

**VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY HYDERABAD**  
**B.TECH. II YEAR**  
**DEPARTMENT OF CIVIL ENGINEERING**

**III SEMESTER**

**R22**

Course Code	Title of the Course	L	T	P/D	CH	C
22BS1MT201	Probability Statistics and Time Series	2	1	0	3	3
22HS1MG201	Engineering Economics and Accountancy	3	0	0	3	3
22PC1CE201	Strength of Materials-I	3	0	0	3	3
22PC1CE202	Concrete Technology	3	0	0	3	3
22PC1CE203	Fluid Mechanics	3	0	0	3	3
22PC2CE201	Strength of Materials Laboratory	0	0	2	2	1
22PC2CE202	Concrete Laboratory	0	0	2	2	1
22PC2CE212	Advanced Surveying Laboratory	0	0	2	2	1
22PW4CE201	Design Thinking	1	0	2	3	2
22MN6HS103	Happiness and Wellbeing	2	0	0	2	0
<b>Total</b>		<b>17</b>	<b>1</b>	<b>8</b>	<b>26</b>	<b>20</b>

**IV SEMESTER**

**R22**

Course Code	Title of the Course	L	T	P/D	CH	C
22PC1CE204	Strength of Materials-II	3	0	0	3	3
22PC1CE205	Structural Analysis	3	0	0	3	3
22PC1CE206	Hydraulic Engineering and Hydraulic Machines	3	0	0	3	3
22PC1CE207	Transportation Engineering	3	0	0	3	3
22ES1ME211	Electrical Technology and Mechanical Technology	3	0	0	3	3
22PC2CE216	Fluid Mechanics and Hydraulic Machines Laboratory	0	0	2	2	1
22PC2CE207	Transportation Engineering Laboratory	0	0	2	2	1
22SD5CE201	Computer Aided Drafting Laboratory	0	1	2	3	2
22SD5CE202	Field Project	0	0	2	2	1
22MN6HS201	Intellectual Property Rights	2	0	0	2	0
<b>Total</b>		<b>17</b>	<b>1</b>	<b>8</b>	<b>26</b>	<b>20</b>

L – Lecture      T – Tutorial      P – Practical      D – Drawing      CH – Contact Hours/Week  
C – Credits      SE – Sessional Examination      CA – Class Assessment      ELA – Experiential Learning Assessment  
SEE – Semester End Examination      D-D – Day to Day Evaluation      LR – Lab Record  
CP – Course Project      PE – Practical Examination

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. III Semester

### (22BS1MT201) PROBABILITY, STATISTICS AND TIME SERIES

TEACHING SCHEME		
L	T/P	C
2	1	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** Permutations and Combinations, Basic Statistics

#### COURSE OBJECTIVES:

- To learn the elementary ideas in basic probability and probability distribution functions
- To learn the methods of calculating correlation and regression coefficient
- To learn the various methods to test the hypothesis for large samples
- To learn the various methods to test the hypothesis for small samples
- To introduce the notion of time series and its utility in engineering application

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Solve problems involving basic probability and distributions

**CO-2:** Calculate correlation, regression, rank correlation coefficients

**CO-3:** Apply the knowledge of different probability distributions to Test of Hypothesis for large samples

**CO-4:** Apply the knowledge of different probability distributions to Test of Hypothesis for small samples

**CO-5:** Use Least squares method to compute time series

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	2	2	1	-	-	-	-	-	-	-	1	3	2	-
CO-2	3	2	2	2	-	-	-	-	-	-	-	1	3	2	-
CO-3	3	2	2	2	-	-	-	-	-	-	-	1	3	2	-
CO-4	3	2	2	2	-	-	-	-	-	-	-	1	3	2	-
CO-5	3	2	2	2	-	-	-	-	-	-	-	1	3	2	-

#### UNIT-I:

**Basic Probability and Probability Distributions:** Sample space and events, Probability- The axioms of probability, some elementary theorems, conditional probability, Baye's theorem. Random variables - discrete and continuous distributions - Expectation of Random Variables, Sequence of random variables, Sum of random variables.

**Probability Distributions:** Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions –related properties.

**UNIT II:**

**Correlation and Regression:** Coefficient of correlation, Multiple and partial correlation, regression coefficient, the lines of regression, rank correlation

**UNIT III: Testing of Hypothesis - Large Samples**

Sampling distributions, Central limit theorem, Tests of hypothesis - null hypothesis, alternate hypothesis, type I, type II errors, critical region. Inferences concerning means and proportions- Large samples- test of hypothesis for single mean and difference between the means. Test of hypothesis for the proportions- single and difference between the proportions, confidence interval for the mean and proportions.

**UNIT IV: Testing of Hypothesis - Small Samples**

Tests of significance-t distributions, confidence interval for the t- distribution, F-distributions and Chi square distributions.

**UNIT V: Time Series**

**Time Series:** Utility of time series analysis, components of time series. Preliminary adjustments before analyzing time series. Measurement of trend by the method of least squares, method of moments, basics of ARIMA model.

**TEXT BOOKS:**

1. Advanced Engineering Mathematics, Erwin Kreyszig, 9<sup>th</sup> Edition, John Wiley & Sons, 2006
2. Probability and Statistics for Engineers, Richard A. Johanson, 5<sup>th</sup> Edition, Prentice-Hall, 1995
3. Introduction to Probability Theory, P. G. Hoel, S. C. Port and C. J. Stone, Universal Book, 2003
4. Statistical Methods, S. P. Gupta, Sultan Chand and Sons, 2011

**REFERENCES**

1. A Textbook of Engineering Mathematics, N. P. Bali and Manish Goyal, Laxmi Publications, 2010
2. Higher Engineering Mathematics, B. S. Grewal, 35<sup>th</sup> Edition, Khanna Publishers, 2000
3. Applied Statistics for Engineers, Jay L. Devore, Nicholas R. Famum, Jimmy A. Doi, 3<sup>rd</sup> Edition, Cengage Learning
4. The Analysis of Time Series -An Introduction, Chris Chatfield, 6<sup>th</sup> Edition, CRC Press

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

### B.Tech. III Semester

### (22HS1MG201) ENGINEERING ECONOMICS AND ACCOUNTANCY

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

- To understand the basic concepts of economics and different forms of business organizations
- To create awareness on basics of business economics and to analyze the concepts of demand and supply
- To describe each stage of product life cycle with the help different costs and their role in maintaining optimum cost of production and overall profitability by considering different market competitions
- To acquaint with the basic accounting knowledge and financial accounting process
- To evaluate the performance of the organization using various ratios

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Perform decision making function effectively in an uncertain framework by applying the based concepts of economics and select suitable form of business organization which meets the requirements of business

**CO-2:** Take the right decisions towards buying and selling of goods and services based on the demand and supply dynamics in the markets

**CO-3:** Fix the right price based upon production cost which can best meet the pre-determined objectives of the business under different market conditions

**CO-4:** Prepare book of accounts and understand overall position of the business

**CO-5:** Interpret the firm's financial performance using various ratios

#### COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	-	-	-	-	-	-	-	1	2	1	3	1	1	1	1
CO-2	-	-	-	-	-	-	-	1	2	1	3	1	1	1	1
CO-3	-	-	-	-	-	-	-	1	2	1	3	1	1	1	1
CO-4	-	-	-	-	-	-	-	1	2	1	3	1	1	2	1
CO-5	-	-	-	-	-	-	-	1	2	1	3	1	1	1	1

#### UNIT-I:

**Introduction to Economics:** Definition, nature, scope and types of Economics. National Income (NI) & types of Inflation.

## **Forms of Organizing Private and Public-Sector Business Enterprises:**

**Private Sector Business Enterprises:** (i) Sole Proprietorship – Definition, features, merits, limitations & suitability. (ii) Partnership – Definition, Partnership Act, features, types, merits, limitations, suitability. (iii) Joint-Stock Company – Definition, Companies Act, features, types, merits, limitations, suitability.

