damage, defects, moisture content, cover depth, rebar corrosion present in a concrete structure and apply his engineering skills to address the issue of distressing with all ethical professional engineering practice.

[CV 1760.2] Take critical engineering decisions to retrofitting and strengthening of existing structural elements and structures to improve life and performance to justify the suitability and economy of the existing construction projects.

[CV 1760.3] Communicate effectively with society/engineering community for all sort of maintenance issues of a structure and give/develop specific scientific solutions in the broadest context of technological advancements.

[CV 1760.4] Case studies will help them to work independently or in a group as a repair engineer for repair solution and testing as per the guidelines of Indian and international codes of standard, which can increase employability.

B. SYLLABUS

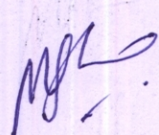
Introduction and terminology: Introduction, Maintenance, rehabilitation, repair, retrofit and strengthening, need for rehabilitation of structures. Distress and Deterioration in structures: Types of distress and deterioration in concrete structures, causes and effects. Assessment Techniques: Visual inspection, Non-Destructive and Semi Destructive Testing for assessing strength, voids, flaws, density, moisture content, cover depth, rebar corrosion and bond strength. Repair Methods and materials: material selection, compatibility between repair material and existing concrete, repair techniques for different types of structural elements and structures. Seismic evaluation and strengthening of existing reinforced concrete buildings. Retrofitting and strengthening of structural elements and structures. Case studies on distress, repair and rehabilitation of structures.

C. TEXT BOOKS

- P. K. Guha, Maintenance, and Repairs of Buildings, New Central Book Agency (P) Ltd, 2011.

D. REFERENCE BOOKS

1. D. C. Allen, H. Roper, Concrete Structures, Materials, Maintenance and Repair, Longman Scientific and Technical UK, 1991.
2. R. T. Allen, S. C. Edwards, Repair of Concrete Structures, Blakie and Sons, UK, 1987.
3. P. I. Modi, C. N. Patel, Repair and Rehabilitation of Concrete Structures, PHI Learning, India, 2015.
4. A. R. Santha kumar, Training Course notes on Damage Assessment and repair in Low Cost Housing, "RHDC-NBO" Anna University, July 1992.
5. IS 15988: 2013, Seismic evaluation and strengthening of existing reinforced concrete building – Guidelines.


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School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

Geographical Information System | CV 1690 | 3 Credits | 3 0 0 3

Session: January – May 2021 | Faculty: Dr Harshavardhana B G | Class: Open Elective

A. Course Outcomes: At the end of the course, students will be able to;

[CV1690.1]. Understand the concept and basics of remote sensing (RS) and geographical information system (GIS) required for employment opportunities in the related field.

[CV1690.2]. Know about different satellites and sensors involved in the RS and GIS application.

[CV1690.3]. Discern the application of RS and GIS in spatial and temporal investigations of geological, climatic and environmental problems and hence, helping for an entrepreneurship.

B. SYLLABUS

Introduction and Concepts: Introduction of remote sensing: energy sources and radiation principles, energy equation, electromagnetic radiation (EMR) and spectrum, interaction of EMR with atmosphere and earth surface features, spectral response pattern and spectral reflectance of vegetation, soil and water bodies. Introduction to aerial photography.

Satellite Remote Sensing Principles: Data acquisition procedure, digital image processing, intensity reference data, ground-truth, analogue to digital conversion, detector mechanism: spectro-radiometer, platforms and sensors, orbit types and image resolution.

Remote Sensing Satellites: Land observation satellites, characters and applications, IRS series, LANDSAT series, SPOT series, high resolution satellites, character and applications, CARTOSAT series, IKONOS Series, QUICKBIRD series, weather/meteorological satellites, INSAT series, NOAA, GOES, NIMBUS applications, Marine observation satellites OCEANSAT.

Types of Remote Sensing and Image Interpretation: Introduction to active and passive remote sensing, optical remote sensing, visible, infrared, thermal sensors, concept of microwave remote sensing and sensors, SLAR, SAR scatterometer, image interpretation characters.

Geographical Information Systems (GIS): Database, raster and vector data, database management system, digital elevation models and their applications, strategies involved in GIS (data capture, data retrieval, spatial measurement, data integration, spatial interpolation, data analysis); application of GIS in various fields such as land use and land cover, water and land resources, environment and traffic system etc.

C. TEXT BOOKS

1. Cambell J.B., "Introduction to Remote Sensing", Taylor & Francis, UK, 22.
2. Sabins Jr F.F., "Remote Sensing - Principles and Interpretation", W.H. Freeman and Co., New York, 1986.
3. Burrough P. A. and McDonnell, R. A., "Principles of Geographical Information Systems", 2nd Edition, Oxford University Press, 1998.
4. Demers M. N., "Fundamentals of Geographic Information Systems", John Wiley and Sons, 3rd Edition, 22.

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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

Traffic Engineering and Management | CV1761 | 3 Credits | 3 0 0 3

Session: August 2020 – December 2020 | Faculty: Dr. Gaurav Sancheti | Class: Department Elective

A. Course Outcomes: At the end of the course, students will be able to:

- [1761.1]. Identify various traffic flow characteristics and apply his engineering knowledge to relate them to the road used characteristics, implying safe and ethical professional engineering practice.
- [1761.2]. Take critical engineering decisions and develop skill for managing the traffic by applying appropriate/modern techniques, justifying the suitability of stakeholders and economy of the project
- [1761.3]. Communicate effectively with society/engineering community for all traffic management issues and give/develop specific scientific solutions in the broadest context of technological advancements, enhancing their employability.
- [1761.4]. Work independently or in a group as a consultant for traffic management solutions, hence developing the ability to engage in independent and life-long learning.

B. SYLLABUS

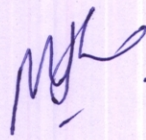
Traffic stream characteristics: Introduction, Road user characteristics, **Relations of traffic flow:** speed, density, and volume. Traffic measurement techniques, equipment used and analysis, Measurement of volume, speed, and density at a point, over a short section, and along the length of road. **Principles of traffic control:** Requirements, basic driving rules, priority movements, principles of traffic control, intersections conflicts. **Traffic signs and road markings:** Regulatory, warning, and information signs; longitudinal, transverse, and object marking. **Uncontrolled intersection:** Level of service concept, priority streams, conflicting traffic, critical gap and follow-up time, capacity, queue length, control delay. **Channelization:** channelizing devices, geometrical aspects, turning radius. **Traffic rotary:** Conflict resolution in a rotary, geometric layout, design elements, capacity of rotary. **Traffic Signal Design:** Definitions, Phase design, Cycle time determination, Green splitting, Pedestrian phases, and Performance measures. **Grade separated intersection:** Road over bridges, under pass, overpass, trumpet interchange, diamond interchange, fully and partial clover leaf intersection. **Road Safety:** The identification of problem, causation and Prevention, Road layout and Improvements, Safety equipment.

C. TEXT BOOKS

- Kadiyali L.R., *Traffic Engineering and Transport Planning*, Khanna Publishers New Delhi - 110006, 2016.

D. REFERENCE BOOKS

- R.P. Roess, E.S. Prassas, and W.R. McShane, *Traffic Engineering*, Pearson, 4th Edition, 2010.


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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

Building Construction and Project Management | CVI763 | 3 Credits | 3 0 0 3

Session: August 2020 – December 2020 | Faculty: Dr. Bhavna Tripathi | Class: Department Elective

A. Course Outcomes: At the end of the course, students will be able to:

[1763.1]. Recall types of buildings as per NBC and functions of its components necessary for employment of civil engineer.

[1763.2]. Apply the knowledge of construction techniques and components involved in building construction necessary for employment as site engineer.

[1763.3]. Apply the elements of construction project management and create work breakdown structure.

[1763.4]. Create construction project networks and analyse using PERT and CPM techniques for being able to work as an entrepreneur.

B. SYLLABUS

Building types & components: Definition and classification of buildings, load bearing and framed structure. Sequence of construction activity and co-ordination, building components and their functions, requirement of foundation, shallow and deep foundations, floor types and selection of flooring, types of stairs, classification of roofs, types of pitched roofs, trussed roofs, steel roof trusses. Brick and Stone Masonry: different types of bonds in brick and stone masonry, merits and limitations, Comparison between stone and brick masonry. Damp Proofing: Causes and effects of dampness, methods and materials used for damp proofing. Joints: Requirements of construction joints and different types. Temporary structural measures: Types & methods of shoring, underpinning and scaffolding. Fabrication and Erection work: Fabrication, handling, transportation, and erection of steel members and structures, difference between prefabricated, precast and cast-in-situ construction. Construction Project Management: Characteristics of a construction project, Stages of Construction Project, Construction team, functions of project management, Work Breakdown Structure, scheduling techniques. Network preparation and analysis: Rules for drawing a network diagram, PERT and CPM Analysis, calculation of Slack, Critical Path, Floats, and probability of meeting scheduled completion time.

