



**MATS School of Engineering & I.T**  
**MATS University, Raipur**  
**Scheme of Teaching & Examination**  
**V<sup>th</sup> Semester**  
**B.Tech in Civil Engineering**



| S.N.         | code   | Subject  | Periods per week |          |          | Scheme of marks |            | Total Credit |
|--------------|--------|--|------------------|----------|----------|-----------------|------------|--------------|
|              |        |  | L                | T        | P        | ESE             | IM         |              |
| 1.           | BT540  | Soil Mechanics   | 4                | 0        | -        | 70              | 30         | 4            |
| 2.           | BT541  | Highway & Airport Engineering                                | 4                | 0        | -        | 70              | 30         | 4            |
| 3.           | BT542  | Reinforced Cement Concrete Design                            | 4                | 0        | -        | 70              | 30         | 4            |
| 4.           | BT543  | Water Supply Engineering                                     | 4                | 0        | -        | 70              | 30         | 4            |
| 5.           | BT544  | Engineering Hydrology  | 3                | 0        | -        | 70              | 30         | 3            |
| 6.           | BT545x | Open Elective – II   | 3                | 0        | -        | 70              | 30         | 3            |
| 7.           | BT546  | Vocational & Industrial Training Evaluation and Presentation | -                | -        | 2        | 30              | 20         | 1            |
| 8.           | BT547  | Soil Mechanics Laboratory                                    | -                | -        | 2        | 30              | 20         | 1            |
| 9.           | BT548  | Highway Engineering Laboratory                               | -                | -        | 2        | 30              | 20         | 1            |
| 10.          | BT549  | Water Supply Engineering Laboratory                          | -                | -        | 2        | 30              | 20         | 1            |
| <b>Total</b> |        |  | <b>22</b>        | <b>0</b> | <b>8</b> | <b>540</b>      | <b>260</b> | <b>26</b>    |

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

| Subject Code | Subject Name                             |
|--------------|--|
| BT5751       | Artificial Intelligence and Robotics     |
| BT5752       | Analog & Digital Communication           |
| BT5753       | Infrastructure Systems Planning          |
| BT5754       | Rural Technology & Community Development |
| BT5755       | Managing Innovation and Entrepreneurship |

**Semester: B.Tech 5<sup>th</sup> Sem**  
**Subject:- SOIL MECHANICS**

Total Theory Periods: - **40**

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

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

**Branch:- Civil Engineering**  
**Code:-BT540**

Total Tutorial Periods: **00**

**Objective of the Subject:**

1.  To provide basic knowledge about Geotechnical Engineering, soil formation, index properties of soil, physical and engineering properties of soil.
2.  To know about the types of soil according their classification, classification system, field identification, study of effective stress, capillary seepage force, etc.
3.  How to measure the compaction and permeability of soil by lab experiments theoretically uses of Darcy law. Two dimensions flow and develop flow net and characteristics.
4.  To know about stresses due to applied load a soil mass, consolidation and their factor one dimensional consolidation as per Terzaghi theory
5.  To find shear strength in soil with the help of Mohr circle. How shear strength can be determine in laboratory, soil exploration.

**Unit 1**

**INTRODUCTION :**

Introduction to Soil Mechanics and Geotechnical Engineering; Unique nature of soil; Soil formation and soil types, interrelationship of soil, aim and scope of soil mechanics. Index Properties of Soil : Basic definitions; phase relations; physical and engineering properties of soil, soil grain and properties coarse and fine grained soils, Stoke's law, method of fine grained analysis.

**Unit 2**

**SOIL CLASSIFICATION AND EFFECTIVE STRESS :**

Clay mineralogy, soil structure, Indian standard soil classification system, Purpose of soil Classification, Different System of soil Classification, Field Identification, Principal of Effective Stress and Related Phenomena, Types of soil moisture; capillarity; seepage force and quicksand condition

**Unit 3 COMPACTION, PERMEABILITY AND SEEPAGE ANALYSIS OF SOIL :**

Compaction theory, laboratory compaction tests, method of compaction control, permeability, one dimensional flow, permeability of soil, Darcy's law, laboratory methods of determination, pumping out tests for field determination of permeability, seepage through soils, two-dimension flow problems, confined flow and unconfined flow, flow nets and their characteristics, exit gradient and failure due to piping, criteria for design of filters.

**Unit 4 STRESSES DUE TO APPLIED LOADS AND CONSOLIDATION :**

Stresses due to applied Loads, Boussinesq equation of vertical pressure under concentrated loads, rectangularly loaded area, circular Loaded Area Newmart's Chart, Westergoard's equation, compressibility, effects of soil type, stress history and effective stress on compressibility, consolidation, factors affecting consolidation and compressibility parameters. normally consolidated and over consolidated soils, different forms of primary consolidation equation – transient flow condition, Terzaghi theory of one-dimensional consolidation and time rate of consolidation.

