II YEAR
II SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SOLID MECHANICS- II

Course Code: GR20A2016 **L/T/P/C: 2/1/0/3**

II Year II Semester

Prerequisites: Mathematics, Physics, Engineering Mechanics and Solid Mechanics I

Course Objectives:

1. Knowledge of various stresses in thin and thick cylinders under pressures and show stress distribution diagrams.
2. Introduce concept of torsion and bending in circular shafts and springs.
3. Evaluate the bulking or failure load for axially loaded and eccentrically loaded columns and struts.
4. Knowledge of direct and bending stresses in concrete structures like retaining wall, chimney, dams, and stability in dams.
5. Describe unsymmetrical bending in simply supported beams and to memorise beams in curved plan.

Course Outcomes:

At the end of course, the student will be able to

1. Compute various stresses in thin and thick cylinders under pressure, show stress distribution diagrams and define Lame's theorems.
2. Analyse the torsional strength of structural members and differentiate between closed and open coiled helical springs.
3. Determine the buckling failure load for axially loaded and eccentrically loaded columns.
4. Evaluate stresses in chimneys, retaining walls and dams and to check the stability of dams.
5. Evaluate the behaviour of members under unsymmetrical bending and locates hear centres for the section and find stresses in circular and semi-circular beams.

Unit I: Thin Cylinders and Thick Cylinders

Derivation of formula for longitudinal and calculation of hoop stress, longitudinal stress in a cylinder, longitudinal and volumetric strains, changes in diameter, volume of thin cylinders and sphere subjected to internal pressures. Introduction -Lame's theory for thick cylinders- Derivation of Lame's formulae, distribution of hoop, radial stresses across thickness due to internal pressure, design of thick cylinders and thick spherical shells.

Unit II: Torsion and Springs

Derivation of torsion equation and its assumptions**,** Torsional moment of resistance, polar section modulus, power transmitted by shafts, torsional rigidity, combined bending, torsion and end thrust of circular shafts, principal stress and maximum shear stresses under combined loading of bending and torsion.

Springs Introduction, types of springs, analysis of close coiled helical spring.

Unit III: Columns, Struts and Beam Columns

Introduction –Types of columns–Short, medium, and long columns**.** Axially loaded compression members, crushing load. Euler's theorem for long columns, assumptions, derivation of Euler's critical load formulae for various end conditions. Effective length of a column, slenderness ratio, Euler's critical stress. Limitations of Euler's theory. Rankine's formula, Gordon formula. Long columns subjected to eccentric loading. Secant formula, Empirical formulae. Straight line formula.

Beam Columns: Laterally loaded struts subjected to uniformly distributed concentrated loads, Maximum B.M and stress due to transverse and lateral loading.

Unit IV: Direct and Bending Stresses of Chimneys, Retaining walls and Dams

Stresses under the action of direct loading and bending moment, core of a section**.** Determination of stresses in the case of chimneys, retaining walls and dams. Conditions for stability of dams. Stresses due to direct loading and bending moment about its axis.

Unit V: Unsymmetrical Bending of Beamsand Curved Beams

Introduction–Centroid principal axes of section–Graphical Stresses in beams subjected to unsymmetrical bending. Principal axes- Resolution of bending moment into two rectangular axes through the centroid - Location of neutral axis. Deflection of beams under unsymmetrical bending.

Curved Beams: Introduction – Circular beams loaded uniformly and supported on symmetrically placed columns and Semi-circular beams simply supported on three equally spaced supports.

Text/Reference Books:

1. R.K Bansal, A textbook of Strength of materials, Laxmi Publications(P)Ltd., NewDelhi, 6th Edition,2018.
2. B.S. Basavrajaiah and P. Mahadevappa,Strength ofmaterials, University Press, Hyderabad, 3rd Edition, 2010.
3. S.S. Bhavikatti, Strength of materials, Vikas Publications, 4th Edition,2010.
4. Ferdinand Beer and others, Mechanics of solid, Tata Mc. Graw Hill Publications, 6th Edition.
5. S.Rama Krishna and R.Narayan, Strength of materials, Dhanpat Rai Publications.
6. R.K.Rajput, Strength of materials,S.Chand&Co,NewDelhi,5th Edition,2010.
7. A.R.Basu,Strength of materials, Dhanpat Rai & Co, NaiSarah, NewDelhi, firstrevisedon 2005, Re-print 2009.
8. L.S.Srinath, Strength of materials, Macmillian India Ltd.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code: GR20A2017 **L/T/P/C: 3/0/0/3**

II Year II Semester

Course Objectives:

1. Understand and apply fundamental electrical theory and laws in basic series and Parallel dc circuits including ohm's law, power, application of ohm's law & Kirchhoff's laws.
2. Learn the principle, working operations of various DC and AC machines.
3. Measure the fundamental electrical quantities using digital and analog multi-meters and an oscilloscope.
4. Learn the rectification (AC to DC) by using diodes.
5. Learn the basic semiconductor switching devices and its characteristics.