C. TEXT BOOKS

1. B.C. Punmia, A.K. Jain, and A.K. Jain, Building Construction, Laxmi Publications, 11th Edition, 2016.
2. K.K. Chitkara, Construction Project Management: Planning, Scheduling and Controlling, McGraw Hill Education, 3rd Edition, 2014.

D. REFERENCE BOOKS

1. S.K. Sarkar and S. Saraswati, Construction Technology, Oxford University Press, 2008
2. B.C. Punmia, and K.K. Khandelwal, Project Planning and Control with PERT and CPM, Laxmi Publications, 4th Edition, 2016.

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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

DEPARTMENT OF CIVIL ENGINEERING

Course Hand-out

Earthquake Resistant Design of Structures | CVI767 | 3 Credits | 2 | 0 | 3

Session: Aug 20 – Dec 20 | Faculty: Dr. Shaik Hussain | Class: B.Tech. Civil VII SEM

A. Course Outcomes: At the end of the course, students will be able to:

[CV 1767.1] An ability to understand the load transfer mechanism in structures.

[CV 1767.2] To do investigative work in design structures for better employment opportunity.

[CV 1767.3] Gain knowledge to do inter disciplinary work for entrepreneurial skills enhancement.

B. SYLLABUS

Introduction: Plate tectonics, Elastic rebound theory of earthquake, Seismic zoning map of India, Seismic waves, Seismograms, Earthquake magnitude and intensity. Introduction to theory of vibration: Free vibration of single degree un-damped and damped systems. Forced vibration (Harmonic Loading) of single degree un-damped and damped systems. Introduction to Resonance and MDOF system, Primary and secondary effects of earthquake. Structural irregularities: the performance of RC buildings during Earthquakes: Vertical irregularities, Plan configuration problems; equivalent static method (is 1893). Ductile detailing of RC frames as per IS 13920 (1993). Restoration and retrofitting: of existing structures. Case studies: of important earthquakes: Indian earthquakes, Major world earthquakes.

C. TEXT BOOKS

1. P. Agarwal and M. Shrikhande, Earthquake Resistant Design of Structures, Prentice-Hall of India Private Limited, New Delhi. 2006.
2. S.K Duggal, Earthquake resistant Design of Structures
3. Mario Paz, William Leigh. Structural Dynamics

D. REFERENCE BOOKS

1. Anil K Chopra, Dynamics of structures, Theory and Application of Earthquake Engineering, Pearson Publication.
2. IS: 1893 (Part 1) - 2016, Criteria for Earthquake Resistant Design of Structures, Bureau of Indian Standards, New Delhi.
3. IS: 13920 - 1993, Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces- Code of Practice, Bureau of Indian Standards, New Delhi.

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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

Fluid Mechanics-I | CV2101 | 4 Credits | 3 1 0 4

Session: July, 2020 – Dec.2020 | Faculty: Dr. Parwez M. Akhtar | Class: 3rd Semester B.Tech(Civil)

A. COURSE OUTCOMES: At the end of the course, students will be able to:

[CV2101.1]. Understand the basic concept, historical context and wider importance of theoretical fluid mechanics including preliminary analysis of fluid inertial behaviour and enhance employment.

[CV2101.2]. Understand kinematics of fluid motion through knowledge of mathematics/science/fundamentals and solution of complex engineering problems. Critical review and analysis

[CV2101.3]. Understand and be able to solve fluid dynamics problems through knowledge of mathematics/science/fundamentals and solution of complex engineering problems.

[CV2101.4]. Overview of preliminary flow measurement apparatus and dissemination of preliminary model similarities covering design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

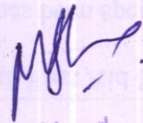
[CV2101.5]. Be able to develop skills in critical thinking and professional procedures through various forms of oral and written presentation and individual and group work and be trained to be able to pursue advance courses in related fields to promote entrepreneurship.

B. SYLLABUS

Introduction, Fluid Properties and Classification of Fluid, Pressure and its Measurement using manometers, Hydrostatics, Kinematics of Fluid Motion, Dynamics of Fluid Motion, Laminar Flow, Turbulent Flow, Flow Measurement, Dimensional Analysis, Flow in open Channels, Gradually varied flow rapidly varied flow.

C. TEXT BOOKS

1. V. L. Streeter, E. B Wiley, Fluid Mechanics, McGraw Hill book Co., New York. 1998
2. Çengel Yunus, John M Cimbala, Fluid Mechanics Fundamentals and Applications, Tata McGraw Hill Education Pvt. Limited New Delhi, 2011
3. P. N. Modi, S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House, New Delhi. 2005
4. R. K. Bansal, Fluid Mechanics and Hydraulic Machines, Laxmi Publishers, New Delhi. 2010
5. R.J. Garde, Fluid Mechanics through problems, New age international Pvt. Ltd., Publishing, New Delhi. 2003


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DEPARTMENT OF CIVIL ENGINEERING

Course Hand-Out

Building Materials & Construction Technology | CV2102 | 4 Credits | 3 | 0 | 4

Session: August 17 – November 23 2020 | Faculty: Mr. Vikram Singh Kashyap | Class: B.Tech Civil III SEM

A. Course Outcomes: At the end of the course, students will be able to:

[2102.1] Identify various type of building materials and apply his engineering skills to investigate them for their suitability in sustainable construction works for safe and ethical professional engineering practice.

[2102.2] Take critical engineering decisions on the type of building components and appropriate/modern construction techniques to be used to justify the suitability and economy of the project

[2102.3] Communicate effectively with society/engineering community for all sort of maintenance issues of a building and give/develop specific scientific solutions in the broadest context of technological advancements

[2102.4] Work independently or in a group as a consultant for material design and testing as per the guidelines of Indian Standard codes, which can increase employability.

B. SYLLABUS

Building Materials: Lime; Bricks; Tiles; Tar; FRP; Glass; Ferro-cement; Ceramics; Paints; Timber. Cement – Ty composition, properties and uses, physical tests on cement. Concrete: Ingredients and production, properties & tests on fresh and hardened concrete as per IS codes. Construction Technology: Classification of buildings, load bearing and framed structure; Sequence of construction activity; building components and its type, viz. foundations (shallow and deep), flooring, stairs, arches & lintels, roofs (trusses); Brick and Stone Masonry; Damp Proofing; Construction joints; Temporary

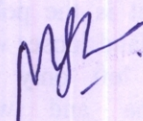
structural support viz. shoring, shuttering, underpinning and scaffolding; Fabrication and Erection work; Construction practices for plastering, pointing, painting, flooring.

C. TEXT BOOKS

1. B. C. Punmia, A. K. Jain, A. K. Jain; *Building Construction*, Laxmi Publications, 11th Edition, 2016.

REFERENCE BOOKS

1. A. M. Neville, *Properties of Concrete*, McGraw-Hill, Singapore, 2012.
2. SP 20, *Handbook on Masonry Design and Construction*, B.I.S. Publication, 1991.
3. SP 62 (S&T), *Handbook on Building Construction Practices*, B.I.S. Publication, 1997.
4. S.K.Duggal, *Building Materials*, TMH Publication, 2010
5. Rangwala, *Engineering Materials*, Charotar Publication, 2014


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School of Civil and Chemical Engineering

Course Hand-out

Surveying

| CV2103 | 4 Credits | 3 1 0 4

Session: 2020-21 (odd Sem.) | Faculty: Mr. Alok Damare | Class: B.Tech IInd Year

A. Course Outcomes: At the end of the course, students will be able to

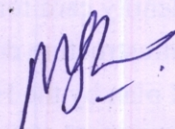
- [2103.1]. Use conventional surveying tools such as chain/tape, compass, plane table, level in the field of civil Engineering applications such as structural plotting and highway profiling.
- [2103.2]. Apply the procedures involved in field work and to work as a surveying team Make entry in field book.
- [2103.3]. Plan a survey appropriately with the skill to understand the surroundings
- [2103.4]. Take accurate measurements, field booking, plotting and adjustment of errors can be understood
- [2103.5]. Plot traverses / sides of building and determine the location of points present on field on drawing sheet.