**Unit 5**

**Shear Strength and Soil Exploration :**

Introduction, stress at a point and Mohr's stress circle; Mohr-Columb Failure criterion: Laboratory tests for shear strength determination; shear strength parameters; UU, CU and CD tests and their relevance to field problems; Shear strength characteristics of normally consolidated and reconsolidated clays; Shear strength Characteristics of sands, Soil Exploration, Various Method of field

Exploration, Undisturbed Soil Sampling equipments and Field test (Static & Dynamic Penetration Test, Field Vane Shear Test), modern electronic test of site characterisation..

**Text Books:** 1. Soil Mechanics and Foundations – B.C. Punmia, A. K. Jain, A. K. Jain (Laxmi Publication)  
2. Soil Engineering in Theory and Practice (Vol-II) – Alam Singh (Asia Publishing House)

**Name of Reference Books:** 1. Soil Mechanics and Foundation Engineering – S.N. Murthy (Dhanpat Rai Publications)  
2. Basic and Applied Soil Mechanics – Gopal Ranjan and Rao A.S.R. (New Age International)  
3. Design Aids in Soil Mechanics and Foundation Engineering – S.R. Kaniraj (Tata McGraw Hill)  
4. Geotechnical Engineering Principles and Practice – D. P. Coduto (Prentice Hall of India)  
5. Soil Mechanics and Foundation Engineering – Garg S.K. (Khanna Publishers)  
6. Soil Mechanics and Foundation Engineering – Purushothama Raj (Pearson Education)  
7. Text Book of Geotechnical Engineering – I. H. Khan (PHI Learning)  
8. Foundation Engineering – R. B. Peck, W. E. Hanson, and T. H. Thornburn (John Wiley)  
9. Foundation Design and Construction – M. J. Tomlinson (Pearson Education)

**Outcomes of the Subject:**

1. Know about soil and development of soil mechanics and soil formation and characteristic of soil.
2. Field identification, soil classification system.
3. Study the lab experiments and simulations of experiment result with the theoretical characteristic of soil.
4. Study of different theory Newmark Charts, Westergaard and Boussinesq equation.
5. Able to find at experiment, shear strength of soil and different method of soil exploration.

**MATS UNIVERSITY  
GULLU, ARANG, RAIPUR**

**Semester: B.Tech 5<sup>th</sup> Sem  
Engineering**

**Branch: - Civil**

**Subject:-Highway & Airport Engineering Code:-BT541**

Total Theory Periods: - **40**

Total Tutorial Periods: **00**

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

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

**Course Objectives:**

1. Be familiar with principles of Highway planning & Geometric design.
2. Fundamental Concepts of Traffic Engineering.
3. Learning different highway materials & their testing.
4. Learning pavement design & its Construction.
5. Learning different aspect of Airport planning.

## **UNIT- 1                    PRINCIPAL OF HIGHWAY PLANNING**

Road development and planning in India Highway alignment, requirements. Engineering Surveys for highway location Maps and Drawing. Elements of Transportation Engineering (Vehicle, Driver, Terminal and Control).Geometric Design:Cross Section elements of horizontal and vertical Alignment. Highway drainage, Surface and subsoil drainage. Geometry of Hill Roads, curve layout.

## **UNIT-2                    TRAFFIC ENGINEERING**

Introduction to Traffic flow theory speed-density, speed-flow and flow-density relation, data collection techniques for traffic parameters and delay studies, parking facilities, etc. and their uses. Traffic control. Devices, Prevention of road accidents, rotary intersection, highway lighting, Highway materials: Behavior of highway materials, properties of Sub grade and pavement component materials. Tests on sub grade soil, Aggregate and bituminous materials.

## **UNIT- III                    Pavement Design –**

Study of flexible and rigid pavements, Basic concepts of pavement analysis and design. Stresses in rigid pavements. I.R.C. recommendations.

## **UNIT-3                    PAVEMENT CONSTRUCTION TECHNIQUES AND QUALITY CONTROL**

Types of Pavements water bound macadam, bituminous and cement concrete pavements. Joints in cement concrete pavements, pavement failures. Modern materials in pavements.

## **UNIT-4                    AIRPORT PLANNING**

Definition of terms related to airport engineering, factors affecting site, selection, obstructions, various surveys for site selection, zoning laws. Classification of Obstructions Runways Orientation, Basic runway length and its corrections. Geometric design, runway configuration taxiways layout geometric, Standards, exit taxiways fillets separation.

### **Text Books:**

1. Principle and Practices of Highway Engineering – Kadiyali (Khanna Publishers, Delhi)
2. Highway Engineering – S. K. Khanna& C.E.G. Justo (Khanna Publishers, Delhi)

Reference Books: 1. Air-port planning and Design – Khanna and Arora (Khanna Publishers, Delhi).

