GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SOLID MECHANICS II

Course Code: GR18A2014 **L/T/P/C: 3/1/0/4**

II Year II Semester

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

- Knowledge of various stresses in thin and thick cylinders under pressures and show stress distribution diagrams.
- Introduce concept of torsion and bending in circular shafts and springs.
- Evaluate the bulking or failure load for axially loaded and eccentrically loaded columns and struts.
- Knowledge of direct and bending stresses in concrete structures like retaining wall, chimney, dams and stability in dams.
- 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

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

Unit I: Thin 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

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 and Struts

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

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 both axis.

Unit V: Unsymmetrical Bending

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.

Beams Curved in Plan: Introduction – Circular beams loaded uniformly and supported on symmetrically placed columns and Semicircular beams simply supported on three equally spaced supports.

Text/Reference Books:

1. R.KBansal,AtextbookofStrengthofmaterials, LaxmiPublications(P)Ltd.,NewDelhi, 5th Edition,2012.
2. BasavrajaiahandMahadevappa,Strengthofmaterials,UniversityPress,Hyderabad,3rdEditio n,2010.
3. Bhavikatti,Strengthofmaterials,VikasPublications,3rd Edition,2008.
4. Ferdinand Beer and others, Mechanics of solid, Tata Mc. Graw Hill Publications, 6th Edition.
5. S.Rama Krishna andR.Narayan,Strengthofmaterials,DhanpatRaiPublications.
6. R.K.Rajput,Strengthofmaterials,S.Chand&Co,NewDelhi,5th Edition,2010.
7. A.R.Basu,Strengthofmaterials,DhanpatRai&Co,NaiSarah,NewDelhi,firstrevised on2005,Re-print2009.
8. L.S.Srinathetal.,Strengthofmaterials,MacmillianIndiaLtd.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code: GR18A2015 **L/T/P/C: 3/1/0/4**

II Year II Semester

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

- 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.
- Learn the principle, working operations of various DC and AC machines.
- Measure the fundamental electrical quantities using digital and analog multi-meters and an oscilloscope.
- Learn the rectification (AC to DC) by using diodes.
- Learn the basic semiconductor switching devices and its characteristics.

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

- Know the application of ohms law & Kirchhoff's laws.
- Know about fundamental principles of electrical machines.
- Measure the fundamental electrical quantities using oscilloscope.
- Illustrate the basic principles of semi conducting devices.
- 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

MECHANICAL ENGINEERING

Course Code: GR18A2016 **L/T/P/C: 2/0/0/2**

II Year II Semester

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

- To understand the parts of turbines and working principles.
- To know the classification of power plants and functioning of different power plants.
- To learn the classification, main components like 2-stroke and 4 – stroke engines.
- To know the processes of Refrigeration and Air conditioning.
- To know the processes of Transmission of Power.

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

- Recognize the types of turbines.
- Recognize the types of power plants.
- Recognize internal components of Internal Combustion Engines.
- Understand the desirable properties and methods in Refrigeration & Air Conditioning.
- Recognize the types of belts.

Unit I: Steam Turbines

Main parts of a steam turbine, types of turbines, working of a single stage impulse turbine (De-Level Turbine) Compounding of impulse steam turbines, Working of Parson's Reaction turbine, Differences between Impulse and Reaction Turbines.

Unit II: Power Plants

Classification of power plants, steam power plants, Nuclear Power plant, Gas Turbines, Diesel Power Plant, Hydro Power Plant, Environmental constraints of power Generation, Solar Energy, Wing Energy, Tidal power, Geothermal Power, ocean Thermal Energy Conversion (OTEC).

Unit III: Internal Combustion Engines

Classification, Main components, 2-stroke and 4-stroke Petrol Engines, 2-stroke and 4-stroke diesel engines, Fuel System in a petrol Engine, Battery or Coil Ignition System, Cooling System in I.C. Engines, Lubrication System, Fuel System for Diesel Engines, Petrol Injection, Differences between Diesel Injection and Petrol Injection.

Unit IV Refrigeration and Air Conditioning

Refrigeration, Refrigerants and their desirable properties, methods of Refrigeration, Requirements of Comfort Air Conditioning, Window Air Conditioner, Thermo Electric Cooling.

Unit V: Transmission of Power

Belt and rope Drives, Types of Belts, Materials, Types of Flat Belt Drives, Velocity Ratio or Speed Ratio, Rope Drives, Gear Trains and Their Types.