**Public Sector Business Enterprises:** Definition, features, objectives, merits, problems

### **UNIT-II:**

**Business Economics:** Definition, nature and scope, linkages with other disciplines.

**Demand Analysis:** Law of Demand, Factors affecting demand; Elasticity of Demand-Types Measurement, Factors affecting and Significance,

**Demand Forecasting:** Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

**Supply Analysis:** Determinants of Supply, Supply function and Law of Supply.

### **UNIT-III:**

#### **Production, Cost, Market Structures & Pricing:**

**Production Analysis:** Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions - Cobb-Douglas.

**Cost Analysis:** Types of Costs, Short run and long run Cost Functions.

**Market Structures:** Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition.

**Pricing:** Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis (Simple problems)

### **UNIT-IV:**

**Introduction to Financial Accounting:** Definition, basic principles and double-entry book-keeping, practice of accounting process-Journal, ledger, trial balance and final accounts (simple problems)

### **UNIT-V:**

**Ratio Analysis:** Meaning, computation of ratios (i) Liquidity Ratios: Current Ratio and Quick Ratio, (ii) Solvency Ratios: Interest Coverage Ratio and Debt-Equity Ratio, (iii) Activity Ratios: Stock/Inventory Turnover Ratio and Debt Turnover Ratio, (iv) Profitability Ratios: Gross Profit Ratio, Net Profit Ratio & Earning Per Share (EPS) Ratio

### **TEXT BOOKS:**

1. Managerial Economics, D. M. Mithani, 9<sup>th</sup> Edition, Himalaya Publishing House, 2022
2. Managerial Economics, Satya P. Das & J. K. Goyal, 2<sup>nd</sup> Edition, Sage Publications, 2022
3. Financial Accounting, S. N. Maheswari, 6<sup>th</sup> Edition, Vikas Publications, 2018

### **REFERENCES:**

1. Managerial Economics, Dominick Salvatore, Siddhartha K. Rastogi, 9<sup>th</sup> Edition, Oxford Publications, 2020
2. Financial Accounting for Management: An Analytical Perspective, Ambrish Gupta, 6<sup>th</sup> Edition, Pearson Education, 2018

3. Business Economics, H. L. Ahuja, 13<sup>th</sup> Edition, S. Chand, 2019
4. Principles of Marketing: A South Asian Perspective, Kotler Philip, Gary Armstrong, Prafulla Y. Agnihotri, and Eshan-ul Haque, 13<sup>th</sup> Edition, Pearson Education/Prentice Hall of India, 2010

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

**B.Tech. III Semester**

## (22PC1CE201) STRENGTH OF MATERIALS-I

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** Engineering Mechanics

**COURSE OBJECTIVES:**

- To define various types of stresses and strains
- To understand the concept of shear force and bending moment
- To understand the flexure concepts across the cross-sections and draw the bending stress distribution
- To determine and draw the shear stress distribution across various cross-sections

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Determine the stresses and strains in determinate and indeterminate systems

**CO-2:** Draw the shear force and bending moment diagrams in determinate beams

**CO-3:** Apply the bending stress concepts to design the beam sections for flexure

**CO-4:** Draw the shear stress distribution for various cross-sections

**COURSE ARTICULATION MATRIX:**

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	2	2	2	-	-	-	-	-	-	-	-	-	1	2
CO-2	3	2	2	2	-	-	-	-	-	-	-	-	-	1	2
CO-3	3	2	2	2	-	-	-	-	-	-	-	-	-	2	2
CO-4	3	1	2	2	-	-	-	-	-	-	-	-	-	2	2

**UNIT-I:**

**Simple Stresses and Strains:** Mechanical properties of solids – Elasticity, Plasticity, Ductility, Brittleness, Malleability, Toughness, Hardness - Stress, Strain – Hooke's law - Types of Stresses and Strains - Stress-Strain curves for ductile and brittle materials - Principle of superposition - Bars of varying sections - Working stress - Factor of safety - Lateral Strain - Poisson's Ratio - Volumetric Strain - Elastic moduli - Relationship between different Elastic moduli.

**UNIT-II:**

**Statically Indeterminate Systems:** Members subjected to self-weight acting axially and their articulation for uniform stress - Equations of Equilibrium and Compatibility - Composite bars - Temperature stresses.

**Strain Energy:** Strain energy due to axial loads - gradually applied, suddenly applied and impact loads.

**UNIT – III:**

**Shear Force and Bending Moment:** Types of supports, loads, beams - Concept of shear force and bending moment - Relation between SF, BM and rate of loading - SF and BM diagrams for statically determinate beams - Cantilever, Simply supported beam, Overhanging beam - Point of contra flexure and its significance.

**UNIT – IV:**

**Bending Stresses:** Theory of Simple bending - Assumptions - Neutral axis – Derivation of flexure formula - Section modulus for various sections - Bending stress distribution - Strength of a section - Design of simple beam sections.

**UNIT-V:**

**Shear Stresses:** Derivation of Shear stress formula - Shear stress distribution across depth of various beam sections like Rectangular, Circular, Triangular, I and T sections.

**TEXT BOOKS:**

1. Mechanics of Materials, R. C. Hibbler, 10<sup>th</sup> Edition, Pearson Education, 2016
2. Mechanics of Materials, James Gere, 9<sup>th</sup> Edition, Cengage Learning, 2022

**REFERENCES:**

1. Strength of Materials, B. C. Punmia, Ashok Jain, Arun Jain, 10<sup>th</sup> Edition, Laxmi Publications, 2018
2. Strength of Materials, R. K. Bansal, 6<sup>th</sup> Edition, Laxmi Publications, 2018
3. Strength of Materials, S. S. Rattan, 3<sup>rd</sup> Edition, McGraw-Hill Education, 2017
4. Strength of Materials, R. K. Rajput, 6<sup>th</sup> Edition, S. Chand, 2015



## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

### B.Tech. III Semester

### (22PC1CE202) CONCRETE TECHNOLOGY

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** Civil Engineering Materials

#### COURSE OBJECTIVES:

- To use different types of cements as per their properties for different field applications
- To understand the different properties of aggregates and their requirement as per IS code for concrete
- To design an economic concrete mix proportion for different exposure conditions and intended purposes
- To understand the different field and laboratory tests on fresh and hardened state concrete

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Determine the properties of concrete ingredients by conducting different tests

**CO-2:** Check the suitability of aggregates for concrete based on their physical properties as per IS code

**CO-3:** Design the mix proportions for concrete and evaluate its fresh and hardened state properties

**CO-4:** Apply the different types of special concrete for various applications

#### COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	1	-	2	1	-	-	-	-	-	1	-	-	-	1	3
CO-2	1	-	2	1	-	-	-	-	-	1	-	-	-	1	3
CO-3	1	2	3	2	-	-	-	-	-	2	-	-	-	2	3
CO-4	1	-	2	-	-	-	-	-	-	-	-	-	-	-	3

#### UNIT-I:

**Cement:** Manufacture of portland cement - Basic cement chemistry - Hydration of cement - Heat of hydration - Tests on cement - Fineness, Consistency, Setting times, Soundness and Strength - Types of cements - Ordinary Portland Cement, Rapid-hardening cement, Low-heat portland cement, Sulfate resisting cement, Portland pozzolana cement, White and colored portland cement, High-alumina cement, Portland slag cement, Calcite cement, Composite cement - Applications.

## **UNIT-II:**

**Aggregates:** Classification of aggregates - Size, Shape and Texture - Mechanical properties of aggregates - Bond, Strength, Toughness and Hardness - Physical properties - Specific gravity, Bulk density, Porosity and Absorption - Moisture content - Bulking of sand - Sieve analysis - Grading curves - Fineness modulus - Grading requirements - Maximum aggregate size - Gap graded aggregate - Quality of water for mixing and curing of concrete.

## **UNIT-III:**

**Admixtures and Fresh Concrete:** Admixtures - Plasticizers - Superplasticizers - Retarders - Accelerators - Air-entraining admixtures - Pozzolanic admixtures - Fresh concrete - Workability - Factors affecting workability - Cohesion and Segregation - Bleeding - Workability tests - Slump, Compaction factor, Vee-Bee consistometer - Setting time of concrete - Effect of time and temperature on workability.

## **UNIT-IV:**

**Hardened Concrete:** Water-cement ratio - Gel-space ratio - Maturity concept of concrete - Factors affecting strength of concrete - Relation between tensile and compressive strength - Elasticity - Factors influencing modulus of elasticity - Poisson's ratio - Creep - Factors influencing creep - Effects of creep - Shrinkage - Factors influencing shrinkage - Types and effects of cracking.

## **UNIT-V:**

**Concrete Mix Design:** Factors in the choice of mix proportions - Concrete mix design as per IS: 10262.

**Special concretes:** Introduction to light weight concrete - Aerated concrete - No-fines concrete - Recycled aggregate concrete - Fibre reinforced concrete - Ferrocement - Roller-compacted concrete - High-performance concrete - Self-compacting concrete.