B. SYLLABUS

Principles of surveying, Classification of surveying; Errors and their adjustment; Maps - scale, coordinate system; Chain surveying, compass surveying, Plane table surveying -Radiation and intersection methods; Levelling , trigonometric levelling; theodolite surveying and tachometry surveying; Traversing and triangulation survey, Contouring, using Total Station; curve setting- Horizontal and vertical curves. Photogrammetry - scale, flying height; Remote sensing - basics, platform and sensors, visual image interpretation; Electronic Distance Measurement., Basics of Geographical information system (GIS), Differential Geographical Positioning system (GPS/DGPS), Hydrographic Survey and surveying using Lidar.

C. Text Books

- T. P. Kanetkar, S. V. Kulkarni, *Surveying and Levelling*, Part I and II, Pune Vidyarthi Griha Prakashana – Pune, 1996
- B. C Punmia, *Surveying*, Vol. I, Lakshmi Publications, New Delhi, 2005.
- Satheesh Gopi , R. Sathikumar, N. Madhu, *Advanced Surveying: Total Station, GIS and Remote Sensing*


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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

DEPARTMENT OF CIVIL ENGINEERING

Course Hand-out

Structural Analysis-I | CV 2104 | 4 Credits | 3 | 0 | 4

Session: Aug 20 - Dec 20 | Faculty: Dr. Shaik Hussain | Class: B.Tech Civil III SEM

A. Course Outcomes: At the end of the course, students will be able to:

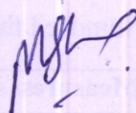
- [CV2104.1]. Define basic structural engineering terminology
- [CV2104.2]. Derive and draw the shear and bending moment equations and diagrams respectively
- [CV2104.3]. Distinguish between stable and unstable and statically determinate and indeterminate structures
- [CV2104.4]. Determine slope, deflections, torsion, stresses of beams by using different methods
- [CV2104.5]. Familiarise with contemporary issues and solving them in structural engineering domain to enhance employment and entrepreneurship.

B. SYLLABUS

Introduction, Thick Cylinders and Shells, Stresses due to Impact and Suddenly Applied Load, Compound Bars. Mohr's circle of stress and strain. Failure theories, analysis of Plane Truss: Method of joints and section, Shear force and bending moment diagrams for statically determinate beams. Influence line diagram. Determination slope and deflection using Macaulay's method, moment-area method and conjugate beam method. Stability of Columns- Euler's formula, Rankine-Gordon formula. Torsion of circular shaft. Analysis of Arches and Suspension Bridge.

C. TEXTBOOKS

- I. R.C. Hibbler, *Structural Analysis*, (8e), Pearson, 2014
- II. Rajput R.K., *Strength of Materials*, S Chand & Co., 2015.
- III. Bhavikatti, S.S., *Structural Analysis – I & II*, Vikas Publishing House Pvt. Ltd., 2013.
- IV. Ramamrutham. S & Narayanan. R, *Strength of Materials*, Dhanpat rai Publishing Co., 2017.


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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

MATERIAL TESTING LABORATORY | CV2130 | 1 Credits | 0 0 2 |

Session: Aug 20 – Nov 20 | Faculty: Mr. Vikram Singh Kashyap | Class: B.Tech Civil III SEM

A. Course Outcomes: At the end of the course, students will be able to:

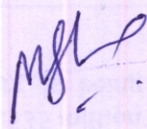
- [CV2130.1]. Understanding the concept of the different properties of materials.
- [CV2130.2]. Applying the concept to determine their properties.
- [CV2130.3]. Enhance entrepreneurship skill.
- [CV2130.4]. Analysing and applying the properties will lead to employability.
- [CV2130.5]. Skills to work in groups or independently.

B. SYLLABUS

Tension, shear and torsion test on mild steel, Compression test on cast iron, timber. Hardness test by Rockwell and Brinell's method. Impact test by Izod and Charpy method. Test on Bricks - Compressive Strength, Absorption, Efflorescence. Tests on Flooring and Roofing Tiles: Wear resistance (Dorry's abrasion Test), Knife Edge Load, Absorption. Determination of specific gravity, Fineness, standard consistency, setting time and soundness of cement. Determination of specific gravity and fineness modulus of fine aggregates. Determination of bulking and clay (or silt) content in sand. Determination of workability of concrete by slump test, compaction factor test and Vee - Bee consistometer method. Determination of compressive, tensile and flexural strength of concrete. Determination of permeability and modulus of elasticity of concrete. Introduction to Non-Destructive test of concrete.

C. REFERENCE BOOKS

- I. Suryanarayana A.V.K., Testing of Metallic Materials, Prentice Hall of India, New Delhi, 1990.
- II. Khanna & Justo, Highway Materials Testing, Nemchand, New Chand, 1989.
- III. Technical Teachers, Training Institute, Laboratory Manual of Strength of Materials, Oxford University Press, 1983.


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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

Surveying practice Lab | CV2131 | 1 Credits | 0 0 3 |

Session: July 2020 – November 20 | Faculty: Alok Damare | Class: AB1-14 Surveying practice lab

A. Course Outcomes: At the end of the course, students will be able to:

- [2131.1]. Use conventional surveying tools such as chain/tape, compass, plane table, level in the field of civil Engineering applications such as structural plotting and highway profiling.
- [2131.2]. Apply the procedures involved in field work and to work as a surveying team Make entry in field book.
- [2131.3]. Plan a survey appropriately with the skill to understand the surroundings
- [2131.4]. Take accurate measurements, field booking, plotting and adjustment of errors can be understood
- [2131.5]. Plot traverses / sides of building and determine the location of points present on field on drawing sheet.

B. SYLLABUS

Chain survey- To conduct direct and indirect ranging, Construction of Geometric figures using chain and tape - triangle, pentagon, trapezium, and hexagon. To erect perpendicular from a given point using, Chain tape and Cross staff. Compass Survey-Study of compass and construction of regular pentagon and hexagon, Construction of a quadrilateral, Distance b/w two inaccessible points. Plane table surveying - Radiation and intersection methods, Solving three point problem by Bessel's solution, Plane table traversing. Levelling Study of instrument, Simple levelling, Height of instrument method, Rise and fall method including inverted staff reading, To find difference in level b/w two points by reciprocal levelling. Theodolite -Study of the instrument, Method of repetition, Method of reiteration, Measurement of vertical angle, to find RL when base of object is inaccessible, single plane method, double plane method, Distance b/w inaccessible points, Theodolite Traversing.

C. REFERENCE BOOKS

- Subramanian R., Surveying and Levelling, Oxford University Press 2012.
- Chandra A.M., Plane Surveying, New Age International Pvt. Ltd., 2011.
- Punmia B.C., Surveying and Leveling Vol. I and II, Lakshmi Publishers, New Delhi 2005.
- Arora K.R., Surveying, Vol. I & II, Standard Book house, New Delhi, 2015.
- Subramanian R., "Surveying and Levelling", Oxford University Press 2012.
- Chandra A.M., "Plane Surveying", New Age International Pvt. Ltd., 2011.
- Arora K.R., Surveying, Vol. I and II, Standard Book House, New Delhi, 1993.
- Punmia B.C., Surveying Vol. I and II, Lakshmi Publications, New Delhi, 2005.

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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering
Department of Civil Engineering

Course Hand-out

Engineering Geology

| CV 2201 | 4 Credits | 4 0 0 4

Session: 2020-21 (Even Sem) | Faculty: Dr Harshavardhana B G | Class: B. Tech. 2nd Year Regular

Course Outcomes: At the end of the course, students will be able to

- [2201.1]. Apply the fundamental knowledge of rocks, minerals and geological structures while planning for building construction; thus, enhancing the employability.
- [2201.2]. Discern different geological processes that may be disastrous to public health and safety.
- [2201.3]. Apprehend the application of geophysical techniques for determining the subsurface deformities before civil constructions.
- [2201.4]. Explore the impact of various geological structures on civil constructions and hence, start a entrepreneurship / consultancy services for safe construction with a thorough geological knowledge.

A. SYLLABUS

Introduction: Overview and scope of the subject, Geology and its role in Civil Engineering, Earth as a planet, its internal structure and composition.

Mineralogy: Description and identification of rock-forming minerals and Ores, their physical and special properties; Olivine, Augite, Hornblende, Mica group, Feldspar group, Quartz and its varieties. Carbonate group, Asbestos, Kaolin, Talc, Gypsum, Garnet, Corundum, Magnetite, Hematite, Limonite, Pyrite, Chalcopryite, Galena and Bauxite.

Petrology: Definition, sources of rocks, classification of rocks based on mode of formation, rock-cycle. Identification and description. Igneous rocks: Granite, Syenite, Diorite, Gabbro, Dunite; Pegmatite, Porphiries, Dolerite; Rhyolite, Basalt and Pumice. Sedimentary rocks: Primary structures and description of Sandstones, Conglomerate, Breccia, Shale, Limestones and Laterite. Metamorphic rocks: Gneiss, Quartzite, Marble, Slate, Phyllite and Schists, Rock as building material.