Text/Reference Books:

1. G. Shanmugham& S. Raveendran-Basic Mechanical Engineering, Tata MC Graw Hill, 2007.
2. Wickert J – An Introduction to Mechanical Engineering, Thomson Brooks Cole, 2004 Edition.
3. Aroraz&Domkundwaqr-Power Plant Engineering, dhanpatRai& Co., 5th Revised Edition.
4. R.S. Khurmi& J.K. Gupta – Thermal Engineering, S. Chand, 2008. 3. C.P.arora-Refrigeration and Air Conditioning, Tata Mc Graw Hill, 2008.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SURVEYING AND GEOMATICS

Course Code: GR18A2017 **L/T/P/C: 3/0/0/3**

II Year II Semester

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

- Describe the function of surveying in civil engineering construction and work with survey observations, and perform calculations.
- To introduce basics and concepts of curves which will enable to setup and map the curves on ground with precision.
- To understand the working of Total Station equipment and solve the surveying problems.
- To introduce basics and concepts of aerial photography, acquisition and mapping from aerial photographs using different types of stereo plotters.
- The objective of this course is to familiarize about the principles of remote sensing, data acquisition and analyse of satellite data.

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

- Apply the knowledge, techniques, skills, and applicable tools of the discipline to Engineering and surveying activities.
- To be able to calculate, design and layout of horizontal and vertical curves, Understand, interpret, and prepare plan, profile, and cross-section drawings.
- Understand the advantages of electronic surveying over conventional surveying methods.
- Acquire knowledge about photogrammetry principles, methods and. product generation strategies in both Analytical and digital Photogrammetry system.
- Acquire knowledge about the principles and physics of Remote sensing and data acquisition and getting familiarized with various data analysis techniques.

Unit I: **Introduction to Surveying**

Principles, Linear, angular and graphical methods, Survey stations, Survey lines- ranging, bearing of survey lines, Levelling: Plane table surveying, Principles of levelling- booking and reducing levels; differential, reciprocal levelling, profile levelling and cross sectioning. Digital and Auto Level, Errors in levelling; contouring: Characteristics, methods, uses; areas and volumes.

Unit II: **Triangulation and Trilateration**

Theodolite survey: Instruments, Measurement of horizontal and vertical angle; Horizontal and vertical control - methods -triangulation -network- Signals. Baseline - choices - instruments and accessories - extension of base lines - corrections - Satellite station - reduction to Centre – Intervisibility of height and distances - Trigonometric levelling - Axis single corrections. Curves- Elements of simple and compound curves – Method of setting out – Elements of Reverse curve - Transition curve – length of curve – Elements of transition curve - Vertical curves.

Unit III: **Modern Field Survey Systems**

Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments, GPS measurements, errors and biases, Surveying with GPS, Co-ordinate transformation, accuracy considerations.

Unit IV: Photogrammetry Surveying

Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereo plotting instruments, mosaics, map substitutes.

Unit V: **Remote Sensing**

Introduction –Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors; visual image interpretation; digital image processing.

Text/Reference Books:

1. Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GISand Remote Sensing, Pearson India, 2006.
2. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011.
3. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010.
4. Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.
5. Anji Reddy, M., Remote sensing and Geographical information system, B.S.Publications, 2001.
6. Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

HYDRAULIC ENGINEERING

Course Code: GR18A2018 **L/T/P/C: 3/0/0/3**

II Year II Semester

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

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

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

- Describe and predict the various economical channel sections
- Apply dynamic equation in the uniform flows.
- Analysing modal and prototype similarities.
- Visualize behavior the hydraulic jump, surface profiles of channel flows.
- 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 π-Theorem application of dimensional analysis and model studies to fluid flow problem Dimensionless groups. Similitude, Model studies, Types of models. Definitions of Reynolds Number, 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.

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

Text/Reference Books:

1. Fuid 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, 5th longman 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 of India 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

STRUCTURAL ANALYSIS I

Course Code: GR18A2019 **L/T/P/C: 3/0/0/3**

II Year II Semester

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

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

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

- Determine deflections of beams and trusses using energy methods.
- Analyze three and two hinged, circular and parabolic arches.
- Analyze indeterminate beams using force method for propped cantilever, fixed and Continuous beams (Clappeyorn's three moment theorem).
- Apply Slope deflection, Moment distribution and Kani's methods to analyze statically indeterminate structures.
- Analyze statically determinate and indeterminate structures using rolling load and influence line method.

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.

Unit II: Arches

Types of arches- three and two hinged arches – Circular and parabolic arches – yielding of supports –Effect of shortening of rib-Effect of temperature changes –Tied and linear arch.