2. Highway Engineering – Rangawala S.C. (Charotar Publishers).
3. Specifications for Road and Bridge Works – MOST (IRC Publishers).

### **Course Outcomes:**

1. Students are expected to understand highway planning & design .
2. Students are expected to understand traffic Engineering.
3. Students are expected to understand & evaluate highway construction material.
4. Students are expected to develop exposure in pavement design.
5. Students are expected to learn airport planning.

**MATS UNIVERSITY  
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**Semester: B.Tech 5<sup>th</sup> Sem  
Engineering**

**Branch: - Civil**

**Subject:-Reinforced Cement Concrete Design      Code:-BT542**

Total Theory Periods: - **40**

Total Tutorial Periods: **00**

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

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

**Objective of the Subject:**

1. To educate the student about the concept of reinforced cement concrete and different method of design of reinforced concrete.
2. To educate the student about concept of working stress method to analysis and design of beams.
3. To educate the student about concept of limit state method to analysis and design of beams, slabs and columns.
4. To educate the student about analysis and design of footings and staircases by limit state method.

**UNIT -1**

**BASIS OF WORKING STRESS METHOD**

Properties of Concrete and reinforcing steel, stress-strain curves, permissible stresses, modular ratio, loads on structure, Basis for design by working stress method. Analysis and design of singly reinforced and doubly reinforced sections by working stress method, shear in beams.

### **UNIT -2** **LIMIT STATE METHOD**

Rectangular Beams: Introduction to limit state method, characteristic loads, partial safety factor, limit state of flexure – assumptions, stress block parameters, neutral axis, analysis and design of singly and doubly reinforced section, shear in beams, bond and development length, design of lintels.

### **UNIT -3** **LIMIT STATE METHOD**

T-Beams and Slabs: Properties of T-section, moment of resistance and design of singly reinforced T-beam. Dead loads, imposed loads, thickness of slabs, modification factors, effective span, reinforcement in slab, design of one way slab and two way slabs.

### **UNIT -4** **LIMIT STATE METHOD**

Columns: Axially loaded short columns, minimum eccentricity, longitudinal and transverse reinforcement, effective length of column, safe load on columns, circular columns,  $P_u - M_u$  interaction curves, combined axial load and uni-axial bending, combined axial load and bi-axial bending.

### **UNIT -5** **LIMIT STATE METHOD**

Staircases and Column Footings: Design of stairs – dog legged stair, open newel stair. General principle of design of reinforced concrete footing, proportioning of footings, edge thickness, depth of footing, design of isolated column footings – square and rectangular footings.

#### **Text Books:**

1. Limit State Design of Reinforced Concrete – B. C. Punmia, A. K. Jain and A. K. Jain (Laxmi Publications)
2. Limit State Theory and Design of Reinforced Concrete (IS:456-2000) – V. L. Shah and S. R. Karve (Structures Publications, Pune)
3. Reinforced Concrete Design – S. U. Pillai and D. Menon (Tata McGraw Hill)

#### **Reference Books:**

1. Relevant IS codes IS: 456:2000, IS 875, Part 1, 2
2. Reinforced Concrete Structures – Dayaratam P. (Oxford and IBH Publishing Co.)
3. Reinforced Concrete Limit State Design – Jain, A.K. (Nem Chand and Bros. Roorkee)
4. Fundamentals of Reinforced Concrete Design – M. L. Gambhir (PHI Learning)
5. Design of Reinforced Concrete Structures – M. L. Gambhir (PHI Learning)
6. Design Aids for Reinforced Concrete to I.S.-456-1978 – SP-16, 1980 (Bureau of Indian Standards, New Delhi)

#### **Outcomes of the Subject:**

1. Understand the importance of reinforced concrete structure.
2. Understand the different method of analysis and design of reinforced concrete structures.
3. Understand the procedure of analysis and design of beams by working stress and limit state method.
4. Understand the procedure of analysis and design of other elements such as slabs, columns, footings and staircases.

**MATS UNIVERSITY  
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**Semester: B.Tech 5<sup>th</sup> Sem  
Engineering**

**Branch: - Civil**

**Subject:- Water Supply Engineering**

**Code:-BT543**

Total Theory Periods: - **40**

Total Tutorial Periods: **00**

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

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

**Course Objective:**

1. To provide fundamental awareness about the water sources, population forecasting, water quality.
2. To develop an interest in pursuing the subject for P.G. studies because environmental pollution and its management is a critical topic of the hour.
3. To develop skills of designing a water treatment plant.
4. Developing a professional skill for design of water distribution system and environmental problems related to civil engineering.

**UNIT-1**

**INTRODUCTION**

Necessity and importance of water supply schemes. Water demand: Classification of water demands, Estimation of quantity of water required by a town, per capita demand, factors affecting per capita demand, design period and population forecasting, variation in water demand.