Structural Geology: Definition, outcrop, dip and strike of a rock-bed, clinometer and compass. Folds, joints, faults, and unconformity, their recognition and importance in Civil Engineering field investigation.

Physical Geology: Weathering of rocks, types of weathering, agencies, causes and products of weathering. Origin and development of river systems, erosion, transportation and deposition by rivers, geological action of wind and its geomorphic features.

Hydrogeology: Hydrological cycle, distribution of ground water in the earth crust, types and properties of water bearing geological formation, selection of sites for well locations, techniques of ground water exploration, artificial recharge of groundwater methods, rain water harvesting. Sea water intrusion and remedial measures.

Geodynamics: Plate tectonics, earthquake, seismic waves, magnitude and intensity scales, earthquake-recording instruments, characteristics of strong ground motions and attenuation, earthquake occurrence in the world, seismic zoning map of India and its use. Tsunami and landslides, causes, effects and remedial measures.

Application of Engineering Geology: Geological considerations in selection of sites for Dams, Reservoirs, Tunnels, Bridges and Highways.

B. TEXT BOOKS

1. P. Singh, "Engineering and General Geology", Published by S. K. Kataria and Sons, New Delhi, 2013.
2. P. K. Mukherjee, "A Text Book of Geology", World Press, Kolkata, 2005.
3. D. V. Reddy, "Engineering Geology for Civil Engineering", Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 2012.

C. REFERENCE BOOKS

1. F. G. Bell, "Engineering Geology", Butterworth-Heinemann, 2nd Edition, 592 P, 2007.
2. F. G. H. Blyth, M. H. de Freitas, Butterworth-Heinemann, 7th Edition, 325 P, 2006.

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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

Water Supply Engineering | CV 2202 | 1 Credits | 3 1 0 4

Session: January 21 – May 21 | Faculty: Mr. Sagar Gupta | Class: B.Tech IIInd Year

A. Course Outcomes: At the end of the course, students will be able to:

- [2202.1] Comprehend about different quality parameters of water and water demand.
- [2202.2] Design of Sources and Transmission of water.
- [2202.3] Understand the various treatment systems of drinking water.
- [2202.4] Design hydraulic analysis of distribution system.
- [2202.5] Applying several concept to promote entrepreneurship.

B. SYLLABUS

Introduction, Sources of water, Water collection works, Water demand, Population forecasting, Variation in water demand, Factors affecting water demand, Characteristics of water and its analysis, Drinking Water Standards (BIS and WHO), Design capacities for various water supply components. Treatment of Water: Primary, Secondary & tertiary treatment, Design of sedimentation tanks, Coagulation, flocculation & their design criteria including other treatment processes. Filtration theory & design, Disinfection-theory, methods of disinfection, softening, removal of taste, colour & odour, desalination, reverse osmosis, de-fluoridation and removal of other dissolved impurities. Design and layout of distribution systems & transmission, Hydraulic analysis of distribution systems, Pipe appurtenance & Design of plumbing system.

C. TEXT BOOKS

1. S. K. Garg, Environmental Engg.-I, Khanna Publishers, New Delhi, 2012.
2. G. S. Birdie, Water Supply and Sanitary Engineering, Dhanpath Rai and Sons, New Delhi, 2012.
3. B. C. Punmia, Water Supply and Sanitary Engg., Dhanpath Rai and Sons, New Delhi, 2010
4. Modi, Sethi, Water Supply and Sanitary Engg, Dhanpath Rai and Sons, New Delhi, 2010.
5. Manual on water supply and treatment CPHEEO, Ministry of Urban development, New Delhi, 1991.

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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

Analysis of Indeterminate Structures

| CV 2203 | 4 Credits | 3 | 0 | 4

Session: 2020-21 (Even Sem) | Faculty: Mr. Kamal Kumar | Class: B. Tech. 2nd Year Regular

Course Outcomes: At the end of the course, students will be able to

- [2203.1]. Understand the concept of indeterminate structures and its applications
- [2203.2]. Apply the concept of degree of indeterminacy of structural systems for its analysis
- [2203.3]. Analyse indeterminate structures using the Displacement methods
- [2203.4]. Evaluate a practical indeterminate structure by inducing entrepreneurship skills to face live problems.

A. SYLLABUS

Introduction to indeterminate structures, degrees of freedom per node, static and kinematic indeterminacy. Analysis of beams and frames by slope deflection method, analysis of fixed and continuous beams by theorem of three moments. Analysis of structures using moment distribution methods. Portal frame method, Cantilever method of analysis of frames. Unit load method. Unit load method. Strain energy for gradually applied, suddenly applied and impact loads, Strain energy due to axial loads, bending, shear and torsion. Introduction to matrix method of structural analysis.

B. TEXT BOOKS

1. C. K. Wang, Indeterminate Structural Analysis, Indian Ed., McGraw Hill Education, 2017
2. S. Timoshenko, D. H. Young, Mechanics of Structures, (3e), Mc Graw Hill Book Co., 2015
3. R. C. Hibbler, Structural Analysis, (8e), Pearsons, 2014
4. B. C. Punmia, Strength of Materials and Mechanics of Structures: Vol. I, (10e), Laxmi Publications (P) Ltd., 2018
5. S. B. Junarkar, H. J. Shah, Mechanics of Structures Vol.-I, (3e), Charotar Publishing House, 2013
6. S. P. Gupta, G. S. Pandit, R. Gupta, (3e), Structural Analysis – A Matrix Approach-Volume 2, McGraw Hill, New Delhi, 2016.

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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

Engineering Geology Laboratory Practices| CV 2230 | I Credit | 0 0 2 I

Session: January – May 2021 | Faculty: Dr Harshavardhana B G | Class: Regular

A. Course Outcomes: At the end of the course, students will be able to

- [2230.1]. Apply the fundamental knowledge of physical properties of minerals and rocks for their identification, which helps to decide on the type of rock needed for the construction. This practical knowledge, along with the theoretical knowledge of the subject would increase the employability.
- [2230.2]. Discern geological/contour/topographic maps and extract necessary information related to the thickness and attitude of a rock outcrop.
- [2230.3]. Understand the importance of the subsurface geological structures and their attitudes while planning civil constructions. This allows them to incorporate suitable measures while providing solutions to the problems associated with geological structures and thus, help for an entrepreneurship.

B. Syllabus:

Identification and description of the following minerals with uses and distribution in India. Rock forming Minerals: Quartz group - rock crystal, Amethyst, Rose crystal, agate, flint, Jasper, Orthoclase, Microcline, Plagioclase, Muscovite, Biotite, Koaline, Calcite, Magnesite, Dolomite, Hornblende, gypsum, Olivine, Corundum, Garnet, Talc, Asbestose, Chlorite. Ore minerals: hematite, Magnetite, Limonite, Chromite, Chalcopryrite, Pyrite, Galena, Azurite, Malacite. Megascopic study of the following rocks with their composition, texture, structure, and engineering importance- Granite, gabro, dunite, pegmatite, dolomite, basalt, obsidian, pumice, conglomerate, breccia, sandstone, limestone, shale, laterite, gneiss, slate, quartzite and marble. Interpretation of geologic maps with horizontal inclined, folded, faulted and unconformity. Determination of thickness of strata on horizontal ground, Dip and strike problems, Borehole problems and their uses in dams, tunnels and reservoir site.

References:

1. Reddy M.T.M., Engineering Geology Practicals, New Age International Publishers, New Delhi 2002.
2. Gurappa K.M., Structural Geology Maps and Problems, 1975.
3. Gokhale W., Manual of Geological Maps, CBS publications, New Delhi 1987.

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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Course Hand-out

Geotechnical Engineering Laboratory
| CV 2231 | 1 Credits | 0021

Session: 2020-21 (odd Sem.) | Faculty: Dr. Mohammad Parwez Akhtar | Class: B.Tech IIInd Year

- A. Course Outcomes:** At the end of the course, students will be able to
- [2231.1]. Understanding of calibration/operation of various types of flow measurement devices such as notches, weirs, venture-meter /orifice-meters and enhance employability.
 - [2231.2]. Understanding of measurement/evaluation/operation of pipe flow and corresponding pipe friction factors and comprehend the basic and practical concept of fluid flow.
 - [2231.3]. Understand/test and evaluation of hydraulic machinery such as impact of jet on vanes, centrifugal pump, and turbines.
 - [2231.4]. Develop skills in critical thinking and professional procedures through various forms of oral and written presentation to promote entrepreneurship.