Course outcomes: At the end of the course, the student will be able to

1. Know the application of ohms law & Kirchhoff's laws.
2. Know about fundamental principles of electrical machines.
3. Measure the fundamental electrical quantities using oscilloscope.
4. Illustrate the basic principles of semi conducting devices.
5. Analyse the different applications of a transistor.

UNIT I:

Electrical Circuits : Basic definitions, Types of elements, Ohm's Law, Resistive networks, Kirchhoff's Laws, Inductive networks, capacitive networks, Series, Parallel circuits and Star-delta and deltastar transformations.

UNIT II:

DC Machines and AC Machines Principle of operation of DC Generator - emf equation - types– DC motor types – torque equation– applications – three point starter. Principle of operation of alternators – regulation by synchronous impedance method – Principle of operation of induction motor – slip – torque characteristics – applications.

UNIT III:

Transformers and Instruments Principle of operation of single phase transformers – EMF equation – losses – efficiency and regulation. Basic Principle of indicating instruments – permanent magnet moving coil and moving iron instruments. Cathode Ray Oscilloscope Principles of CRT (Cathode Ray Tube), Deflection, Sensitivity, Electrostatic and Magnetic deflection, Applications of CRO - Voltage, Current and frequency measurements.

UNIT IV:

Diode and its Characteristics P-N junction diode, symbol, V-I Characteristics, Diode Applications, and Rectifiers – Half wave, Full wave and Bridge rectifiers (simple Problems).

UNIT V:

Transistors P-N-P and N-P-N Junction transistor, Transistor as an amplifier, SCR characteristics and applications.

Text/Reference Books:

1. David V. Kerns, JR. J. David Irwin, Essentials of Electrical and Computer Engineering.
2. V.K.Mehta, S.Chand& Co, Principles of Electrical and Electronics Engineering.
3. M.S Naidu and S. Kamakshaiah, Introduction to Electrical Engineering,TMH Publications.
4. Kothari and Nagarath, Basic Electrical Engineering, TMH Publications, 2nd Edition.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
STRUCTURAL ANALYSIS - I

Course Code: GR20A2018 **L/T/P/C: 3/0/0/3**
II Year II Semester

Prerequisites: Engineering Mechanics, Solid mechanics.

Course Objectives:

1. Skill to Estimate the deflections of simple beams and pin-jointed trusses using energy theorems.
2. Ability to analyze three and two hinged, circular and parabolic arches
3. Knowledge to Analyze statically in-determinate structures using force and displacement methods.
4. To understand the effect of moving loads and analyse statically determinate beams and simple trusses.
5. To understand the effect using influence diagrams in analysis of statically determinate beams and simple trusses.

Course Outcomes:

At the end of course, the student will be able to

1. Determine deflections of beams and trusses using energy methods.
2. Analyse three and two hinged of circular and parabolic arches.
3. Analyse indeterminate beams using force method for propped cantilever, fixed and Continuous beams (Clapeyorns's three moment theorem).
4. Apply Slope deflection, Moment distribution and Kani's methods to analysestatically In-determinate structures.
5. Analyse statically determinate structures using rolling load and influence line methods.

Unit I: **Energy Theorems:**

Introduction – strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castiglione's first theorem – Deflections of simple beams and pin jointed trusses(Use Unit load method)

Unit II: **Arches:**

Classification of arches, advantage of arch, three and two hinged arches – Circular and parabolic arches yielding of supports, Effect of rib shortening, Effect of temperature changes, Tied and linear arch, Eddy's theorem.

Unit III: Indeterminate Beams (Force Method)

a. Propped cantilevers
b. Fixed beams
c. Continuous Beams (By Clapeyorns's theorem of threemoments).

Unit IV: Analysis of Simple and Continuous Beams (Indeterminate Structures)

(up to 2nd degree of Static in-determinacy)

a. Slope Deflection method

b. Moment Distribution method

c. Kani's Method.

Unit V: Moving Loads and Influence Line Diagrams:

Introduction, maximum SF and BM at a given section and absolute maximum S.F and B.M due to single concentrated load, U.D load longer than the span, U.D load shorter than the span, two point loads with fixed distance between them and several point loads – Equivalent uniformly distributed load – focal length.