Sources of water supply Surface sources and underground sources, Intake works, site selection, type of intake works.

## **UNIT-2** **QUALITY OF WATER**

Common impurities, physical, chemical and biological characteristics of water, water quality standards for municipal and domestic supplies. Water Processing: Object of water processing, flow diagrams of typical ground water system and surface water systems. Sedimentation. Theory of sedimentation, sedimentation tanks and its types, design parameters related with sedimentation tanks, sedimentation with coagulations, coagulants and coagulant aids, Jar test for determining coagulant dosage.

## **UNIT-3** **FILTRATION**

Theory of filtration, slow sand and rapid sand filters, Construction and operation. Disinfection: Methods of disinfection, Chlorination, Types of chlorination, Break Point chlorination.

## **UNIT-4** **SOFTENING**

Methods of Softening, Iron Removal, Fluoridisation. Distribution System: Methods of distribution, layout of distribution system, methods of analysis, pressure in the distribution system, distribution reservoirs, functions and its types, storage capacity of distribution reservoir.

## **UNIT-5** **AIR POLLUTION**

Introduction, causes, sources, characteristics, effects of air pollution on plants, humans, animals and materials and atmosphere, air pollution control methods and equipment

**Text Books:** 1. Water Supply Engineering – S.K. Garg (Khanna Publication).  
2. Water Supply Engineering – B.C. Punmia, A. K. Jain, A. K. Jain (Laxmi Publications)

**Reference Books:** 1. Environmental Engineering – Peavy and Rowe (Tata McGraw Hill).  
2. Water Supply and Sanitary Engineering – G.S. Birdi (Dhanpat Rai Publications).  
3. Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications)  
4. Environmental Science and Engineering – Henry and Heinke (Pearson Education)

### **Outcome:**

1. Provide deep understanding about planning, designing, construction and monitoring of a water treatment plant as per a city's water demand.
2. Students possess the ability to design an analysis the complexities of water distribution system.
3. Ability to give meaningful result to the water supply project they get in hand.
4. Have a appreciation for the scope, complexity and requirement to treat the subject as the need of the hour and has a positive attitude to earth environment and its protection.



**MATS UNIVERSITY  
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**Semester: B.E.5<sup>th</sup> Sem  
Engineering**

**Branch: - Civil**

**Subject:- Engineering Hydrology**

**Code:-BT544**

Total Theory Periods: - **40**

Total Tutorial Periods: **10**

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

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

**Objectives of the Subject:**

1. To understand basic concepts of hydrology and hydrologic cycle
2. To understand the concepts of precipitation and its measurement.
3. To learn about runoff and estimation of runoff.
4. Be familiar with the concepts of hydrograph.
5. To understand the concepts of ground water.

**Unit 1**

**INTRODUCTION**

Definition and scope, Hydrology in relation to water resources development, Hydrologic Cycle, The necessity for hydrologic data, the global water budget, Practical applications. Hydrometeorology : Introduction, constituents of atmosphere, the weather and the atmosphere, the general circulation, air masses and fronts, climate and weather seasons in India.

**Unit 2**

**PROBABILITY AND STATISTICS**

Introduction, probability and random variable, Distribution Functions, Selection of Distribution Function and Estimation of Parameters, Frequency analysis, correlation and Regression analysis. B.Precipitation : Forms of precipitation, measurement of precipitation, Recording and Non-recording type of rain gauges, Typical and record rainfall data, errors in measurement of rainfall. Location of rain gauge stations, analysis and interpretation of rainfall data, Average depth of rainfall over area, Probable maximum precipitation (PMP).

### **Unit 3 INFILTRATION AND RUN OFF**

Introduction, factors affecting in filtration, measurement of infiltration, infiltrometers, infiltration equations, infiltration indices, effect of infiltration on runoff and recharge of ground water, Runoff, components of runoff, estimation of runoff, calculations by infiltration method, rainfall-runoff relationship, rational method of estimating runoff, Basin yield. B. Stream-Flow Measurement : Introduction, Measurement of stage, discharge measurement by various methods, stage-discharge relationships, rating curve, stream gauging network, units of stream flow.

### **Unit 4 HYDROGRAPH ANALYSIS**

Introduction, characteristics of the hydrograph, Effect of rainfall distribution on the shape of hydrograph, hydrograph separation, Unit hydrograph, Derivation of the unit hydrograph, Unit hydrograph from the complex storms-hydrograph, applications of Unit hydrograph.

### **Unit 5 EVAPORATION AND EVAPOTRANSPIRATION**

Introduction, evaporation process, Factors affecting evaporation, estimation of evaporation, measurement of evaporation, reducing evaporation from water surfaces, transpiration, Evapotranspiration B. Ground Water : Introduction, occurrence of ground water, aquifer parameters, ground water movement, Darcy's Law, permeability, steady and unsteady flow to wells in Confined and Unconfined aquifers, ground water exploration, Safe yield.