B. SYLLABUS

Calibration of V - Notch, Rectangular notch, Cippoletti Notch; Broad crested weir, curved weir; orifices, mouth pieces; Venturimeter, orifice meter; Venturi flume, standing wave flume; Determination of Friction factor of pipes; Tests on Impact of jet on Vanes, Centrifugal pump, Pelton turbine, Francis turbine and Kaplan Turbine.

C. Text Books

1. G.L. Asawa Laboratory work in Hydraulic Engineering, New Age International (P) Ltd. 2009
2. V. L. Streeter, E. B Wiley, Fluid Mechanics, McGraw Hill book Co., New York. 1998
3. A. Çengel Yunus, John M Cimbala, Fluid Mechanics Fundamentals and Applications, Tata McGraw Hill Education Pvt. Limited New Delhi, 2011
4. P. N. Modi, S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House, New Delhi. 2005
5. R.J. Garde, Fluid Mechanics through problems, New age international Pvt. Ltd., Publishing, New Delhi. 2003Text Books

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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

Building Design and Drawing | CV2232 | 1 Credits | 0 0 3 |

Session: January 21 – May 21 | Faculty: Sanchit Anand | Class: Departmental Laboratory Course

A. Course Outcomes: At the end of the course, students will be able to:

- [1430.1]. **Replicate** any furnishing details in a residential building in reality into a drawing
- [1430.2]. **Create** a detailed building plan with elevation and cross sectional elevation.
- [1430.3]. **Use** computer software like AutoCAD to convey the building drawing.
- [1430.4]. **Learn** the procedures of submission of drawings and Develop working and submission Drawings for building
- [1430.5]. **Prepare, read and interpret** the drawings in a professional set up.

B. SYLLABUS

Introduction: Overview and scope of the subject;

Introduction to Auto cad: Drafting plan and elevation of single bed room RCC building with flat roof;

Foundations: Masonry foundations, RCC Footings - Isolated, Combined and Raft footings;

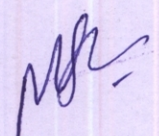
Doors and Windows: Wooden and Aluminium doors, PVC and Steel doors such as Collapsible Doors, Wooden windows, Aluminium windows;

Designing and Drawing of Residential Buildings: Plan, Elevation and Sectional views of Single bedroom house with Mangalore tiled roof, Double bedroom house with RCC roof;

Designing and Drawing of Public Buildings: Plan, Elevation and Sectional views of School, Bank, and Health Centre for the given Line Diagram.

C. TEXT BOOKS

1. Balagopal Pabhu T.S., Paul K.V. and Vijayan C., Building Design of Civil Engg. Drawing, Spades Publishers, Calicut. 1999.


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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Course Hand-out

Geotechnical Engineering-I

| CV 1501 | 4 Credits | 3 1 0 4

Session: 2020-21 (odd Sem.) | Faculty: Mr. Kamal Kumar | Class: B.Tech IIIrd Year

A. Course Outcomes: At the end of the course, students will be able to

[CV1501.1]. Realize the importance of geotechnical engineering in civil engineering construction.

[CV1501.2]. Identify the basic properties and mineralogy in soils for prediction and analyses of its engineering properties.

[CV1501.3]. Investigate the suitability of soils and its improvement techniques for structures to be constructed.

[CV1501.4]. Determine the properties of soils and its critical evaluation for design and construction of civil engineering structures.

[CV1501.5]. Apply the knowledge to handle the various geotechnical projects independently/or, in group to develop self-employment and entrepreneurship among learner.

B. SYLLABUS

Introduction: definition, historical development of soil mechanics, origin and classification of soils: transported soils, residual soils, alluvium, colluviums; Basic Definitions and Relationships: phase relationship of soil: two and three phase diagram, basic definitions: specific gravity, volume relationships (void ratio, porosity, degree of saturation, air void and air content), weight relationships (water content, densities/unit weights), weight-volume inter-relationships; Determination of Index Properties: water content, specific gravity, particle size distribution by sieve and sedimentation analysis, consistency limits, void ratio and density index, field identifications: density of undisturbed soils; sensitivity, thixotropy and activity of clays; Classification of Soils: introduction, gradation of soil and its importance, particle size classification: USBS and PRA Classification, International Classification, MIT Classification, Textural Classification, Highway Research Board Classification, AASHO Classification, Unified Soil Classification and Indian Standard Classification, Classification based on shapes; Soil Structure and Clay Mineralogy: introduction, inter-particle forces, classification of soil structure, single grained, honey combed, flocculent and dispersed structure, clay minerals: kaolinite, montmorillonite and illite and their properties; Flow through Soils: soil water: free or gravitation water, held water, structural water, adsorbed water and capillary water. permeability: Darcy's law of permeability, factors effecting permeability, laboratory determination of permeability: constant and variable head methods, field determination of permeability: pumping in and pumping out test for confined and unconfined strata, permeability of stratified soil deposits; Stress in Soil Mass: stresses within a soil: total, effective and neutral stress, effective stress principle, stress point and stress path, calculation of stresses, soil-water systems-capillarity, quick sand phenomenon; Seepage Analysis: introduction: seepage forces, flow net and its elements, boundary conditions, graphical method of flow net construction, one dimensional and two dimensional flow, Laplace equation, stream and potential functions, uses of flow net, Casagrande and analytical method to determine phreatic line of an earthen dam, design of filters; Compaction of Soils: definition and objectives, theory of compaction, laboratory compaction tests: proctor and modified proctor test, factors effecting compaction, effect of compaction on soil properties, placement water content, placement layer thickness, methods of compaction and types of equipment used in field, field control of compaction, Proctor's needle; Shear

Strength of Soils: introduction, shear resistance of soil, principle stresses, Mohr's circle, Mohr's strength theory, Mohr- coulomb's strength theory, determination of shear strength parameters: direct shear test, unconfined compression test, vane shear test, tri-axial shear test, typical stress-strain curves for soils, typical failure envelopes for cohesionless soils and normally consolidated clay soils, critical void ratio..

C. Text Books

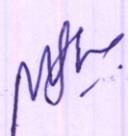
T1. Murthy, V. N. S., "Soil Mechanics and Foundation Engineering: A Book for Students and Practising Engineers", Dhanpat Rai, 1977.

T2. K. R, Arora, "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 2005.

D. Reference Books

R1. Punmia B.C., "Soil Mechanics and Foundations", Laxmi Publications, 6th edition, 2005.

R2. Ranjan G. and Rao A.S.R., "Soil Mechanics and Foundation Engineering", New Age International Publisher, New Delhi, 2006.


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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

Environmental Engineering I | CVI504 | 1 Credits | 3 | 0 4

Session: August 20- December 20 | Faculty: Prof. A D Vyas Class: Environmental Engineering I

A. Course Outcomes: At the end of the course, students will be able to:

- [1504.1] Comprehend about different quality parameters of water and water demand.
- [1504.2] Design of Sources and Transmission of water.
- [1504.3] Understand the various treatment systems of drinking water.
- [1504.4] Design hydraulic analysis of distribution system.
- [1504.5] Analysis of effect of Air and noise pollution.

B. Syllabus

Introduction, Water demand, Population forecasting methods, Factors affecting water consumption, Variation in water demand, Design capacities for various water supply components. Source of water and water collection works. Water quality requirements, Transmission of water. Preliminary treatment of water, Water treatment processes Design of sedimentation, Coagulation, feeding mixing devices, flocculation-design consideration, other treatment, processes. Secondary treatment of water: Filtration-types of filters, Design of filters, Dissolved solids removal, Treatment plant design, Disinfection-theory, methods of disinfection, chlorination. Design of distribution systems, Air and noise pollution: Sources and types of air pollutants, Effect of air pollutants and Economic aspects, Greenhouse effect, Acid rain. Noise pollution and control.