Unit III: Indeterminate Beams (Force Method)

a. Propped cantilevers
b. Fixed beams
c. Continuous Beams (By Clapeyron's theorem of three moments).

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

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 international publishers, New Delhi.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SURVEYING LAB

Course Code: GR18A2020 **L/T/P/C: 0/0/4/2**

II Year II Semester

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

- Introduction to the applicability of basic survey instruments.
- Skill of determining relative positions in land surveying.
- Visualization of elevations, areas and volumes.
- Skill of plotting existing geographical surface information.
- Knowledge to judge the compatibility of instruments.

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

- Define the characteristics and applications of basic survey instruments.
- Apply knowledge of mathematics, science and engineering in land measurement Techniques.
- Calculate distances, inclinations, elevations, areas and volumes.
- Generate maps of earth surfaces.
- Analysing the data and transfer relevant points onto ground.

Task-1: Measurement of an area by Chain Survey (Open and Closed Traverse).

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

Task-3: Measurement of an area by compass survey.

Task-4: Simple, fly, Differential Leveling.

Task-5: Exercise of L.S and C.S and plotting.

Task-6: Study of Theodolite- Measurement of horizontal and vertical angles- (Repetition and Reiteration method).

Task-7: Trigonometric Levelling- Heights and distances problems.

Task-8: Calculation of R.L and distance using tachometric survey.

Task-9: Curve setting by any two methods.

Task-10: Determine the area of the field by using total station.

Task-11: Column and foundation marking using Total Station.

Task-12: Distance, gradient, differential height between two inaccessible points using Total Station.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

CAD LAB

Course Code: GR18A2021 **L/T/P/C: 0/0/2/1**

II Year II Semester

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

- Introduction of CAD Software and describe its applications in different fields.
- Understanding of the basic drawing fundamentals that are used to create and manipulate geometric models by CAD System.
- Knowledge of advanced capabilities of CAD to increase the creativity to design projects.
- Visualize the Real time Components of Building Drawings.
- Skill of Design to create Real time Building Drawings.

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

- Comprehend the fundamentals of building drawings and understand CAD software for drafting.
- Draw Material, Sanitary, Electrical Symbols and various brick bonds by using drawing commands in CAD.
- Develop geometric plan for single and multi-storeyed building with suitable scale and dimensions.
- Develop the Sections and Elevations for Single and Multi Storeyed Buildings using CAD software.
- Draft the building components and sectional view of doors, windows and trusses.

Task-1: Introduction to CAD (Computer Aided Drafting).

Task-2: Software for CAD and Introduction to different Softwares.

Task-3: General Commands and Practice exercises on CAD Software.

Task-4: Drawing of Material Symbols, Sanitary Symbols and Electrical Symbols.

Task-5: Drawing of Various Bonds in Brick Work.

Task-6: Drawing of Plans of Buildings using software.
a)Single Storied Buildings (b) Multi Storied Buildings.

Task-7: Developing Sections and Elevations for
a)Single Storied Buildings (b) Multi Storied Buildings.

Task-8: Detailing of Building Components like
a) Doors b) Windows c) Trusses

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Course Code: GR18A2022 **L/T/P/C: 0/0/2/1**

II Year II Semester

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

- Demonstration of the discharge through venturi meter and orifice meter.
- Verify the Energy head in the pipe flows and able to compute impact coefficients of jet.
- Describe the laminar and turbulent flows and velocity distribution in pipe lines.
- Evaluate the major and minor losses in pipe flow.
- Compute the efficiency of Pelton wheel turbine and multistage centrifugal pump.

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

- Predict the discharge through Venturi meter and orifice meter.
- Estimate the energy heads.
- Compute the Reynolds number for types of flows.
- Compute the losses in pipe flow.
- Evaluate the efficiency of hydraulic machines.

Task-1: Verification of Bernoulli's Theorem

Task-2: Calibration of Venturi meter.

Task-3: Calibration of Orifice meter.

Task-4: Impacts of jets on vanes.

Task-5: Reynolds experiment Laminar Flow through pipes.

Task-6: Reynolds experiment Turbulent flow through pipes.

Task-7: Multi stage centrifugal pump.

Task-8: Major losses in pipe flow.

Task-9: Minor losses in pipe (Hydraulic losses due to sudden enlargement of pipe).

Task-10: Minor losses in pipe (Hydraulic losses due to sudden contraction of pipe).

Task-11: Pelton wheel turbine.

Task-12: Hydraulic Jump.

Task-13: Calibration of Rectangular notch.

Task-14: Calibration of Triangular notch.