## **TEXT BOOKS:**

1. Concrete Technology, A.M. Neville and J. J. Brooks, 2<sup>nd</sup> Edition, Prentice Hall, 2019
2. Concrete Technology, M. S. Shetty, 8<sup>th</sup> revised Edition, S. Chand & Co., 2019

## **REFERENCES:**

1. Concrete Technology, A. R. Santha Kumar, 2<sup>nd</sup> Edition, Oxford University Press, 2018
2. Concrete Technology, M. L. Gambhir, 5<sup>th</sup> Edition, Tata McGraw-Hill Press, 2017
3. Properties of Concrete, A. M. Neville, 5<sup>th</sup> Edition, Pearson Publication, 2017
4. Concrete: Micro Structure, Properties and Materials, P. K. Mehta and J. M. Monteiro, 4<sup>th</sup> Edition, McGraw-Hill Publishers, 2017

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. III Semester

### (22PC1CE203) FLUID MECHANICS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** Engineering Mechanics and Engineering Physics

#### COURSE OBJECTIVES:

- To obtain knowledge of basic fluid properties and relationship between them
- To explain the principles of continuity, momentum, and energy as applied to fluid motions
- To derive mathematical equations based on conservation principles
- To enable the students to solve the mathematical equations as applied to practical fluid mechanics problems

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Define fundamental concepts of fluid mechanics as applied to civil engineering problems

**CO-2:** Discuss and derive the fundamental mathematical equations of fluid mechanics

**CO-3:** Solve the fluid mechanics problems as related to practical civil engineering problems of water conveyance in pipes, orifices, mouth pieces, notches and weirs

**CO-4:** Evaluate the various assumptions made in the application of equations to avoid the common pitfalls

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	3	1	1	-	-	-	-	-	-	-	1	-	1	-
CO-2	2	2	2	1	-	-	-	-	-	-	-	1	-	2	-
CO-3	3	3	3	3	-	-	-	-	-	-	-	1	-	3	-
CO-4	3	3	3	3	-	-	-	-	-	-	-	1	-	2	-

#### UNIT-I:

**Properties of Fluid:** Introduction - Properties of Fluid - Units of measurement - Fluid Continuum - Newtonian and Non-Newtonian fluids - Vapor pressure.

**Fluid Statics:** Variation of static pressure - Absolute and gauge pressure - Pressure measurement by mechanical gauges and manometers - Pressure on plane surfaces and curved surfaces.

## **UNIT-II:**

**Kinematics of Fluid Motion:** Methods of describing fluid motion - Classification of flow - Steady, unsteady, uniform and non-uniform flows - Laminar and turbulent flows - Three, two- and one-dimensional flows - Irrotational and rotational flows - Streamline & stream tube - Equation for acceleration - Convective acceleration - Continuity equation in Cartesian coordinates - Velocity potential and stream function - Flownet - Vortex flow - free vortex and forced vortex flow.

**Dynamics of Fluid Flow:** Euler's equation of motion - Bernoulli's equation - Momentum principle - Applications of momentum equation - Force exerted on a pipe bend.

## **UNIT-III:**

**Flow Measurement:** Measurement of velocity by Pitot tube - discharge through Venturi meter, Orifice meter, flow nozzle - Determination of coefficients for an orifice - Flow through rectangular, triangular and trapezoidal notches and weirs - End contractions - Velocity of approach - Broad crested weir.

## **UNIT-IV:**

**Analysis of Pipe Flow:** Reynolds experiment - Classification of Laminar & Turbulent flows - Steady laminar flow through circular pipes - Energy losses in pipelines - Minor losses - Darcy-Weisbach equation - Pipes in series and parallel - Total energy line and hydraulic gradient line.

## **UNIT-V:**

**Theory of Boundary Layer:** Boundary layer and its growth - Characteristics of Boundary layer along a thin flat plate - Boundary Layer thickness - Displacement, Energy & momentum - Boundary layer Separation and its control - Flow around submerged objects - Drag and Lift - Magnus effect.

## **TEXT BOOKS:**

1. Fluid Mechanics and Hydraulic Machines, Modi and Seth, Standard Book House, 2019
2. Fluid Mechanics and Hydraulic Machines, R.K. Bansal, Laxmi Publications, 2019
3. Fluid Mechanics: Fundamentals and Applications, Cengel and Cimbala, McGraw-Hill, 2018

## **REFERENCES:**

1. Fluid Mechanics, V. L. Streeter, E. Benjamin Wiley and W. Bedford, McGraw-Hill, 2015
2. Fluid Mechanics & Hydraulic Machines - Problems and Solutions, K. Subramanya McGraw-Hill, 2013
3. Fluid Mechanics, Frank M. White, Tata McGraw-Hill, 2011

## **ONLINE RESOURCES:**

1. <https://nptel.ac.in/courses/112104118>

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

### B.Tech. III Semester

#### (22PC2CE201) STRENGTH OF MATERIALS LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

#### COURSE OBJECTIVES:

- To understand the need to test various types of materials
- To understand the mechanism of the various machines
- To test different materials against various types of straining actions
- To know the nature of the material and its performance under loading

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Prepare the specimens for assessing strengths against various straining actions

**CO-2:** Perform the experiments making use of load / deformation measuring instruments

**CO-3:** Determine the characteristics of various engineering materials

**CO-4:** Evaluate the suitability of a material for the use of different applications

#### COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	2	2	2	-	-	-	-	2	-	-	-	-	2	2
CO-2	3	2	2	2	-	-	-	-	2	-	-	-	-	2	2
CO-3	3	2	2	2	-	-	-	-	2	-	-	-	-	2	2
CO-4	3	2	2	2	-	-	-	-	2	-	-	-	-	2	2

#### LIST OF EXPERIMENTS:

1. Uni-axial Tension test on ductile specimen
2. Compression test on brick and concrete
3. Compression test on close coiled helical spring
4. Bending test on cantilever beam
5. Bending test on simply supported beam
6. Bending test on continuous beam
7. Direct shear test
8. Torsion test
9. Rockwell hardness test
10. Brinell's hardness test
11. Izod impact test
12. Charpy impact test

**REFERENCES:**

1. Strength of Materials, Dr. Sadhu Singh, Khanna Publishers
2. Strength of Materials Lab Manual, Anand Jayakumar, Notion Press
3. Experiments in Mechanics of Solids, B.M. Raval, Charotar Publishing House

**I.S. Codes:**

1. IS 1608 (Part 1) : 2022 - Metallic materials - Tensile testing - Method of test at room temperature
2. IS 1786 : 2008 - High strength deformed steel bars and wires for concrete reinforcement
3. IS 1717 : 2018 - Metallic materials - Wire - Simple torsion test
4. IS 516 (Part 1/Sec 1) : 2021 - Hardened concrete methods of test - Testing of strength of hardened concrete - Section 1 : Compressive, Flexural and Split tensile strength
5. IS 3495 (Part 1) : 2019 - Burnt Clay Building Bricks - Methods of Tests Part 1 Determination of Compressive Strength
6. IS 3495 (Part 2) : 2019 - Burnt Clay Building Bricks - Methods of Tests Part 2 Determination of Water Absorption
7. IS 1500 (Part 1) : 2019 - Metallic materials - Brinell hardness test: Part 1 test method
8. IS 1586 (Part 1) : 2018 - Metallic materials - Rockwell hardness test: Part 1 test method
9. IS 7906 (Part 1) : 1997 - Helical compression springs - Design and calculation for springs made from circular section wire and bar
10. IS 1598 : 1977 - Method for Izod impact test of metals
11. IS 1757 (Part 1) : 2020 - Metallic Materials — Charpy Pendulum Impact Test - Test Method

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

### B.Tech. III Semester

### (22PC2CE202) CONCRETE LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

**COURSE PRE-REQUISITES:** Elements of Civil Engineering

#### COURSE OBJECTIVES:

- To perform various test to find the physical properties of cement as per IS requirements
- To understand the test procedures for various physical requirements of aggregates for concrete
- To evaluate fresh properties of conventional vibrated concrete and self-compacting concrete
- To understand the various destructive and non-destructive test procedures on hardened concrete

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Design conventional vibrated concrete mix proportion by using IS method and determine its workability

**CO-2:** Design a self-compacting concrete mix and evaluate its fresh properties

**CO-3:** Conduct destructive tests on hardened concrete and determine its mechanical properties

**CO-4:** Evaluate the strength and quality of concrete using non-destructive methods

#### COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	1	2	2	3	1	-	-	1	2	2	-	-	-	1	3
CO-2	1	2	2	3	1	-	-	1	2	2	-	-	-	1	3
CO-3	1	2	2	3	2	-	-	1	2	2	-	-	-	1	3
CO-4	1	2	2	3	3	-	-	1	2	2	-	-	-	1	3

#### LIST OF EXPERIMENTS:

1. Characterization of concrete making materials:
  - a) Specific gravity of cement, fine aggregate and coarse aggregate
  - b) Consistency and Setting times of cement
  - c) Zone classification and Fineness modulus of fine aggregates
2. IS method of mix design of normal and high-strength concrete.