**Name of Text Books:** Engineering Hydrology- K. Subramanya (Tata McGraw Hill) A Text Book of Hydrology- Dr. P. Jaya Rami Reddy (Laxmi Publications) Name of Reference Books: Hydrology Principles and Analysis - H.M. Raghunath (New Age International Publication) Applied Hydrology - Ven Te Chow, David R. Maidment, Larry W. Mays (McGraw Hill) Applied Hydrology- Linsely R.K. Kohler, M.A. and J.L.H. Paulhus (McGraw Hill) Hydrology for Engineers and Planners- Cassidy W.C. (Iowa State University Press)

#### **Outcomes of the Subject:**

1. Students are able to understand the concepts of hydrologic cycle and are able to explain the practical application of hydrology.
2. Students should be able to analyze the rainfall data.
3. Students can explain the effects of infiltration on runoff.
4. Students should be able to develop the unit hydrograph.
5. Students can estimate the ground water flow.



Introduction to project management processes - Initiating, Planning, Executing, Controlling, and Closing processes; Project Integration Management - Project plan development, Project plan execution, and Overall change control; Project Scope Management - Initiation, Scope planning, Scope definition, Scope verification, and Scope change control.

#### **UNIT 4                      CONTRACTS AND MANAGEMENT OF CONTRACTS**

Engineering contracts and its formulation, Definition and essentials of a contract, Indian Contract Act 1872, types of contracts and clauses for contracts, Preparation of tender documents, Issues related to tendering process, Awarding contract.

#### **UNIT 5    CITY PLANNING**

Evolution of cities; principles of city planning; types of cities & new towns; planning regulations and building byelaws; eco-city concept; sustainable development. Concept of housing; neighbourhood concept; site planning principles; housing typology; housing standards; housing infrastructure; housing policies, finance and management; housing programs in India; self help housing.

#### **Name of Text Books:**

A. S. Goodman and M. Hastak, Infrastructure planning handbook: Planning, engineering, and economics, McGraw-Hill, New York, 2006. J. Parkin and D. Sharma, Infrastructure planning, Thomas Telford, London, 1999. • P. Chandra, Projects: Planning, analysis, selection, financing, implementation, and • review, Tata McGraw-Hill, New Delhi, 2009. J. D. Finnerty, Project financing - Asset-based financial engineering, John Wiley • & Sons, New York, 1996. L. Squire and H. G. van der Tak, Economic analysis of projects, John Hopkins University • Press, London, 1975.

#### **Course Outcomes:**

1. Students are expected to understand to learn the subject well and use it in practicality
2. Students are expected to understand the need of this subject and can manage to use it with other technology
3. Students are expected to understand the restrictions in use of this subject

**MATS UNIVERSITY**  
**GULLU, ARANG, RAIPUR**

**Semester: B.E.5<sup>th</sup> Sem**  
**Engineering**

**Branch: - Civil**

**Subject:-Artificial Intelligence and Robotics**  
**BT5751**

**Code:-**

Total Theory Periods: - **40**

Total Tutorial Periods: **10**

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

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

**Course Objectives:**

1. Make student understand the subject and its uses in engineering
2. To make students understand the basics and utilize them according to modern needs
3. To make students learn the problems faced while using this subject and how to prevent those problems

**UNIT 1**

**INTRODUCTION**

Robot anatomy-Definition, law of robotics, History and Terminology of Robotics-Accuracy and repeatability of Robotics-Simple problems Specifications of Robot-Speed of Robot-Robot joints and links-Robot classifications-Architecture of robotic systems-Robot Drive systems Hydraulic, Pneumatic and Electric system.

**UNIT 2**

**END EFFECTORS AND ROBOT CONTROLS**

Mechanical grippers-Slider crank mechanism, Screw type, Rotary actuators, cam type-Magnetic grippers-Vacuum grippers-Air operated grippers-Gripper force analysis-Gripper design-Simple problems-Robot controls-Point to point control, Continuous path control, Intelligent robot-Control system for robot joint-Control actions-Feedback devices-Encoder, Resolver, LVDT-Motion Interpolations-Adaptive control.

**UNIT 3**

**ROBOT TRANSFORMATIONS AND SENSOR**

Robot kinematics-Types- 2D, 3D Transformation-Scaling, Rotation, Translation- Homogeneous coordinates, multiple transformation-Simple problems. Sensors in robot – Touch sensors-Tactile sensor – Proximity and range sensors – Robotic vision sensor-Force sensor-Light sensors, Pressure sensors. 4 RB-2013 SRM

#### **UNIT 4                    ROBOT CELL DESIGN AND APPLICATIONS**

Robot work cell design and control-Sequence control, Operator interface, Safety monitoring devices in Robot-Mobile robot working principle, actuation using MATLAB, NXT Software Introductions-Robot applications Material handling, Machine loading and unloading, assembly, Inspection, Welding, Spray painting and undersea robot.