Definition of influence line for SF, Influence line for B.M- load position for maximum SF at a section –Load positions for maximum BM at a section – Point loads , UDL longer than the span, UDL shorter than the span- Influence lines for forces in members of Pratt and Warren trusses.

Text/Reference Books:

1. V. N. Vazirani& M. M. Ratwani, Analysis of structures –Vol. & Vol. II, Khanna Publications,New Delhi.
2. T.S. Thandavamoorthy, Analysis of structures, Oxford University Press, New Delhi.
3. S.S Bhavikatti, Structural Analysis, Vikas Publishing House.
4. S.B. Junnakar, Mechanics of structures, Charotar Publishing House, Anand, Gujarat.
5. Pandit& Gupta, Theory of structures, Tata Mc. Graw Hill Publishing Co. Ltd., New Delhi.
6. R. S. Khurmi, Theory of structures, S. Chand Publishers.
7. B. C. Punmia, Strength of materials and Mechanics of Structures, Khanna Publications, New Delhi.
8. B.D. Nautical, Introduction to structural analysis, new age internationalpublishers,New Delhi

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ECONOMICS AND ACCOUNTING FOR ENGINEERS

Course Code: GR20A2004 **L/T/P/C : 3/0/0/3**

II Year II Semester

Course Objectives:

1. To provide the student with a clear understanding of demand analysis, elasticity of demand and demand forecasting;
2. To provide the insight on theory of production and cost analysis.
3. To describe different types of markets and competition and to elaborate the different forms of organisation and different methods of pricing.
4. To make the students understand various capital budgeting techniques
5. To Provide an insight of fundamental of accounting and emphasis on describe final accounts preparation

Course Outcomes: After studying this course, students will be in a position to:

1. The student will be able to understand the concepts of economics and Demand concepts, elasticity and techniques for forecast demand of products
2. The student will be able to plan the production levels in tune with maximum utilization of organizational resources and with maximum profitability.
3. To understand the types of markets, types of competition and to estimate the cost of products and decide the price of the products and services produced
4. The student will be able to analyze the profitability of various projects using capital budgeting techniques and
5. The student is able will be able prepare the financial statements and more emphasis on preparation of final accounts.

Unit-1: Introduction & Demand Analysis: ***Definition and Scope:*** Introduction to Economics, Nature and Scope of Managerial Economics. ***Demand Analysis***: Demand Determinants, Law of Demand and its exceptions. ***Elasticity of Demand***: Definition, Types, Measurement and Significance of Elasticity of Demand. ***Demand Forecasting***, Factors governing demand forecasting, methods of demand forecasting.

Unit-2: Production & Cost Analysis: ***Production Function*** – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Laws of Returns, Internal and External Economies of Scale. ***Cost Analysis*****:** Cost concepts. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

Unit-3: Markets and Forms of Business organizations: ***Types of competition and Markets***, Features of Perfect competition, Monopoly and Monopolistic Competition. ***Pricing*****:** Objectives and Policies of Pricing. Methods of Pricing. ***Business:*** Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types.

Unit-4: Capital Budgeting: Capital and its significance, Types of Capital, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value (NPV) Method and Internal Rate of Return (IRR) (simple problems) and Profitability Index (PI)

Unit-5: Introduction to Financial Accounting: ***Accounting Concepts and Conventions*** - Double-Entry Bookkeeping. ***Accounting Cycle:*** Journal, Ledger, Trial Balance, Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Text Books

1. Aryasri: Managerial Economics and Financial Analysis, TMH, 2009.
2. Managerial Economics: Analysis, Problems and Cases - P. L. Mehta, Edition, 13. Publisher, Sultan Chand, 2007.
3. Financial Accounting -1: S P Jain and K. L. Narang, Kalyani Publishers,2005.

Reference Books

1. Peterson, Lewis and Jain: Managerial Economics, Pearson, 2009
2. Mithani : Managerial Economics , HPH, 2009
3. Lipsey&Chrystel, Economics, Oxford University Press, 2009
4. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.2009
5. Horngren : Financial Accounting, Pearson, 2009.
6. Dr. S. N. Maheswari and Dr. S.K. Maheshwari: Financial Accounting, Vikas, 2009.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
HYDRAULIC ENGINEERING

Course Code: GR20A2019 **L/T/P/C: 2/0/0/2**
II Year II Semester

Prerequisite: Fluid Mechanics

Course Objectives:

1. Describe the type of channel flow and application of chezys and manning equation
2. Predict the non-uniform flow in open channel flows.
3. Analyze the dimensions of model with prototype.
4. Identify the hydraulic jump losses, surface profiles and channel bed slopes.
5. Compute hydropower and work done by the centrifugal pumps.