3. Tests on Fresh Concrete:
  - a) Slump cone
  - b) Compacting factor
  - c) Vee-Bee consistometer
4. IS method of mix design of self-compacting concrete.
5. Tests on fresh properties of self-compacting concrete:
  - a) Slump flow
  - b) J-Ring
  - c) V-Funnel
  - d) L-Box
6. Tests on Hardened Concrete:
  - a) Compressive strength
  - b) Split-tensile strength
  - c) Flexural strength
  - d) Modulus of elasticity of concrete
7. Non-Destructive tests on concrete:
  - a) Rebound hammer
  - b) Ultrasonic pulse velocity

**TEXT BOOKS:**

1. Concrete Technology, M. Neville and J. J. Brooks, 2<sup>nd</sup> Edition, Prentice Hall, 2019
2. Concrete Technology, M. S. Shetty, 8<sup>th</sup> Edition, S. Chand & Co., 2019

**IS CODES:**

1. IS: 269 - 2015 (Reaffirmed 2020), "Ordinary Portland Cement - Specification (Sixth Revision)", Bureau of Indian Standards, New Delhi, 2015
2. IS: 4031 (Part-V) - 1988 (Reaffirmed 2019), "Methods of Physical Tests for Hydraulic Cement (Part-V: Determination of Initial and Final Setting Times) (First Revision)", Bureau of Indian Standards, New Delhi, 2019
3. IS: 4031 (Part-IV) - 1988 (Reaffirmed 2019), "Methods of Physical Tests for Hydraulic Cement (Part-IV: Determination of Consistency of Standard Cement Paste) (First Revision)", Bureau of Indian Standards, New Delhi, 2019
4. IS: 383 - 2016, "Coarse and Fine Aggregate for Concrete - Specification (Third Revision)", Bureau of Indian Standards, New Delhi, 2016.
5. IS: 2386 (Part-I) - 1963 (Reaffirmed 2021), "Methods of Test for Aggregates for Concrete - Part-I (Particle Size and Shape) (Eleventh Reprint August 1997)", Bureau of Indian Standards, New Delhi, 2021
6. IS: 2386 (Part-III) - 1963 (Reaffirmed 2021), "Methods of Test for Aggregates for Concrete - Part-III (Specific Gravity, Density, Voids, Absorption and Bulking) (Eleventh Reprint March 1997)", Bureau of Indian Standards, New Delhi, 2021
7. IS: 10262 - 2019, Concrete Mix Proportioning - Guidelines (Second Revision), Bureau of Indian Standards, New Delhi, 2019
8. IS: 1199 (Part-2) - 2018, "Fresh Concrete - Methods of Sampling, Testing and Analysis - Part-II (Determination of Consistency of Fresh Concrete)", Bureau of Indian Standards, New Delhi, 2018
9. IS: 516 (Part-1 / Sec-1) - 2021, "Hardened Concrete - Methods of Test - Part-I (Testing of Strength of Hardened Concrete - Section-1: Compressive, Flexural, and Split Tensile Strength)", Bureau of Indian Standards, New Delhi, 2021



## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

### B.Tech. III Semester

### (22PC2CE212) ADVANCED SURVEYING LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

**COURSE PRE-REQUISITES:** Surveying, Mathematics, Physics

#### COURSE OBJECTIVES:

- To understand the principles of trigonometric surveying for measurement of horizontal and vertical distances
- To apply the concepts of levelling for determining longitudinal and cross-sectional profile
- To develop contour maps through in-direct method
- To appraise the applications of modern instruments for setting out works

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Determine horizontal and vertical distances of accessible and inaccessible points

**CO-2:** Measure and plot given field areas

**CO-3:** Plot the profile of a given ground location and develop contour maps

**CO-4:** Set-out points in the field for construction works

#### COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	1	-	-	-	3	-	-	2	2	-	-	-	3	-	-
CO-2	1	-	-	-	3	-	-	2	2	-	-	-	3	-	-
CO-3	1	2	-	-	3	-	-	2	2	-	-	2	3	-	-
CO-4	1	1	-	-	3	-	-	2	2	-	-	2	3	-	-

#### LIST OF EXERCISES:

1. Remote elevation measurement
2. Missing line measurement
3. Traversing
4. Differential levelling
5. Area measurement and plotting (Coordinate method)
6. Longitudinal profile levelling and plotting
7. Cross - sectional levelling and plotting
8. Contouring and Volume estimation

9. Setting out of works for buildings
10. Setting out of simple circular curve

**REFERENCES:**

1. Surveying, Arora K. R., Vol. I, II and III, 5<sup>th</sup> Edition, Standard Book House, 2019
2. Surveying, Duggal S. K., Vol. I & II, 5<sup>th</sup> Edition, Tata McGraw-Hill, 2019
3. Surveying I & II, B. C. Punmia, Ashok Kumar Jain, Arun Kr. Jain., 5<sup>th</sup> Edition, Laxmi Publications, 2018

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

### B.Tech. III Semester

### (22PW4CE201) DESIGN THINKING

TEACHING SCHEME		
L	T/P	C
1	2	2

EVALUATION SCHEME		
CIE	SEE	TOTAL
40	60	100

#### COURSE OBJECTIVES:

- To instill a sense of significance towards applying creativity to product and service design
- To teach a systematic approach to identifying and defining a problem before brainstorming for a solution
- To inculcate core design principles and applied creativity to develop innovative strategies that better connect engineers and technologies with their end users
- To build a mindset leading to flow of creative ideas, validating those ideas and prioritizing the best ones among them.
- To motivate students to apply design thinking while implementing projects focusing on local, regional or global societal problems

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Demonstrate the understanding of design principles from a technology perspective

**CO-2:** Validate problem statements through user empathisation with societal, cultural, global and environmental consciousness

**CO-3:** Use specific and relevant ideation and brainstorming techniques to find innovative solutions

**CO-4:** Prototype a solution to address user challenges

**CO-5:** Investigate the cultural, emotional, environmental, technological and business factors relevant to developing new product or service design concept

#### COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	-	-	2	-	-	2	-	-	3	3	1	1	-	2	1
CO-2	-	-	3	2	1	3	-	-	3	2	1	1	2	1	3
CO-3	-	-	2	-	-	2	-	-	2	2	3	-	-	-	2
CO-4	-	-	3	-	2	-	-	-	2	3	1	-	-	1	2
CO-5	-	-	-	3	-	3	1	-	1	-	1	-	-	-	2

#### UNIT-I:

**Design Overview and Doing Design:** Various perspectives of design; Good and Bad Design; Introduction to the Design Double Diamond: Discover-Define-Develop-Deliver; Discover Phase- Looking for problems; Identifying Stakeholders and Defining User Personas; User Empathization; Data collection, creating and conducting surveys

and Empathy Tools – What/How/Why, Five Why method, Empathy Maps, AEIOU method, Story Share and Capture.

#### **UNIT-II:**

**Need Analysis:** Types of Users, Types of Needs; Market Size; Value Proposition to the Users; Identifying Addressable Needs and Touch points; Structuring Need Statements; Customer Experience (CX) Design; Service Design and Development Process; Customer Journey Map (CJM), Service Experience Cycle.

#### **UNIT-III:**

**Ideation Process:** Introduction to creativity and closed-world solutions, Idea generation techniques: Brainstorming, Mind Maps, SCAMPER, Systematic Inventive Thinking methods (Subtraction, Multiplication, Division, Task Unification and Attribute Dependency);

**Strategic Innovation for Competition in Future:** Linear Innovation vs. Non-linear innovation, Understanding and identifying weak signals, 3-box thinking, 3-Box framework and Box-3 ideation, Four-Action Framework (Eliminate-Reduce-Raise-Create, or ERRC Matrix).

#### **UNIT -IV:**

**Building Prototypes:** Building Conceptual model of product/service using various prototype methods, test a business model or business case to support the viability of the solution using MVP.

**Design for Sustainability:** Concern for Environment and Sustainability in Design, Case Studies to understand good Design For Environment (DFE) Decisions; Sustainable Design Approaches in the five stages of the Product Life Cycle.

#### **UNIT -V:**

**Capstone Project (Interdisciplinary):** Applying design thinking principles and methods for problem definition, ideation, prototyping, testing, refining and taking the solution to the users, using visual representation tools to indicate problem, User persona, needs, empathisation, ideas and prototype that leads to chosen solution, creating presentation.