#### **UNIT 5                    MICRO/NANO ROBOTICS SYSTEM**

Micro/Nanorobotics system overview-Scaling effect-Top down and bottom up approach- Actuators of Micro/Nano robotics system-Nanorobot communication techniques-Fabrication of micro/nano grippers-Wall climbing micro robot working principles-Biomimetic robot-Swarm robot-Nanorobot in targeted drug delivery system.

#### **REFERENCES .**

S.R. Deb, Robotics Technology and flexible automation, Tata McGraw-Hill Education., 2009 2. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, McGraw Hill, 2012 3. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning., 2009. 4. Francis N. Nagy, Andras Siegler,

#### **Course Outcomes:**

1. Students are expected to understand to learn the subject well and use it in practicality
2. Students are expected to understand the need of this subject and can manage to use it with other technology
3. Students are expected to understand the restrictions in use of this subject

**MATS UNIVERSITY  
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**Semester: B.E.5<sup>th</sup> Sem  
Engineering**

**Branch: - Civil**

**Subject:- Analog & Digital Communication**

**Code:-BT5752**

Total Theory Periods: - **40**

Total Tutorial Periods: **10**

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

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

**Course Objectives:**

1. Make student understand the subject and its uses in engineering
2. To make students understand the basics and utilize them according to modern needs
3. To make students learn the problems faced while using this subject and how to prevent those problems

**UNIT - 1**

**AMPLITUDE MODULATION**

Introduction to communication system, Need for modulation, Frequency Division Multiplexing, Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves: Square law detector, Envelop detector, Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSB-SC Modulated waves, COSTAS Loop.

**UNIT - 2**

**SSB MODULATION**

Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves, Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelop detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

**UNIT - 3**

**ANGLE MODULATION**

Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band

FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM and AM.

#### **UNIT – 4 NOISE IN ANALOG COMMUNICATION SYSTEM**

Types of Noise: Resistive (Thermal) Noise Source, Shot noise, Extraterrestrial Noise, Arbitrary Noise Sources, White Noise, Narrowband Noise- In phase and quadrature phase components and its Properties, Modeling of Noise Sources, Average Noise Bandwidth, Effective Noise Temperature, Average Noise Figures, Average Noise Figure of cascaded networks.Noise in DSB and SSB System Noise in AM System, Noise in Angle Modulation System, Noise Triangle in Angle Modulation System, Pre-emphasis and de-emphasis.

#### **UNIT - 5 RECEIVERS**

Radio Receiver - Receiver Types - Tuned radio frequency receiver, Superhetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting.

#### **PULSE MODULATION:**

Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation and demodulation of PWM, PPM, Generation and demodulation of PPM, Time Division Multiplexing.

#### **TEXTBOOKS :**

1. Communication Systems - Simon Haykin, 2 Ed, Wiley Publications.
2. Communication Systems – B.P. Lathi, BS Publication, 2004.

#### **REFERENCES BOOKS:**

1. Electronic Communications - Dennis Roddy and John Coolean, 4th Edition, PEA, 2004.
2. Electronic Communication Systems - Modulation and Transmission - Robert J. Schoenbeck, 2nd Edition, PHI.
3. Analog and Digital Communication - K. Sam Shanmugam, Wiley, 2005.
4. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
5. Principles of Communication Systems - H Taub & D. Schilling, Gautam Sahe, TMH, 2007, 3rd Edition

#### **Course Outcomes:**

1. Students are expected to understand to learn the subject well and use it in practicality
2. Students are expected to understand the need of this subject and can manage to use it with other technology
3. Students are expected to understand the restrictions in use of this subject



**MATS UNIVERSITY  
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**Semester: B.E.5<sup>th</sup> Sem  
Engineering**

**Branch: - Civil**

**Subject:-Rural Technology & Community Development**

**Code: BT5754**

Total Theory Periods: - **40**

Total Tutorial Periods: **10**

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

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

**Course Objectives:**

1. Make student understand the subject and its uses in engineering
2. To make students understand the basics and utilize them according to modern needs
3. To make students learn the problems faced while using this subject and how to prevent those problems

**Unit 1 CONCEPTS AND CONNOTATIONS OF RURAL DEVELOPMENT**

Concepts of Rural Area and Rural Development, Definition and Scope of Rural Development; Causes of Rural Backwardness, Need for Rural Development, Experiments in Rural Development before Independence .

**Unit 2 MEASURES OF DEVELOPMENT**

Population Growth in India: Size and growth rate, Population and economic development, Population policy, Work participation rate, Occupational structure and economic development, Concept of poverty line, Incidence of poverty, Human poverty, Rural poverty, Measures of rural poverty, Strategy of poverty alleviation programme and its evaluation, Rural Work Force, Problems of Unemployment and Underemployment in Rural Areas.