On Line Course on Coursera : Introduction to Household Water Treatment and Safe Storage


Link : <https://www.coursera.org/learn/water-treatment/home/welcome> , by École Polytechnique Fédérale de Lausanne

References:

1. S.K. Garg, "Environmental Engg.-I", Khanna Publishers, New Delhi, 2012.
2. G.S. Birdie, "Water Supply and Sanitary Engineering", Dhanpath Rai and Sons, New Delhi, 2012.
3. B.C. Punmia, "Water Supply and Sanitary Engg.", Dhanpath Rai and Sons, New Delhi, 2010
4. Modi and Sethi, "Water Supply and Sanitary Engg.", Dhanpath Rai and Sons, New Delhi, 2010

BIS Publications:

1. Manual on water supply and treatment CPHEEO, Ministry of Urban development, New Delhi, 1991.


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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

Transportation Engineering - I | CV1505 | 4 Credits | 4 0 0 4

Session: July 30 – November 26 | Faculty: Sanchit Anand | Class: B.Tech , 3rd Year

A. Course Outcomes: At the end of the course, students will be able to:

- [1505.1]. Identify possible highway alignment between given origin and destination
- [1505.2]. Apply the knowledge of mathematics, science, engineering fundamentals for geometric design for safe and convenient highways
- [1505.3]. Apply modern engineering and IT tools to design and construct various kinds of pavements for highways and urban roads to enhance employability in Highway sector
- [1505.4]. Conduct the quality assurance of various highway materials through different tests and identify new materials that could be used for sustainable construction of highways in order to promote entrepreneurship
- [1505.5]. Design traffic signals and manage traffic management projects and operations in urban areas

B. SYLLABUS

Introduction

Highway classifications, design of road length as per 20 year plans

Geometric design

Sight distance-stopping and overtaking, horizontal curve, extra widening. Super elevation, transition curve, vertical curves-summit and valley Curves, design problems, design of cross drainage structures.

Pavement materials

Tests on different highway materials, Soil-CBR and Plate load test, Bitumen, Difference between tar and bitumen

Design of pavements

Design of flexible pavements, rigid pavement design, stresses in rigid pavement, joints and failures of rigid pavement.

Highway economics and finance

Methods of Economic Analysis-benefit cost ratio, net present value method. Transport planning.

Traffic engineering

Traffic engineering, vehicular and road user characteristics. Traffic studies, relation between speed, travel time and traffic volume. Traffic density and passenger car units, traffic signs and traffic signals, design of traffic signals. Accident studies- overview, objectives, causes, accident analysis and road safety.

C. TEXT BOOKS

1. Highway Engineering, S.K Khanna, CEG Justo, A. Veeragavan, 10th Edition, Nem Chand Bros.
2. Traffic and transport planning, LR Kadiyali

D. REFERENCE BOOKS

1. Highway and Traffic Engineering, Subhash C Saxena, CBS Publishers
2. Transportation Engineering and Planning, C.S Papacostas, P.D. Prevedouros, PHI Learning
3. Transportation Engineering, Volume I: Highway Engineering, C Venkatramiah
4. Highway Engineering, 7th Edition, Wright and Dixon, Wiley Publication

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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Course Hand-out

Geotechnical Engineering Laboratory
| CV 1530 | 1 Credits | 0 0 2 1

Session: 2020-21 (odd Sem.) | Faculty: Mr. Kamal Kumar | Class: B.Tech IIIrd Year

A. Course Outcomes: At the end of the course, students will be able to

- [CV1530.1]. Determine physical properties of soil.
- [CV1530.2]. Determine the index properties of natural soils.
- [CV1530.3]. Understand the compaction control in the field.
- [CV1530.4]. Determine shear strength and compressibility characteristics of soil.
- [CV1530.5]. Apply the knowledge to handle the various geotechnical projects independently/or, in group to develop self-employment and entrepreneurship among learner.

B. SYLLABUS

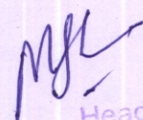
Determination of water content, specific gravity, particle size distribution of coarse and fine grained soil, Atterberg's limits of soil. Determination of dry density of natural soil. Determination of compaction characteristics (optimum moisture content and maximum dry density of soil) using standard proctor method and modified proctor method. Determination of California Bearing Ratio (CBR) of soil in dry and wet condition. Determination of Unconfined Compressive Strength (UCS) of soil. Determination of shear strength parameters of soil using direct shear test. Determination of shear strength of clay by using Vane shear test. Determination of the coefficient of permeability of soils by constant and falling head method. Determination of shear strength parameters of soils using Triaxial tests. Determination of compressibility characteristics of soil by using one dimensional oedometer test.

C. Text Books

- T1. Indian Standard codes practices for soil testing.
- T2. K. R. Arora, "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 2005.

D. Reference Books

- R1. Punmia B.C., "Soil Mechanics and Foundations", Laxmi Publications, 6th edition, 2005.
- R2. Ranjan G. and Rao A.S.R., "Soil Mechanics and Foundation Engineering", New Age International Publisher, New Delhi, 2006.


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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

Environmental Engineering Laboratory-I | CVI532 | 1 Credits | 0 0 3 |

Session: 2020 –2021 | Faculty: Mr. Sagar Gupta | Class: B.Tech

A. Course Outcomes: At the end of the course, students will be able to:

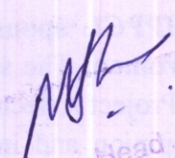
- [1532.1]. Applying knowledge to classify and analysing various water quality parameters.
- [1532.2]. Analysing various physio-chemical and biological parameters of water and wastewater.
- [1532.3]. Understanding the importance of advance waste treatment technologies with functional design of low-cost treatment systems used in rural areas for the sake of waste management.
- [1532.4]. Apply knowledge of quality requirement and analysing techniques in the field of water and wastewater, according to the specific needs of public/ institute/ industry, making himself employable and involvement in independent and lifelong learning.

B. SYLLABUS

Analysis of water/wastewater for physicochemical parameters: Turbidity, alkalinity, pH, hardness, chlorides, sulphates, ammonical nitrogen, nitrates, sulphate, oil and grease, available chlorine, dissolve oxygen, biochemical oxygen demand, chemical oxygen demand. Residual chlorine and chlorine demand, determination of available chlorine in Bleaching powder, Determination of Calcium, Potassium and Sodium. Determination of heavy metals in aqueous solution – Chromium, Lead and Zinc. Coagulation and flocculation of water – optimization of dose / pH / time of flocculation. Characteristics of Industrial wastewater. Analysis of solid wastes: characterisation of wastes from different industries.

C. TEXT BOOKS

1. Standard Methods for the Examination of Water and Waste Water - ALPHA - AWWA – WPCF.
2. Sawyer C. McCarty P. and, Parkin G., Chemistry for Environmental Engineering, McGraw Hill, New York. 1994.
3. IS - 3025 - 1964 - Methods of Sampling and Test (Physical and Chemical) for Water Used in Industry, IIT New Delhi.
4. Drinking water Standards IS - 10500-1991.


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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

I. Concrete Technology | CVI560 | 3 Credits | 3 0 0 3

Session: August 2020 – December 2020 | Faculty: Priyansha Mehra | Class: Program Elective Course

A. Course Outcomes: At the end of the course, students will be able to:

- [1560.1]. Understand the hydration of cement and properties of concrete in fresh and hardened state for application in lifelong learning in construction sector.
- [1560.2]. Design concrete mixes of desired strength as per codal provisions and learn the process of concrete production.
- [1560.3]. Understand the durability of concrete important for field application.
- [1560.4]. Know the recent developments and advancements in concrete technology.

B. SYLLABUS

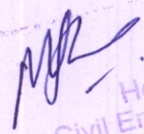
1. **Chemistry of cement:** Composition of cement, hydration of Bogue's compounds, structure of hydrated cement, C-S-H gel, heat of hydration, gel- space ratio and its significance.
2. **Concrete:** Definition, Grade, water cement ratio and it's role, Properties of fresh concrete, workability, air content, Flow ability, Segregation, Bleeding and Viscosity etc. Factors affecting workability. Influence of aggregate properties on workability of fresh concrete, methods of workability determination. Concrete Admixtures: Chemical and mineral admixtures, their types and uses, water reducers, accelerator, retarders, water-proofing plasticizers, super plasticizers, air-entraining agents.
3. **Hardened Concrete:** Properties of hardened concrete, strength, permeability, creep, shrinkage, and factors influencing properties of concrete in hardened state.
4. **Concrete mix design:** Concrete Mix Design as per Indian Standards
5. **Concrete Production:** Batching, mixing, placing, transportation, compaction, and finishing of concrete; equipment used in production, methods of concrete curing.
6. **Durability of Concrete:** Definition, parameters effecting durability. Deteriorating mechanisms, alkali aggregate reaction, freeze and thaw, carbonation, chloride attack, sulphate attack, corrosion of steel reinforcement.
7. **Modern Concrete Technology:** Ready Mix Concrete, Pumpable concrete, High Strength and High performance Concrete, Self Compacting Concrete, waste utilization in concrete..