#### **TEXT BOOKS:**

1. Change by Design, Tim Brown, Harper Business, 2012
2. The Design of Everyday Things, Donald A. Norman, MIT Press, 2013

#### **REFERENCES:**

1. The Art of Innovation, Tom Kelly, Jonathan Littman, Harper Collins Business, 2002
2. Design Thinking: Integrating Innovation, Customer Experience, and Brand Value, Thomas Lockwood, Allworth Press, 2009
3. Design Thinking for Start-ups: A Handbook for Readers and Workbook for Practitioners, Jimmy Jain, Notion Press, 2018

#### **ONLINE RESOURCES:**

1. <https://www.ideo.com/pages/design-thinking>
2. <https://www.ibm.com/design/thinking/page/framework>
3. [https://onlinecourses.nptel.ac.in/noc20\\_mg38/preview](https://onlinecourses.nptel.ac.in/noc20_mg38/preview)
4. <https://nptel.ac.in/courses/110106124>

5. <https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process>

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

**B.Tech. III Semester**

### (22MN6HS103) HAPPINESS AND WELLBEING

TEACHING SCHEME		
L	T/P	C
2	0	0

EVALUATION SCHEME			
SE-I	SE-II	SEE	TOTAL
50	50	-	100

#### **COURSE OBJECTIVES:**

- To learn sustainable strategies to develop positive attitude and happy heart
- To develop self-awareness and self-discipline to meet the needs of happiness
- To practice good health & mindfulness for wellbeing
- To adapt personality attributes of happiness and success strategies
- To nature happiness development index for better living

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Recognize what is happiness in life and how to sustain it

**CO-2:** Focus on interpersonal skills for a mindful approach

**CO-3:** Develop to mindfulness to handle challenging situations

**CO-4:** Recognize the importance of positive attitude for personal and professional development

**CO-5:** Interpret the need for nurturing happiness development index through Indicators

#### **COURSE ARTICULATION MATRIX:**

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	-	-	-	-	-	3	-	2	1	-	-	3	-	-	-
CO-2	-	-	-	-	-	3	-	3	1	-	-	3	-	-	-
CO-3	-	-	-	-	-	1	-	1	1	-	-	3	-	-	-
CO-4	-	-	-	-	-	2	-	2	1	-	-	3	-	-	-
CO-5	-	-	-	-	-	3	-	1	1	-	-	3	-	-	-

#### **UNIT-I:**

**Introduction to Happiness:** Definition & theories of happiness: Hedonism theory, Desire theory, Objective list theory. Identifying potential barriers of happiness: Devaluing happiness, chasing superiority, being needy, being overly control-seeking, distrusting others, distrusting life, and ignoring the source within. Strategies for overcoming the potential barriers

#### **UNIT – II:**

**Power of Emotions & Relationships:** Role of emotional intelligence, self-awareness, and empathy in creating harmonious relationship with ourselves and others. Balancing emotions. Hormones that promote happiness. The importance of social connections

for happiness. Role of share & care, gratitude, forgiveness & kindness in building relationships

**UNIT – III:**

**Health and Wellbeing:** The link between health & happiness-exercise regularly, eat a healthy diet, get enough sleep for physical fitness. Mental wellbeing-Take notice, keep learning, stay connected with nature, and financial wellbeing. The practice of mindfulness and its benefits for mental and physical health. Moving from restlessness to restfulness- meditation and yoga to increase awareness and reduce stress

**UNIT – IV:**

**Re-wirement for Wellbeing:** Abundance in life, freedom of choice, accepting change, ways of implementation for wellbeing: practicing habits-be proactive, begin with end-in-mind, put-first things-first, think win-win, seek first to understand then to be understood, synergize, sharpen the saw, and effectiveness to greatness

**UNIT – V:**

**Nurturing Happiness Development Index:** Exploring the sources of temporary joy and lasting happiness. Acceptance, Appreciation, forgiveness, gracefulness, and creative procrastination. Time management with four D's (delete, delay, delegate, do). Developing happiness index-track changes in happiness levels over time and identify the indicators

**TEXT BOOKS:**

1. The How of Happiness: A Scientific Approach to Getting the Life You Want, Sonja Lyubomirsky, Penguin Books, 2008
2. Authentic Happiness: Using the New Positive Psychology to Realize Your Potential for Lasting Fulfillment, Martin Seligman, Atria Books, 2004
3. The Book of Joy: Lasting Happiness in a Changing World, Dalai Lama, Desmond Tutu, and Douglas Abrams, Avery, 2016

**REFERENCES:**

1. 7-Habits of Highly Successful People, Stephen Covey, Simon & Schuster, 2020
2. Mindfulness Book of Happiness: Mindfulness and Meditation, Aimen Eman, Publish Drive Edition, 2018
3. Mindfulness at Work: How to Avoid Stress, Achieve More and Enjoy Life, Dr. Stephen McKenzie, Exisle Publishing, 2014
4. The 8th Habit: From Effectiveness to Greatness, Stephen R. Covey, Free Press, 2004

**ONLINE RESOURCES:**

1. Life of Happiness And Fulfillment, Indian School of Business, Coursera <https://in.coursera.org/learn/happiness>
2. Science of Wellbeing, Yale University, Coursera, <https://www.coursera.org/>

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. IV Semester

### (22PC1CE204) STRENGTH OF MATERIALS-II

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

- To determine the stresses on an inclined plane
- To understand the concept of torsion and different types of springs
- To understand the stresses and strains in thin and thick cylinders
- To find out the crippling load of columns and determine stresses in chimneys

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Determine the principal stresses and strains and design the elements according to theories of failure

**CO-2:** Analyze the shafts subjected to torsion and determine the deflections in close coiled helical springs

**CO-3:** Determine the various stresses in thin and thick cylinders

**CO-4:** Determine the crippling loads of columns, to evaluate the combined stresses

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	2	2	1	-	-	-	-	-	-	-	-	1	2	1
CO-2	3	2	2	2	-	-	-	-	-	-	-	-	1	1	1
CO-3	3	3	2	2	-	-	-	-	-	-	-	-	1	1	1
CO-4	3	3	2	2	-	-	-	-	-	-	-	-	1	1	1

#### UNIT-I:

**Principal Stresses and Strains:** Stresses on an inclined plane at a section of a bar under axial loading – Compound stresses – Normal and Tangential stresses on an inclined plane for biaxial stresses – Two perpendicular stresses accompanied by a state of simple shear – Principal stresses and strains – Analytical solutions.

#### UNIT-II:

**Torsion of Circular Shafts:** Theory of pure torsion – Assumptions - Derivation of Torsion equation – Torsional moment of resistance – Polar moment of Inertia - Torsional rigidity – Shafts in series and parallel - Power transmitted by shafts.

**Springs:** Types of springs – Close coiled helical springs under axial pull and axial couple



### **UNIT-III:**

**Thin Cylinders:** Thin cylindrical shells - Derivation of formula for longitudinal and circumferential stresses - hoop, longitudinal and volumetric strains – changes in diameter, length and volume of thin cylinders

**Thick Cylinders:** Lamé's Theory for thick cylinders – Derivation of Lamé's equations - Distribution of hoop and radial stresses across the thickness – Compound cylinders

### **UNIT-IV:**

**Columns and Struts:** Short and Long columns – Euler's theorem for long columns – Assumptions – Derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – Slenderness ratio – Euler's critical stress - Limitations of Euler's theory – Rankin's formula

### **UNIT – V:**

**Direct and Bending Stresses:** Stresses under the combined action of axial loading and bending moment – Core/Kernel of a section – Middle-Third rule - Determination of stresses-Chimneys

**Theories of Failure:** Maximum principal stress theory - Maximum principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

### **TEXT BOOKS:**

1. Mechanics of Materials, R. C. Hibbeler, 10<sup>th</sup> Edition, Pearson Education, 2016
2. Mechanics of Materials, James Gere, 9<sup>th</sup> Edition, Cengage Learning, 2022

### **REFERENCES:**

1. Strength of Materials, B. C. Punmia, Ashok Jain, Arun Jain, 10<sup>th</sup> Edition, Laxmi Publications, 2018
2. Strength of Materials, R. K. Bansal, 6<sup>th</sup> Edition, Laxmi Publications, 2018
3. Strength of Materials, S. S. Rattan, 3<sup>rd</sup> Edition, McGraw-Hill Education, 2017
4. Strength of Materials, R. K. Rajput, 6<sup>th</sup> Edition, S. Chand & Co., 2015

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. IV Semester

### (22PC1CE205) STRUCTURAL ANALYSIS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

- To differentiate between statically determinate and indeterminate structures
- To find the member forces in pin jointed plane frames
- To analyze the statically indeterminate beams by applying the principles of equilibrium and compatibility of deformations
- To draw the Influence line diagrams for SF, BM for various types of moving loads

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Analyze the pin jointed plane frames

**CO-2:** Determine the slopes and deflections in beams

**CO-3:** Analyze statically indeterminate beams and draw SFD and BMD

**CO-4:** Evaluate the maximum SF and BM due to various types of moving loads

#### COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	3	2	1	-	-	-	-	-	-	-	-	1	3	-
CO-2	3	3	3	2	1	1	-	-	-	-	-	-	1	1	2
CO-3	3	3	3	2	1	-	-	-	-	-	-	-	1	1	2
CO-4	3	3	3	2	1	1	-	-	-	-	-	-	1	1	2

#### UNIT – I:

**Pin Jointed Plane Frames:** Types of frames – Assumptions - Analysis of pin jointed frames by Method of joints, Method of sections.