**Unit 3 PARADIGMS OF RURAL DEVELOPMENT**

Modernisation Theory; Dependency Theory of the Marxist School; Rosenstein- Rodan's theory; Leibenstein's theory, Gandhian Model of Rural Development; The Human capital Model of Development.

#### **Unit 4    DETERMINANTS OF RURAL DEVELOPMENT**

Factors affecting rural development- Changes in Output, Changes in the utilization of natural resources, Changes in employment, An increase in capital, Changes in technology, Changes in the organizational & institutional framework, Relation between rural development and its determinants.

#### **Unit 5    CASE STUDIES IN RURAL DEVELOPMENT**

Rural Development in developing countries: Nepal, Malaysia, Srilanka, Pakistan and African countries.

#### **Name of Text Books:**

1. Katar Singh, (2009), "Rural Development", Sage Publications. 2. Komol Singh (ed.), (2009), "Village Development in North-East India", Concept Publishing Company. 3. Gautam Patikar, Komol Singha (2010), "Rural Development in North-East India", Concept Publishing Company. 4. Bimal J Deb, (2002) " Development priorities in North- East India", Bimal J Deb, " Development priorities in North- East India". 5. N.Lalitha, (2004) " Rural Development in India: Emerging Issues and Trends", Dominant Publishers. 6. Jaynal U. Ahmed, (2010) "Development scenario of North-East India", Gyan Publishers.

#### **Course Outcomes:**

1. Students are expected to understand to learn the subject well and use it in practicality
2. Students are expected to understand the need of this subject and can manage to use it with other technology
3. Students are expected to understand the restrictions in use of this subject

**MATS UNIVERSITY  
GULLU, ARANG, RAIPUR**

**Semester: B.E.5<sup>th</sup> Sem  
Engineering**

**Branch: - Civil**

**Subject:-Managing Innovation And Entrepreneurship**

**Code: BT5755**

Total Theory Periods: **-40**

Total Tutorial Periods: **10**

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

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

**Course Objectives:**

1. Make student understand the subject and its uses in engineering
2. To make students understand the basics and utilize them according to modern needs
3. To make students learn the problems faced while using this subject and how to prevent those problems

**UNIT-1 INNOVATION**

Innovation: innovation- an abstract concept; creativity, innovation and imagination; types of innovation -classified according to products, processes or business organizations.

**UNIT-2 ENTREPRENEURSHIP**

Entrepreneurship: who is an entrepreneur? Entrepreneurship- A state of Mind, Emergence of entrepreneur; Role of Entrepreneur; A Doer not a Dreamer- Characteristics of an entrepreneur; Factors affecting entrepreneurial growth – Social, cultural, personality factors, psychological and Social Factors. Impact of Entrepreneurship for sustainable development.

**UNIT-3 CHARACTERISTICS OF ENTREPRENEURSHIP**

Difference between entrepreneur and entrepreneurship, Difference between entrepreneur and intrapreneur, Common Entrepreneurial competencies/Traits; Entrepreneurship stimulants, Obstacles inhibiting Entrepreneurship; Types of entrepreneurs, Functions of an entrepreneur.

**Unit 4 BUSINESS ORGANISATION**

Identification of Business Opportunities: Introduction, Sources of Business of Product Ideas, Steps in Identification of Business opportunity and its SWOT Analysis.

## **UNIT-5 PLANNING OF PROJECT**

Techno-Economic Feasibility of the project: Introduction, Techno-Economic feasibility of the Project, Feasibility Report, Considerations while preparing a Feasibility Report, Proforma of Feasibility Report, Role of Institutions and entrepreneurship.

### **Text and Reference Books:**

1. Competing through Innovation-Bellon & Whittington, Prentice Hall of India
2. A Guide to Entrepreneurship – David Oates- JAICO Publishing House.
3. Entrepreneurship- Rober D Hisrich, Peters, Shepherd- TMH
4. Entrepreneurship in Action- Coulter, Prentice Hall of India
5. Entrepreneurship Management and Development – Ajith Kumar, HPH
6. Fundamentals of entrepreneurship- Mohanty, PHI

### **Course Outcomes:**

1. Students are expected to understand to learn the subject well and use it in practicality
2. Students are expected to understand the need of this subject and can manage to use it with other technology
3. Students are expected to understand the restrictions in use of this subject