C. TEXT BOOKS

1. *Concrete Technology*, A.R. Santhakumar, Oxford University Press, 2006.
2. *Properties of concrete*, A.M. Neville, Pearson Education India; 5 edition (2012)

D. REFERENCE BOOKS

1. *Concrete: Microstructure, Properties & Materials*, P.K. Mehta, Tata Mc Graw Hill.
2. *IS 10262 (2009)*, Bureau of Indian Standards, New Delhi.
3. *Durability of Concrete Structures: Investigation, Repair, Protection*, Geoffrey Mays, E & FN Spon, London, 1992


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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering
Course Hand-out

Structural Analysis-II | CV 1564 | 3 Credits | 3 0 0 3

Session: Aug 20 – Dec 20 | Faculty: Sourav Kr Das | Class: B.Tech Civil V SEM

A. Course Outcomes: At the end of the course, students will be able to

- [1564.1]. Understand the concept of indeterminate structures and its applications
- [1564.2]. Apply the concept of degree of indeterminacy of structural systems for its analysis
- [1564.3]. Analyse indeterminate structures using the Displacement methods
- [1564.4]. Analyse indeterminate structures using the Force methods
- [1564.5]. Evaluate a practical indeterminate structure by inducing entrepreneurship skills to face live problems

B. Syllabus

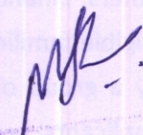
Deflection of beams. Macaulay's method, area moment method and conjugate beam method. **Analysis of indeterminate structures:** Introduction to indeterminate structures, degrees of freedom per node, static and kinematic indeterminacy, releases in structures. **Analysis of beams and frames** by slope deflection method, analysis of fixed and continuous beams by theorem of three moments, effect of sinking and rotation of supports. **Analysis of structures** using moment distribution methods applied to continuous beams and portal frames with and without sway. **Unit load method.** Strain energy for gradually applied, suddenly applied and impact loads, Strain energy due to axial loads, bending, shear and torsion; **Castiglione's theorems**; stresses due to temperature and lack of fit in redundant frames; deflection of determinate beams, and frames using energy methods.

C. Text Books

1. B.C. Punmia, "*Strength of Materials and Mechanics of Structures: Vol. I*", Laxmi Publications (P) Ltd., 2014
2. Junarkar and Shah, "*Mechanics of Structures Vol.-I*", Charotar Publishing House, 2013
3. R. S. Khurmi and N. Khurmi, "*Theory of Structures*", S.Chand, 2018.
4. R. Ramamrutham and Narayan, "*Theory of Structures*", Dhanpat Rai Pub., 2018.

D. Reference Books

1. Timoshenko and Young, "*Mechanics of Structures*", Mc.Graw Hill Book Co., 2015
2. R.C Hibbler, "*Structural Analysis*", Pearsons Education, 2014


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MANIPAL UNIVERSITY JAIPUR
School of Civil and Chemical Engineering

Department of Civil Engineering
Course Hand-out

Geotechnical Engineering-II | CV1601| 4 Credits | 3 1 0 4

Session: January 21 – May 21 | Faculty: Mr. Alok Damare | Class: Departmental Core Course

A. COURSE OUTCOMES:

After successful study of course, students will be able to:

[CV1601.1]. Analyse the problem related to foundation engineering.

[CV1601.2]. Determine and analyse the compressibility characteristics of soil.

[CV1601.3]. Determine earth pressure, stability of retaining walls and slopes for structural design.

[CV1601.4]. Determine bearing capacity of soils for application in the foundations design.

[CV1601.5]. Conduct site investigations and interpret results for engineering applications.

B. SYLLABUS:

Stress distribution in soils: Elastic theories of stress distributions in soils: Boussinesq equation, pressure distribution diagram. Vertical pressure under uniformly loaded circular and rectangular area, equivalent point load method. Newmark's influence chart. Westergaard analysis, and Contact pressure. Numerical Exercises.

Consolidation of soils: Introduction, comparison between compaction and consolidation, Component of settlement- immediate, primary and secondary settlement. Terzaghi's one dimension consolidation theory, normally, under and over consolidated soils, laboratory one-dimensional consolidation test, time factor. Compressibility characteristics: determination of void ratio, coefficient of volume change, coefficient of consolidation and settlement. Estimation of pre-consolidation pressure, factors influencing compressibility behaviour of soils. Numerical Exercises.

Earth pressure: Active, passive and earth pressure at rest. Rankine's and Coulomb's theories of earth pressure. Rebhann's and Culman's graphical methods for active earth pressure for vertical and inclined back retaining walls, horizontal and inclined cohesionless



back fill. Earth pressure on cantilever sheet piles, Stability analysis of retaining walls. Numerical Exercises.

Stability of slopes: Classifications of slopes, Stability analysis of infinite slopes, Stability analysis of finite slopes by Swedish and Friction circle method, Stability analysis by Taylor's stability number, Taylor stability number curves, Stability of slopes of earthen embankments under sudden draw down, steady seepage and during construction, Bishop's method of stability analysis. Numerical Exercises.

Shallow foundation: Introduction, bearing capacity, types of foundations. Rankine's method for minimum depth of foundation. Terzaghi and Meyehoff's theory for bearing capacity. Skempton's method. Effect of eccentricity and water table on bearing capacity. Introduction to machine foundations. Numerical Exercises.

Deep foundation: Types of piles, pile driving, Load carrying capacity of piles, Static and dynamic formulae Pile load test, Group behaviour of piles and negative skin friction, Introduction to well foundation, Numerical Exercises.

Site Investigations: Methods of explorations. Planning of Investigations, Depth of exploration, and number of boreholes. Undisturbed and Disturbed samples. Types of samplers. Brief description of procedures of sampling, Transportation and Storage of samples. Plate load and penetration tests for determining bearing capacity. Geophysical methods of investigations. Numerical Exercises.

C. TEXT BOOKS:

T1. Murthy, V. N. S., "Soil Mechanics and Foundation Engineering: A Book for Students and Practising Engineers", Dhanpat Rai (1977).

T2. K. R, Arora, "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi (2005).

T3. Bowles J. E., "Foundation Analysis and Design." McGraw Hill, New York (1997).

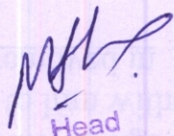
D. REFERENCE BOOKS:

R1. Punmia B.C., "Soil Mechanics and Foundations", Laxmi Publications, 6th edition (2005).

R2. Ranjan G. and Rao A.S.R., "Soil Mechanics and Foundation Engineering", New Age International Publisher, New Delhi (2006).



- R3.** S. K. Garg, "Soil Mechanics and Foundation Engineering", Khanna Publishers, Delhi (2005).
- R4.** Terzaghi K., Peck R. B. and Gholamreza Messi, "Soil Mechanics in Engineering Practice", Wiley India (P) Ltd., New Delhi, 3rd Edition (2013).
- R5.** B. M. Das, "Advanced Soil Mechanics", Taylor and Francis, Washington (1997).
- R6.** Alam Singh, "Soil Engineering in Theory and practice", CBS Publishers and Distributors,


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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

Transportation Engineering-II | CV1603| 4 Credits | 3 | 0 | 4

Session: January 21 – May 21 | Faculty: Dr. Gaurav Sancheti | Class: Core Course

A. Course Outcomes: At the end of the course, students will be able to:

- [CV1603.1]. Understand the characteristics of Railway and Airport Systems
- [CV1603.2]. Investigate and Identify the problems and give the solutions in terms of updated designs for Railway and Airport Systems
- [CV1603.3]. Apply modern tools such as AutoCAD for geometric design and alignment of railway tracks in the optimized manner to benefit the environment, society and maintaining professional ethics
- [CV1603.4]. Demonstrate the knowledge in terms of design reports and presentations for Railway and Airport projects

B. SYLLABUS

Railway engineering: Introduction, Scope, terminology, Survey, Tractive resistance, Permanent way, Components parts rail and rail fastenings, ballast, sleepers, Railway creep, Anti-creep devices, coning of wheel, wear of rail. Alignment Details; Points and crossing: Necessity of turnouts, Switches and track junction, Design of turnouts; Railway Station and Yards: Types and classification, equipment in Station Yards, Signals- Classification, function, Control on movement of train by different methods. Interlocking: Types and function.

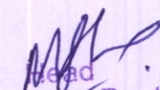
Airport engineering: Introduction, History and development, Aviation organizations and their functions, Aircraft characteristics and its influence on airport planning, Airport Planning, Site selection, Obstructions, Airport configuration; Geometric Design: Runway orientation, Basic runway lengths, Geometric design of Runway and Exit taxiways; Airport Capacity: Runway and Terminal capacity and its improvement, Delay related capacity, Gate position and gate capacity, Terminal area, Aircraft parking system. Visual aids and Air traffic control system: - Flight rules, Navigational and landing aids, VASI, PAPI enroute air traffic control, ILS, MLS; Pavement Design: ESWL concepts, FAA method and LCN-PCN method of pavement design; Airport Drainage System:-Design runoff, Surface and subsurface drainage.