#### UNIT – II:

**Slopes and Deflections:** Slope, Deflection and Radius of curvature – Differential equation for the deflection curve of a beam – Slope and Deflection of beams using Successive Integration method – Macaulay's method – Mohr's Moment Area method – Application to Cantilevers and Simply supported beams.

#### UNIT-III:

**Propped Cantilevers:** Introduction to statically indeterminate beams – Determination of degree of static indeterminacy - Analysis of propped cantilevers – Shear force and Bending moment diagrams.

**Fixed Beams:** Analysis of Fixed beams – Shear force and Bending moment diagrams.

**UNIT-IV:**

**Continuous Beams:** Clapeyron's Theorem of Three Moments - Analysis of continuous beams – Shear force and Bending moment diagrams.

**UNIT-V:**

**Influence Lines and Moving Loads:** Definition of influence line for Reaction, SF and BM - SF and BM at a given section - Load position and Maximum SF and BM - single point load, u.d.l. longer than the span, u.d.l. shorter than the span, two points loads with fixed distance between them and several point loads, Absolute maximum BM - several point loads.

**TEXT BOOKS:**

1. Structural Analysis, Devdas Menon, Narosa Publishers
2. Structural Analysis, R. C. Hibbeler, Pearson Education

**REFERENCES:**

1. Theory of Structures, S. P. Timoshenko, D. H. Young, 2<sup>nd</sup> Edition, McGraw-Hill, 2002
2. Analysis of Structures, V. N. Vazirani, M. M. Ratwani and S. K. Duggal, 16<sup>th</sup> Edition, Khanna Publishers, 2022
3. Theory of Structures, B. C. Punmia, Ashok Kumar Jain, A. K. Jain, 13<sup>th</sup> Edition, Laxmi Publications, 2017
4. Basic Structural Analysis, K. U. Muthu, Azmi Ibrahim, M. Vijayanand and M. Janardhana, 3<sup>rd</sup> Edition, I K International Publishing House, 2017

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

**B.Tech. IV Semester**

### (22PC1CE206) HYDRAULIC ENGINEERING AND HYDRAULIC MACHINES

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** Fluid Mechanics

**COURSE OBJECTIVES:**

- To define the fundamental principles of fluid mechanics for the solution of practical civil engineering problems of water conveyance in open channels
- To discuss the dimensional analysis and design of channels in uniform and non-uniform flow conditions, hydraulic machinery (pumps and turbines) and the factors affecting their operation and specifications as well as the operation in a system
- To solve problems on open channel flow and efficiency of pumps and turbines
- To understand the different types, elements of hydro-electric power plants and operational characteristics of turbines and pumps

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Comprehend the basics of open channel flows and Design open channels under different flow conditions

**CO-2:** Interpret and Apply dimensional analysis and similarity to develop models and testing

**CO-3:** Compare and categorize the design of appropriate hydraulic turbines & pumps and their applications in Hydropower plants

**CO-4:** Interpret the various elements of Hydropower Engineering and Analyze the factors involved in demand and supply of hydropower

**COURSE ARTICULATION MATRIX:**

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	3	2	1	1	1	-	-	-	-	-	1	-	1	1
CO-2	3	3	1	1	-	-	-	-	-	-	-	1	-	2	-
CO-3	3	3	3	2	-	1	-	-	-	-	-	1	-	1	1
CO-4	3	2	1	1	-	1	-	-	-	-	-	1	-	1	-

**UNIT-I:**

**Open Channel Flow-I:** Introduction to Open Channel Flow - Classification of open channels and open channel flows - Velocity Distribution - Characteristics of uniform flow - Chezy's formula - Manning's formula - factors affecting Manning's roughness coefficient - Most economical section of channel.

**Critical Flow:** Specific energy - critical depth - computation of critical depth - critical, sub critical and super critical flows.

#### **UNIT-II:**

**Open Channel Flow-II:** Non-uniform flow - dynamic equation of GVF - classification of channel bottom slopes - classification of surface profile - characteristics of surface profiles - computation of water surface profile by direct step method.

**Rapidly Varied Flow:** Theory of hydraulic jump - elements and characteristics of hydraulic jump in a rectangular channel - energy dissipation.

#### **UNIT-III:**

**Dimensional Analysis and Hydraulic Similitude:** Dimensions of parameters - dimensional homogeneity - study of similarities - model and prototype - Dimensionless Numbers and Model Laws.

**Basics of Hydraulic Machines:** Hydrodynamic force of jets on stationary and moving curved vanes - Jet striking centrally and at tip - Velocity triangles at inlet and outlet - expressions for work done and efficiency - Angular momentum principle.

#### **UNIT-IV:**

**Hydraulic Turbines:** Elements of a typical Hydropower plant - Types of efficiency - Classification of turbines: Pelton wheel & Francis turbine - working proportions, velocity diagram - work done and efficiency - hydraulic design - Draft tube - theory and function.

#### **UNIT-V:**

**Centrifugal Pumps:** Elements of Pump – Classification - Manometric head - Minimum starting speed - Losses and efficiencies - Work done - Multistage pumps - series & parallel, Cavitation.

**Hydropower Engineering:** Classification of Hydropower plants - Definition of terms & their estimation - Load factor - Utilization factor - Capacity factor/plant factor.

#### **TEXT BOOKS:**

1. Fluid Mechanics and Hydraulic Machines, Modi and Seth, Standard Book House, 2019
2. Open Channel Flow, K. Subramanya, Tata McGraw-Hill, 2015

#### **REFERENCES:**

1. Open Channel Hydraulics, V. T. Chow, McGraw-Hill, 2009
2. Fluid Mechanics & Hydraulic Machines - Problems and Solutions, K. Subramanya, McGraw-Hill Education, 2018
3. Fluid Mechanics and Hydraulics Machines, R. K. Bansal, Lakshmi Publications, 2018

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. IV Semester

### (22PC1CE207) TRANSPORTATION ENGINEERING

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** Surveying

#### COURSE OBJECTIVES:

- To classify highways, urban roads and its related planning process
- To analyse different elements used in design of road geometrics
- To understand the concepts of pavement material characteristics
- To formulate the concepts of railway related components and its geometrical elements

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Apply the concepts of alignment for highway planning

**CO-2:** Design of road geometrics

**CO-3:** Design of bituminous mixes based on pavement material characteristics

**CO-4:** Analyze the track components for designing railway track geometry

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	-	-	-	-	-	2	-	2	-	-	-	1	3	-	-
CO-2	3	2	3	-	-	2	-	2	-	-	-	2	-	-	3
CO-3	3	2	3	-	-	-	-	1	-	-	-	1	-	-	3
CO-4	2	1	2	-	-	-	-	1	-	-	-	1	-	-	3

#### UNIT – I:

**Highway Development and Planning:** Importance of transportation –Highway Development in India - Current scenario - Road Plans; Road patterns - Classification of roads - Highway Alignment: Highway alignment – Basic requirements – Controlling factors – Engineering surveys for highway location

#### UNIT – II:

**Geometric Design of Highways:** Introduction – Factors controlling geometric design – Cross sectional elements – Sight distances: Stopping sight distance, overtaking sight distance – Definitions and derivation of equations for computing sight distances – Horizontal alignment – Super elevation – Design of super elevation – Extra-widening on curves – Transition curve – Objectives of providing transition curves – Methods of computing the length of transition curve – Vertical curves.

**UNIT – III:**

**Highway Materials:** Pavement types – Components and their functions – CBR test, Plate bearing test, tests on aggregate - test on bitumen – Mix design by marshall method.

**UNIT – IV:**

**Introduction to Railway Engineering:** Railways for Urban Transportation –LRT, Mono Rail, Metro rail & MRTS; Current developments; Permanent Way: Components and their **Functions:** Rails - Types of Rails, Rail Fastenings, Concept of Gauges, Coning of Wheels, Sleepers – Functions, Materials, Density – Functions, Materials, Ballast less Tracks.

**UNIT – V:**

**Geometric Design of Railway Track:** Gradients and Grade Compensation, cant, widening of Gauges in Curves, Transition Curves, Horizontal, Vertical Curves. Points and Crossings – Turnouts.