Course Outcomes:

At the end of the course, the student will be able to

1. Describe and predict the various economical channel sections
2. Apply dynamic equation in the uniform flows.
3. Analysing modal and prototype similarities.
4. Visualize behaviour the hydraulic jump, surface profiles of channel flows.
5. Evaluate the efficiency of the pumps and hydropower.

Unit I: Introduction to Open Channel Flow Computation of Uniform flow: Comparison between open channel flow and pipe flow,geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section. Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient 'n'. Most economical section of channel.

Specific energy, Specific energy curve, critical flow, discharge curve Specific force Specific depth, and Critical depth.

Unit II: Non-Uniform Flow Channel Transitions. Measurement of Discharge and Velocity – Venturi Flume, Parshall Flume,Measurement of Velocity- Current meter, Floats, Hot-wire.Gradually Varied Flow-Dynamic Equation of Gradually Varied Flow, Classification of channel bottom slopes, Classification of surface profile, Characteristics of surface profile. Computation of water surface profile. Direct Step method.

Unit III: Dimensional Analysis and Hydraulic Similitude

Dimensional homogeneity, Rayleigh method, Buckingham's Pi method. Buckingham's πTheorem application of dimensional analysis and model studies to fluid flow problem Dimensionless groups. Similitude, Model studies, Types of models. Definitions of ReynoldsNumber, Froude Number, Mach Number, Weber Number and Euler Number.

Basics of Turbo Machinery: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally.

Unit IV: Hydraulic Jump

Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular Channel, length and height of jump, location of jump, types, applications and location of hydraulic jump. Energy dissipation and other uses, surges a moving hydraulic jump.

Hydraulic Turbines-I: Layout of a typical Hydropower installation Heads and Efficiencies classification of turbines-pelton wheel, Francis turbine, Kaplan turbine-working, working proportions, velocity diagram, work done and efficiency , draft tube theory and function efficiency. Angular momentum principle, Applications to radial flow turbines. Governing of turbines, characteristic curves.

Unit V: Centrifugal Pumps

Pump installation details-classification-work done- Manometric head minimum starting speed losses and efficiencies-specific speed multistage pumps-pumps in parallel- performance of pumps-characteristic curves- NPSH-Cavitations - Reciprocating pumps basics and definition.

Hydropower Engineering: Classification of Hydropower plants Definition of terms Load factor, utilization factor, capacity factor, estimation of hydropower potential.

Text/Reference Books:

1. Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
2. Open channel Flow, K. Subramanya, Tata McGraw Hill.
3. Open Channel Hydraulics, VenTe Chow, Tata McGraw Hill.
4. Burnside, C.D., "Electromagnetic Distance Measurement," Beekman Publishers.
5. J.F.Douglas, J.M. Gaserek and J.A.Swaffirld, Fluid Mechanics, 5thlongman Edition,2005.
6. Frank.M. White, Fluid Mechanics, Tata Mc. Graw Hill Pvt. Ltd, 4th Edition, 2013.
7. A.K. Mohanty, Fluid Mehanics, Prentice Hall ofIndia Pvt. Ltd., New Delhi, 2nd Edition,1994.
8. Dr. R.K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi.
9. Publications (P) ltd., New Delhi, 9th Edition, 2012.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SURVEYING LAB

Course Code: GR20A2020 **L/T/P/C:0/0/4/2**

II Year II Semester

Prerequisite: Surveying

Course Objectives:

The objectives of this course is to make the student to

1. Introduction to the applicability of basic surveyinstruments.
2. Skill of determining relative positions in land surveying.
3. Visualization of elevations, areas and volumes.
4. Skill of plotting existing geographical surface information.
5. Knowledge to judge the compatibility of instruments.

Course Outcomes:

At the end of the course, the student will be able to,

1. Define the characteristics and applications of basic survey instruments.
2. Apply knowledge of mathematics, science and engineering inlandmeasurement Techniques.
3. Calculate distances, inclinations, elevations, areas and volumes.
4. Generate maps of earth surfaces.
5. Analyzing the data and transfer relevant points onto ground.

Task-1: (i) Measurement of an area by Chain Survey (Open and Closed Traverse).
(ii) Study of Topo sheets

Task-2: Chaining across obstacles (Three Exercises).

Task-3: Simple, fly, Differential Levelling.

Task-4: Study of Theodolite- Measurement of horizontal and vertical angles- (Repetition and Reiteration method).

Task-5: Trigonometric Levelling- Heights and distances problems.

Task-6: Calculation of R.L and distance using tachometric survey.

Task-7: Curve setting by any two methods.

Task-8: Determine the area of the field by using totalstation.