**MATS UNIVERSITY**  
**GULLU, ARANG, RAIPUR**

**Semester: B.Tech 5<sup>th</sup> Sem**

**Subject:- SOIL MECHANICS LAB**

Total Theory Periods: - **40**

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

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

**Branch:- Civil Engineering**

**Code:-BT547**

Total Tutorial Periods: **10**

**Experiments to be performed (Min 10 experiments)**

1. Determination of water content dry density relation using light-compaction test.
2. Determination of water content dry density relation using heavy compaction test.
3. To determine California Bearing Ratio for the designing of pavements, laboratory determination of CBR test. 3. To determine in-situ bearing value of subgrade by North Dakota Cone Apparatus.
4. Direct Shear Test on the (1) Dry cohesionless / cohesive soil specimen remoulded / unremoulded (2) Direct shear test – undrained test, direct shear test-consolidated undrained.
5. Triaxial Compression Test (Triaxial compression test): (a) UU, (b) CU, (c) CC.
6. Determination of bearing capacity of soil by Triaxial UU Test.
7. Determination of Unconfined Compression Strength of cohesive soils (Remoulded / Unremoulded) 8. Laboratory Vane Shear Test (Remoulded / Unremoulded)
9. Consolidated test (Remoulded / Unremoulded) Consolidated test (Fixed Ring / Floating Ring).
10. To determine swelling pressure of purely cohesive soil (Remoulded / Unremoulded specimen). 11. Determination of density index (relative density) of cohesionless soils.
12. Determination of bearing capacity of soil by plate load. 11. Study of standard penetration test. 12. Study of cyclic plate load test
13. Study of field vane shear test.
14. Study of field CBR Test
15. Study of ground improvement techniques

**MATS UNIVERSITY  
GULLU, ARANG, RAIPUR**

**Semester: B.E.5<sup>th</sup> Sem  
Engineering**

**Branch: - Civil**

**Subject:-Highway Engineering Lab**

**Code:-BT548**

**Total Practical Periods: 40**

**Experiments to be performed (min 10 experiments)**

1. Determination of crushing value of aggregates.
2. To determine 10 percent finer value.
3. Determination of abrasion value by Los Angle's Machine.
4. Determination of abrasion value by Deval's Abrasion Machine.
5. Determination of Impact Value of aggregates.
6. Determination of Specific Gravity and Water Absorption of aggregate.
7. Determination of Softening Point of Bitumen.
8. Determination of Ductility Value of Bitumen.
9. Determination of Viscosity Value of Bitumen.
10. Determination of Elongation Index of Aggregate.
11. Determination of Flakiness Index of aggregate.
12. Determination of Penetration Value of Bitumen.
13. Flash and Fire Point Test.
14. Study of Marshal Stability Test.
15. Study of Benkelman Beam.

**List of Equipments / Machine Required:**

Ring and Ball Apparatus  
Standard Penetrometer  
Los Angles Abrasion Machine  
Deval's Abrasion Machine  
Ductility Testing Machine  
Tar Viscometer  
Sieve Shaker  
Standard I.S. Sieves for Fine and Coarse Aggregate  
Length Gauge  
Thickness Gauge  
Crushing Value Cylinder and Mould with Plunger  
Aggregate Impact Testing Machine  
Flash and Fine Point Apparatus  
Benkelman Beam  
Hot Air Oven  
Water Bath  
Marshall Stability Machine and with Mould  
Proving Ring and Dial Gauge

Weighing Balance up to 10 kg capacity

**Name of Text Books:**

Highway Engineering – Justo & Khanna (Khanna Publishers)

Highway Engineering Manual – Justo & Khanna (Khanna Publishers)

**MATS UNIVERSITY  
GULLU, ARANG, RAIPUR**

**Semester: B.E.5<sup>th</sup> Sem  
Engineering**

**Branch:- Civil**

**Subject: Water supply Engineering Lab**

**Code:-BT549**

**Experiments to be performed (Min 10 experiments)**

1. To determine acidity of water sample.
2. To determine alkalinity of water sample.
3. To determine hardness of water sample.
4. To determine chloride content of water sample.
5. To determine D.O. content of water sample.
6. To estimate the quantity of BOD from water sample.
7. To determine the availability of chlorine in bleaching powder.
8. To determine the residual quantity of Cl<sub>2</sub> Content.
9. Determination of quantity of Optimum Coagulant Dose.
10. Determination of Break Point Chlorination.
11. Determination of Total Solids.
12. Determination of Turbidity.
13. Determination of particulates in air.
14. Determination of MPN.
15. Determination of pH of water.

**List of Equipments / Machine Required:**

BOD Incubator

Dust Sampler

Turbidity meter

Microscope

pH meter

Muffle Furnace

Hot Air Oven

Jar Test Apparatus

**Name of Text Books:**

Environmental Engineering Lab Manual – Dr. B. Kottaiah & N. Kumaraswamy (Charotar Publications)

Water Supply Engineering – S.K. Garg (Khanna Publication).

Water Supply Engineering – B.C. Punmia (Laxmi Publication, New Delhi)

Environmental Science and Engineering – Henry and Heinke (Pearson Education).