**TEXT BOOKS:**

1. Highway Engineering, Khanna S. K., Justo C. E. G and Veeraragavan, 10<sup>th</sup> Edition, Nem Chand & Bros., 2014
2. Principles of Transportation Engineering, Partha Chakroborty and Animesh Das, 2<sup>nd</sup> Edition, PHI Learning, 2017
3. Railway Engineering, Chandra S. and M.M. Agarwal, 2<sup>nd</sup> Edition, Oxford University Press, 2013

**REFERENCES:**

1. Introduction to Transportation Engineering, John Khisty, 3<sup>rd</sup> Edition, Prentice Hall, 2017
2. Railway Engineering, Saxena S. C. and S. P. Arora, Dhanpat Rai and Sons, 2010
3. Highway Materials and Pavement Testing, Khanna S. K., Justo C. E. G. and A. Veeraragavan, 6<sup>th</sup> Edition, Nem Chand and Bros., 2014,

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

### B.Tech. IV Semester

### (22ES1ME211) ELECTRICAL TECHNOLOGY AND MECHANICAL TECHNOLOGY

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

- To explain working principles of IC engines and refrigeration
- To understand joining technologies and handling equipment
- To know the principles of DC machines and transformers
- To learn the applications of AC Machines & Instruments

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Classify working principles of IC engines and refrigeration

**CO-2:** Explain different types of welding techniques and handling equipment

**CO-3:** Apply principles of DC machines and transformers

**CO-4:** Understand and apply principles of AC Machines & Instruments

#### COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	3	3	2	2	2	2	-	-	-	-	-	-	-	-
CO-2	3	3	3	2	2	2	2	-	-	-	-	-	-	-	-
CO-3	2	2	2	2	1	1	1	-	-	-	-	-	-	-	-
CO-4	2	2	2	2	2	1	1	-	-	-	-	-	-	-	-

#### UNIT – I:

**Thermal Engineering:** IC Engines- Classification working principles of petrol, Diesel engines- two stroke and four stroke engines- comparison Refrigeration: Block diagram – working principle - Refrigerants and properties- Basic principles of Air conditioning.

#### UNIT – II:

**Metal Joining Technology Welding:** Introduction – classification – Arc welding – Gas welding – equipment and materials required Arc and Gas cutting, riveting, soldering, brazing

#### UNIT- III:

**Handling Equipment:** Earth moving equipment– bull dozers, power shovels, excavators conveyors – screw, rollers, pneumatic, hydraulic concrete mixers.



**UNIT – IV:**

**DC Machines and Transformers:** Principle of operation of DC Generator – emf equation – types – DC motor types – torque equation – applications – three-point starter – Principles and Operation of single-phase transformer – emf equation losses – efficiency & regulation.

**UNIT – V:**

**Ac Machines & Instruments:** Principles of operation alternators – regulation by synchronous impedance method – Principle of operation of Induction motor – slip – torque characteristics – Application – Basic principles of indicating instruments – Permanent magnet moving coil and moving iron instruments.

**TEXT BOOKS:**

1. A Textbook of Mechanical Technology, R. S. Khurmi, S. Chand & Co.
2. Introduction of Electrical Engineering, M. S. Naidu & S. Kamakshaiah, Tata McGraw-Hill

**REFERENCES:**

1. Elements of Mechanical Engineering, S. B. Mathur, S. Domkundwar, Dhanpat Rai & Co.
2. Construction Planning, Equipment, and Methods, 9<sup>th</sup> Edition, Robert L. Peurifoy, Clifford J. Schexnayder, Robert L. Schmitt, P. E. Aviad Shapira, McGraw-Hill, 2018
3. Fundamentals of Electrical Engineering, Ashafaq Hussain, 2<sup>nd</sup> Edition, Dhanpat Rai & Co.
4. Theory and Problems of Basic Electrical Engineering, D. P. Kothair & I. J. Nagrath, PHI

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

### B.Tech. IV Semester

### (22PC2CE216) FLUID MECHANICS AND HYDRAULIC MACHINES LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

**COURSE PRE-REQUISITES:** Fluid Mechanics

#### COURSE OBJECTIVES:

- To identify the behavior of analytical models introduced in lecture to the actual behavior of real fluid flows
- To explain the standard measurement techniques of fluid mechanics and their applications
- To illustrate the students with the components and working principles of the hydraulic machines- different types of turbines, pumps, and other miscellaneous hydraulics machines
- To analyse the laboratory measurements and to document the results in an appropriate format

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Describe the basic measurement techniques of fluid mechanics and its appropriate application

**CO-2:** Interpret the results obtained in the laboratory for various experiments

**CO-3:** Discover the practical working of hydraulic machines- different types of turbines, pumps, and other miscellaneous hydraulics machines

**CO-4:** Compare the results of analytical models introduced in lecture to the actual behaviour of real fluid flows and draw correct and suitable conclusions

#### COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	1	-	2	-	-	-	-	3	1	1	-	-	1	-
CO-2	3	3	-	3	-	-	-	1	3	1	1	-	-	1	-
CO-3	3	3	1	3	-	1	-	-	3	-	1	1	-	1	1
CO-4	3	3	-	2	-	-	-	1	3	1	1	-	-	1	-

#### LIST OF EXPERIMENTS:

1. Verification of Bernoulli's equation
2. Determination of Coefficient of discharge for a small orifice by a constant head method.

3. Calibration of Venturimeter / Orifice Meter
4. Calibration of Triangular / Trapezoidal Notch
5. Study of Minor losses in pipe flow
6. Determination of Friction factor of a pipeline
7. Impact of jet on vanes
8. Main characteristics of Pelton wheel turbine
9. Performance test on Francis turbine
10. Main characteristics of a single stage/multistage Centrifugal Pump
11. Operating characteristics of Reciprocating Pump

**TEXT BOOKS:**

1. Fluid Mechanics and Hydraulic Machines, Modi and Seth, Standard Book House, 2019
2. Fluid Mechanics and Hydraulic Machines, R.K. Bansal, Laxmi Publications, 2019

**REFERENCES:**

1. IS 2065-1983 (Reaffirmed 2001), Code of Practice for Water Supply in Buildings (Second Revision)

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

### B.Tech. IV Semester

### (22PC2CE207) TRANSPORTATION ENGINEERING LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

**COURSE PRE-REQUISITES:** Transportation Engineering

#### COURSE OBJECTIVES:

- To learn on test on aggregates materials used road constructions
- To gain knowledge on bitumen grading used pavement construction
- To estimation of relative compaction of compacted pavement layers
- To understand the concepts of bituminous mix design

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Categorize aggregate used in pavements along with its suitability

**CO-2:** Classify the grades for bitumen binders

**CO-3:** Estimate the relative compaction and estimate the binder content for bituminous mixes

**CO-4:** Evaluate the Marshall parameters for preparation of bituminous mixes

#### COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1		1	2	-	-	-	-	-	2	-	-	-	-	2	-
CO-2	-	1	2	-	-	-	-	-	2	-	-	2	-	2	-
CO-3	-	2	2	-	-	2	-	-	2	-	-	-	-	2	-
CO-4	2	3	2	-	-	-	-	-	2	-	-	2	-	-	3

#### LIST OF EXPERIMENTS:

##### Test on Road Aggregates:

1. Los Angeles Abrasion Test
2. Specific Gravity & Water absorption

##### Test on Bitumen

3. Penetration Test
4. Softening Point test
5. Ductility Test
6. Flash & Fire Point Test
7. Absolute Viscosity
8. Kinematic Viscosity

9. Bitumen Extraction Test
  - a. Centrifugal apparatus
  - b. Soxhlet apparatus

**Field Tests**

10. Roughness using MERLIN

**Test on Bituminous Mixes**

11. Stripping Value of Aggregates
12. Marshall Stability Test

**TEXT BOOKS:**

1. Highway Engineering, Khanna S. K., Justo C. E. G., and Veeraragavan A., 10<sup>th</sup> Edition, Nem Chand and Bros., 2014
2. Highway Materials and Pavement Testing, Khanna S. K., Justo C. E. G. and A. Veeraragavan, 5<sup>th</sup> Edition, Nem Chand and Bros., 2014

**\*Note:** Bituminous Mix design is carried as per MoRTH & IRC specifications.

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

### B.Tech. IV Semester

### (22SD5CE201) COMPUTER AIDED DRAFTING LABORATORY

TEACHING SCHEME		
L	T/P	C
0	4	2

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

**COURSE PRE-REQUISITES:** Computer Aided Engineering Graphics, Building Construction and Planning

#### COURSE OBJECTIVES:

- To understand various basics of architectural plans
- To draw the plan, section and elevation of building components
- To use drafting tools to draw building plans, sections and elevations from a given line diagram and specifications
- To develop electrical and plumbing drawings for various types of buildings