Task-9: Column and foundation marking using TotalStation.

Task-10: (i) Distance, gradient, differential height between two inaccessible points using Total Station.
(ii) GPS Hand Application

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
COMPUTER AIDED DESIGN LAB

Course Code: GR20A2021 **L/T/P/C:0/0/4/2**
II Year II Semester

Prerequisite: Engineering Graphics

Course Objectives: The objectives of this course is to make the student to

1. Introduction of computer aided drafting software and define its use in construction work.
2. Understand the basic building drawing fundamentals for creating and manipulate geometric models by CAD System.
3. Apply the knowledge of innovative competencies of CAD to increase the creativity to design projects.
4. Visualize and draw the building components like truss, windows and doors.
5. Understand the concepts of various truss members and its applications.

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

1. Comprehend the fundamentals of building drawings and understand CAD software for drafting.
2. Draw Material, Sanitary, Electrical Symbols and various brick bonds by using drawing commands in CAD.
3. Develop Geometric Plan, Sections and Elevations for single and multi-storeyed building with suitable scale and dimensions.
4. Draft the building components and sectional view of doors, windows and trusses.
5. Create the drawings of various trusses like King post truss, Queen post truss and North light truss.

LIST OF EXPERIMENTS

1. Introduction to Computer Aided Drafting
2. Software and Basic drawing commands for CAD
3. Conventional Symbols used in Building Construction
    a. Building materials symbols
    b. Plumbing fixtures and
    c. Electric fixtures
4. Bonds in brick masonry
5. Drawing Plan, Section and Elevation of Building
    a. Single room with R.C.C flat roof
    b. A Residential building with single bedroom
    c. R.C.C framed structure with R.C.C roofslab
    d. Library building with R.C.C flat roof
    e. Planning of fully tiled gabled house
    f. Workshop building with north light roof truss
6. Drawing Plan, Section and Elevation of Multi-storeyed Building
7. Detailing of Building Components
    a. Doors
    b. Windows
    c. Ventilator
    d. Stairs
    e. Lintel Cum Shade
8. Drawing of King post truss, Queen post truss and North light Truss.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Course Code: GR20A2022 **L/T/P/C:0/0/4/2**

II Year II Semester

Prerequisite: Fluid Mechanics and Hydraulic Engineering

Course Objectives:

On completion of this Subject/Course the student shall be able to

1. Demonstration of the discharge through venture meter and orifice meter
2. Verify the Energy head in the pipe flows and able to compute impact coefficients of jet.
3. Describe the laminar and turbulent flows and velocity distribution in pipe lines
4. Evaluate the major and minor losses in pipe flow
5. Compute the efficiency of pelton wheel turbine and multistage centrifugal pump

Course Outcomes:

On completion of this Subject/Course the student shall be able to

1. Predict the discharge through venture meter and orifice meter.
2. Estimate the energy heads.Compute the laminar flow, length of flow.
3. Predict the velocity distribution in pipe flows
4. Compute the major and minor losses in pipe flow
5. Evaluate the efficiency of Hydraulic machines

LIST OF EXPERIMENTS

1. Verification of Bernoulli's Theorem
2. Calibration of Venturimeter
3. Calibration of Orifice meter
4. Impacts of jets on vanes
5. Reynolds experiment Laminar Flow and Turbulent flow through pipes
6. Multi stage centrifugal pump
7. Major losses
8. Minor losses in pipe(Hydraulic losses due to sudden enlargement of pipe)
9. Minor losses in pipe(Hydraulic losses due to sudden contraction of pipe)
10. Pelton wheel turbine
11. Hydraulic Jump
12. Calibration of Rectangular notch
13. Calibration of Triangular notch

Text Books

1. Modi and Seth, Fluid Mechanics, Standard book house, 19th Edition, 2011.
2. S.K.Som & G.Biswas, Introduction to Fluid Machines, Tata Mc.Graw Hill publishers, Pvt. Ltd., 3rd Edition, 2012.
3. Edward J. Shaughnessy, M. Katz and James P. Schaffer, Introduction to Fluid Machines, Oxford University Press, New Delhi, 1st Edition, 2005

References Books

1. J.F.Douglas, J.M. Gaserek and J.A.Swaffirld, Fluid Mechanics, 5th longman Edition,2005.
2. Frank.M. White, Fluid Mechanics, Tata Mc. Graw Hill Pvt. Ltd, 4th Edition, 2013.
3. A.K. Mohanty, Fluid Mehanics, Prentice Hall of India Pvt. Ltd., New Delhi, 2nd Edition,1994.
4. Dr. R.K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) ltd., New Delhi, 9th Edition, 2012.