C. TEXT BOOKS

1. Saxena S.C. and Arora S.P, *A Text Book of Railway Engineering*.
2. Rangwala S.C., *Airport Engineering*, Charotar Publication, 2013

D. REFERENCE BOOKS

1. Rangwala S.C., *Airport Engineering*, Charotar Publication, 2013
2. Horenjeff R. and McKelvey F. *Planning and Design of Airports*, Fourth edition, McGraw Hill Company, New York, 1994.
3. Ashford N. and Wright P.H., *Airport Engineering*, Third edition, John Wiley and Sons, New York, 1992.


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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

Design of Steel Structures | CV I 604 | 3 Credits | 3 | 0 | 4

Session: Jan 21 – May 21 | Faculty: Dr. Shaik Hussain | Class: B.Tech Civil (VI Sem)

A. Course Outcomes: At the end of the course, students will be able to

- [CVI 604.1]. Understand the load transfer mechanism in steel structures
- [CVI 604.2]. Various connections in the steel structures and their applicability
- [CVI 604.3]. Design of various structural steel elements for flexure, compression and in truss members.
- [CVI 604.4]. The applicability of plastic analysis and how it varies from conventional design methods.

B. Syllabus

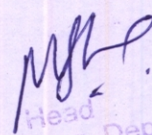
Introduction: Scope and use of structural steel. Structural fasteners: Bolted and welded connections. Design of Tension members: Design of axially loaded tension members for yielding, rupture and block shear - Sections with welded and bolted connections, lug angle. **Design of compression member** Design of axially loaded compression member - laced and battened columns, Design of column splices. Design of column base: Simple slab base, gusseted base and grillage foundation. **Design of flexural member:** Design of beams - laterally supported and laterally unsupported compression flange. Design of plate girder and gantry girder: Design of plate girder: proportioning of web, proportioning of flanges, stiffeners. Design of Gantry girder. **Plastic analysis:** Plastic theory, Shape factor, Upper bound and lower bound theory, application of these theory in beams with different support conditions, symmetrical and asymmetrical portal frame.

C. Text Books

1. N. Subramanian, "Design of Steel Structures", Oxford University press, New Delhi, 2008.
2. S.K. Duggal, "Limit State Method of Design of Steel Structures", Tata McGraw-Hill, New Delhi, 2010.

D. REFERENCE BOOKS

1. IS 800-2007: General Construction in Steel-Code of Practice (Third Revision), Bureau of Indian Standards, New Delhi.
2. SP: (6)-1964: Hand Book for Structural Engineers, Bureau of Indian Standards, New Delhi.


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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

DEPARTMENT OF CIVIL ENGINEERING

Course Hand-out

Structural Drawing | CVI630 | 1 Credits | 0 0 3 |

Session: Jan 21 - May 21 | Faculty: Mr. Charanjeet Singh | Class: B.Tech Civil VI SEM

A. Course Outcomes: At the end of the course, students will be able to:

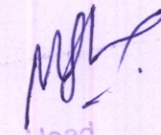
- [CVI630.1]. **Replicate** the reinforcement layout details of a residential building into a drawing
- [CVI630.2]. **Create** a detailed residential building/commercial building reinforcement layout.
- [CVI630.3]. **Use** computer software like Staad-Pro and AutoCAD to design and draw the reinforcement layout along with the section, elevation view.
- [CVI630.4]. **Learn** the procedures of submission of drawings and Develop working and submission Drawings for Different types of structures.
- [CVI630.5]. **Prepare, read and interpret** the drawings in a professional set up.

B. SYLLABUS

RCC design and detailing of one-way and two-way continuous slab, singly and doubly rectangular square isolated beam and T-beam, axial, biaxial and uniaxial column, Rectangular combined, isolated and raft footings, dog-legged type and open newel type staircase. Steel design and detailing of axial/uniaxial/biaxial loaded steel column with lacings, battening and splices, roof truss purlin and bearing plate, beam to beam and beam to column connection, Welded plate girder.

C. REFERENCE BOOKS

1. Krishnamoorthy, "*Structural Design and Drawing (Concrete Structures)*", CBS Publications, New Delhi 2008.
2. S.K. Duggal, "*Limit State Design of Steel Structures*", Tata McGraw Hill Education Private Limited - New Delhi, 2008.


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MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

DEPARTMENT OF CIVIL ENGINEERING

Course Hand-out

Computer Aided Design | CV1631 | ICredits | 0 0 2 |

Session: Jan 21-May 21 | Faculty: Mr. Kamal Kumar | Class: B.Tech VIth SEM

A. Course Outcomes: At the end of this course, students will be able to:

[CV 1631.1] **Comprehend** about different software used in civil engineering.

[CV 1631.2] **Design** and analysis of buildings using STAAD software and exposure to employment in similar industry.

[CV 1631.3] **Apply knowledge** of engineering fundamentals to analyse the results from software.

[CV 1631.4] **Use modern tools** for proper represents the results of software and entrepreneurial opportunities

B. SYLLABUS

Analysis of plane truss, space truss, palne frames, space frames by STAAD Pro V8i. Analysis of a four noded plate element with one end fixed and point load at free end in StaadPro V8i. Design of trusses using STAAD V8i software. Design of frames using STAAD Pro V8i software. Study of GIS and Remote Sensing software. Modelling of an isolated footing in STAAD Foundation V8i. Modelling of a dome structure using structure wizard in StaadPro V8i. Demonstration of packages in Engineering Management - MS-Project, and Estimation. Demonstration of packages in Transportation Engineering - Bentley MX Road Suite V8i, Bentley Power Civil for Country. Demonstration of packages in Environmental Engineering - Bentley SewerGEMS V8i, WaterGEMS V8i. Analysis and design of a G+4 reinforced concrete building in StaadPro StaadPro V8i

C. TEXT BOOKS

1. www.bently.com/ software manual

2. Design of R.C.C. Buildings using Staad Pro V8i with Indian Examples: Static and Dynamic Methods By TS Sharma

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(Signature of Student)

Date:

Registration No.

Name:

Signature of Student



MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

Environmental Engineering II | CVI660 | I Credits | 3 0 0 3

Session: January 21 – May 21 | Faculty: Prof. Anil Dutt Vyas | Class: Environmental Engineering II

A. Course Outcomes: At the end of the course, students will be able to:

- [CVI660.1] **Comprehend** about different characteristics of waste water.
- [CVI660.2] Design the sewer lines and the sewerage systems.
- [CVI660.3] Understand the various treatment systems of waste water.
- [CVI660.4] **Utilize the knowledge in Waste water disposal and reuse and design of house drainage.**

B. Syllabus

CVI660

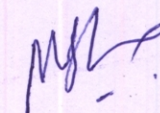
ENVIRONMENTAL ENGINEERING-II

[3 0 0 3]

Overview and general terms. Characteristics of sewage, standards of disposal into natural waters and on land, Indian standards. Collection of sewage, components of sewerage systems, systems of layout, quantity of sanitary sewage and variations. Hydraulic design of sewers. Treatment of sewage: Various unit and their purpose, sequence and efficiencies, preliminary treatment, screening and grit removal units, oil and grease removal, primary treatment, secondary treatment, activated sludge process, trickling filter, sludge digestion and drying beds, stabilization pond, septic tank, soakage systems, recent trends in sewage treatment. Advanced wastewater treatment - nutrient removal, solids removal. Waste water disposal and reuse: Disposal of sewage by dilution, self- purification of streams, sewage disposal by irrigation sewage farming, waste water reuse. Plumbing for design of buildings: Various systems of plumbing, layout of house drainage.

References:

1. Sawyer and Mc Carty, "*Chemistry for Environmental Engineering*" International student Edition, McGraw Hill Book Company, New York., 1994.
2. IS Standards 2490 - 1974, 3360 – 1974, 3307 – 1974, Indian Standard Institution, Manak Bhavan, New Delhi.
3. "*Manual on sewage and sewage treatment CPHEO*", Ministry of Urban development, New Delhi.
4. Metcalf and Eddy, "*Waste Water Engg, Treatment and Reuse*", Tata McGraw Hill, New Delhi, 1974.
5. "*Standard Methods*", APHEA, American Public Health Association, 1015 Fifteenth Street, NW Washington DC.
6. S. K. Garg, "*Environmental Engg- II*", Volume – II, Khanna Publishers, New Delhi, 2015.
7. G.S. Birdie, "*Water Supply and Sanitary Engineering*", Dhanpat Rai and Sons, New Delhi, 2012


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