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Use different AutoCAD commands to draw architectural plans

**CO-2:** Plan, draw and detail the different building components

**CO-3:** Draw plan, section and elevation for different types of buildings following NBC norms

**CO-4:** Draw electrical and plumbing layouts for various types of buildings

#### COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	-	-	-	-	3	1	1	-	3	2	-	3	3	-	-
CO-2	-	-	-	-	3	1	-	-	3	2	-	2	3	-	-
CO-3	2	-	1	-	3	3	1	2	3	2	-	-	3	-	-
CO-4	-	-	-	-	3	2	-	-	2	-	-	-	3	-	-

#### LIST OF EXPERIMENTS:

1. Implementation of drafting commands for drawing of internal architectural features for a given plan.
2. Drawing elevation and section of a fully paneled door
3. Developing plan and section of dog-legged staircase
4. Developing plan of single storied residential building
5. Developing section and elevation of single storied residential building
6. Developing of Electrical layout drawing for a plan
7. Developing of Plumbing layout drawing for a plan

**TEXTBOOKS:**

1. Civil Engineering Drawing-I, N. Sreenivasulu, S. Rama Rao, Radiant Publishing House, 2017
2. Civil Engineering Drawing-II, N. Sreenivasulu, Radiant Publishing House, 2017

**REFERENCES:**

1. Engineering Graphics, P. J. Sha, 3<sup>rd</sup> Edition, S. Chand & Co., 2016
2. Building Drawing, M. G. Shah, 5<sup>th</sup> Edition, Tata McGraw-Hill Education, 2017
3. Civil Engineering Drawing-III, S. Mahaboob Basha, Falcon Publishers, 2014
4. National Building Code of India 2016, Volume 1 and 2, Bureau of Indian Standards, 2016

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

### B.Tech. IV Semester

### (22SD5CE202) FIELD PROJECT

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME		
CIE	SEE	TOTAL
50	-	50

#### COURSE OBJECTIVES:

- To identify, analyze and solve industry / technical / societal problems creatively through sustained critical investigation
- To practice the skills, elegance and commitment to excellence needed to engage in lifelong learning
- To demonstrate an awareness and application of appropriate personal, social and professional ethical standards

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Understand the formulated industry / technical / societal problems

**CO-2:** Apply fundamental and disciplinary concepts and methods in ways appropriate to their principal areas of study

**CO-3:** Demonstrate skills and knowledge of current information, technological tools and techniques specific to the professional field of study

**CO-4:** Analyze and / or develop models for providing solution to industry / technical / societal problems

**CO-5:** Use effectively oral, written and visual communication

#### COURSE ARTICULATION MATRIX:

(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
<b>CO-1</b>	2	-	-	-	-	3	3	-	3	-	1	3	-	-	-
<b>CO-2</b>	3	3	2	2	3	2	-	-	3	-	2	3	-	-	-
<b>CO-3</b>	-	-	3	-	3	2	-	2	3	3	3	3	-	-	-
<b>CO-4</b>	2	3	3	3	3	3	3	3	3	-	3	3	-	-	-
<b>CO-5</b>	-	-	-	-	2	-	-	3	3	3	-	3	-	-	-

#### COURSE OUTLINE:

Filed project-based learning offers students real world opportunities to research issues, think critically, gain new perspectives, solve problems and develop written and oral communication skills all within the framework of a team environment and guided by engaged and involved faculty

- A student shall undergo a one credit Field Project course in II year.



- It shall be a project based course involving the student to undertake issues for industries, companies, and any organizations which they encounter in their day-to-day work.
- Evaluation of the field project shall consist of Continuous Internal Evaluation (CIE) only for 50 marks.
- CIE shall be done by a Project Review Committee (PRC) consisting of the Head of the Department, faculty supervisor and a senior faculty member of the specialization / department.
- The internal evaluation shall be on the basis of two seminars for 50 marks one before SE-I and the other before SE-II as per the calendar dates and evaluation format.
- CIE shall be carried out for 50 marks on the basis of review presentation as per the calendar dates and evaluation format.
- The field project report shall be accepted for submission to the PRC only upon meeting the prescribed similarity index of less than 25%.

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

### B.Tech. IV Semester

### (22MN6HS201) INTELLECTUAL PROPERTY RIGHTS

#### TEACHING SCHEME

L	T/P	C
2	0	0

#### EVALUATION SCHEME

SE-I	SE-II	SEE	TOTAL
50	50	-	100

#### COURSE OBJECTIVES:

- To familiarize students with the nuances of Intellectual Property Rights (IPR) to help them integrate the IPR process in their research activities
- To make the students capable of identifying their own protectable innovations and realizing the process of taking it from bench to market

**COURSE OUTCOMES:** After completing this course the student should be able to

**CO-1:** Get an adequate knowledge on patent and copyright for their innovative research works and academic projects

**CO-2:** Understand and acquire the knowledge of trademarks and registration aspects

**CO-3:** Interpret various forms of Intellectual Property on Design, Geographical Indication (GI), Plant Variety and Layout Design Protection and their registration aspects

**CO-4:** Obtain useful insights from the information in patent documents, especially on novelty of their idea from state-of-the art search, during their research career. This provides further way for developing their idea or innovations

**CO-5:** Get awareness about current trends in IPR and Govt. steps in fostering IPR

#### COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	-	-	-	-	-	2	-	3	-	-	-	2	-	-	-
CO-2	-	-	-	-	-	2	-	3	-	-	-	2	-	-	-
CO-3	-	-	-	-	-	2	-	3	-	-	-	2	-	-	-
CO-4	-	-	-	-	-	2	-	3	-	-	-	2	-	-	-
CO-5	-	-	-	-	-	2	-	3	-	-	-	2	-	-	-

#### UNIT – I:

**Overview of Intellectual Property:** Introduction and the need for Intellectual Property Right (IPR) - Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical Indication, Plant Varieties and Layout Design – Genetic Resources and Traditional Knowledge – Trade Secret - IPR in India : Genesis and development – IPR in abroad - Major International Instruments concerning Intellectual Property Rights: Paris Convention, 1883, the Berne Convention, 1886, the Universal Copyright Convention, 1952, the WIPO Convention, 1967, the Patent Co-operation Treaty, 1970, the TRIPS Agreement, 1994

## **UNIT – II:**

**Patents:** Patents - Elements of Patentability: Novelty, Non-Obviousness (Inventive Steps), Industrial Application - Non - Patentable Subject Matter - Registration Procedure, Rights and Duties of Patentee, Assignment and licence, Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties - Patent office and Appellate Board

## **UNIT – III:**

**Copyrights:** Nature of Copyright - Subject matter of copyright: original literary, dramatic, musical, artistic works; cinematograph films and sound recordings - Registration Procedure, Term of protection, Ownership of copyright, Assignment and licence of copyright - Infringement, Remedies & Penalties – Related Rights - Distinction between related rights and copyrights

## **UNIT – IV:**

### **Trademarks:**

Concept of Trademarks - Different kinds of marks (brand names, logos, signatures, symbols, well known marks, certification marks and service marks) - Non Registrable Trademarks - Registration of Trademarks - Rights of holder and assignment and licensing of marks - Infringement, Remedies & Penalties - Trademarks registry and appellate board

## **UNIT – V:**

**Design:** meaning and concept of novel and original - Procedure for registration, effect of registration and term of protection

**Geographical Indication (GI):** meaning, and difference between GI and trademarks - Procedure for registration, effect of registration and term of protection

**Plant Variety Protection:** meaning and benefit sharing and farmers' rights – Procedure for registration, effect of registration and term of protection

**Layout Design Protection:** meaning – Procedure for registration, effect of registration and term of protection

**Current Contour:** India's New National IP Policy, 2016 – Govt. of India step towards promoting IPR – Govt. Schemes in IPR – Career Opportunities in IP - IPR in current scenario with case studies

## **TEXTBOOKS:**

1. Intellectual Property Rights: Protection and Management Nithyananda, K V, India, IN: Cengage Learning India Private Limited, 2019
2. Intellectual Property Rights, Neeraj, P., & Khusdeep, D, India, IN: PHI learning Private Limited, 2014
3. Intellectual property right, Deborah, E. Bouchoux, 4<sup>th</sup> Edition, Cengage learning

## **REFERENCE:**

1. Law relating to Intellectual Property Rights, Ahuja, V K, India, IN: Lexis Nexis, 2017

## **ONLINE RESOURCES:**

1. Intellectual Property Rights – An Overview, Subramanian, N., & Sundararaman, M. Retrieved from <http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf>, 2018
2. WIPO Intellectual property Handbook, World Intellectual Property Organisation, Retrieved from [https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo\\_pub\\_489.pdf](https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf), 2004