## Revised Scheme of Instruction and Examination under R14 Regulation

### II B.Tech., I Semester

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### II B.Tech., II Semester

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<td>Managerial Economics and Financial Analysis</td>
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<td>14AHS15</td>
<td>Quantitative Aptitude and Reasoning-I (Audit Course)</td>
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Objectives:
1. To study the internal effects produced and deformations of bodies caused by externally applied forces.
2. To understand the strength characteristics of different materials and structural members subjected to shear, torsion and bending.
3. To understand the basic concepts of torsion of circular shafts and springs.
4. To understand the concepts of circumferential and hoop stresses in thin and thick cylinders.

Outcomes:
After completion of the course the student will be able to:
1. Understand the concepts and applications of stresses and strains
2. Determine the internal forces in the beams
3. Formulate the expressions for deflection for different loading conditions
4. Formulate the expressions for longitudinal and circumferential stresses in thin and thick cylinders

UNIT I

UNIT II
SHEAR FORCE AND BENDING MOMENTS: Types of supports – Types of beams – Shear force and bending moment diagrams for simply supported - cantilever and over hanging beams with point loads - uniformly distributed load - uniformly varying loads and couples – Relationship between shear force and bending moment.

UNIT III

UNIT IV
DEFLECTIONS OF BEAMS: Bending into a circular arc – slope - deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay’s methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads - U.D.L uniformly varying load.
TORSION OF CIRCULAR SHAFTS AND SPRINGS: Theory of pure torsion - Torsional theory applied to circular shafts – Power transmission - Close and open coiled helical springs under axial loads and axial twist – Carriage springs.

UNIT V
**THICK CYLINDERS:** Thick cylinders – Lame’s equation – Design of thick cylindrical shells – Compound cylinders – Shrink fit allowance – Initial difference of radii at the junction.

**Text Books:**


**References:**

(14AE06) ELECTRICAL ENGINEERING AND ELECTRONICS ENGINEERING

Objectives:
1. To understand the Fundamentals of Electrical Circuits and measurements.
2. To study the construction, principle of operation and performance of DC and AC Machines and also know Principle of Measuring Instruments.
3. To understand the characteristics and applications of diode, transistor and SCR.
4. To understand the operation of CRO and regulated power supplies and function generators.

Outcomes:
After completion of this course the students will be able to:
1. Acquire the knowledge of construction, operation and applications of different types of electrical machines.
2. Have knowledge of instruments for measuring basic electrical quantities.
3. Know applications of PN Junction diode, Transistor and SCR.
4. Gain the knowledge about CRO, regulated power supplies and function generators.

UNIT I
INTRODUCTION TO ELECTRIC CIRCUITS AND MEASUREMENTS: Circuit elements – Sources - Ohm’s Law - Kirchhoff’s Laws - Network reduction Techniques , Mesh analysis and Nodal Analysis –Thevenin’s , Superposition – Simple Problems - Sinusoidal Alternating Quantities – Concept of Frequency, Period, Phase, Average and RMS Values – Concept of Impedance.

UNIT II

UNIT III
AC MACHINES: Concept of Three Phase Supply – Construction, Operation and types of Three Phase Induction Motors - Slip – Torque Characteristics and Application – Principle of Operation of Alternator – Concept of Regulation.
SINGLE PHASE MOTORS: Shaded pole type motor, Repulsion motors, stepper motor- construction and principles of operation only.

UNIT IV
UNIT V


Text Books:

References:
1. Helfrick and Cooper: Modern Electronic Instrumentation and Measurement Techniques, PHI Publications.
Objectives:
1. To understand the importance of various Engineering materials used in mechanical processes/industries.
2. To understand the metallurgical behavior of metals and alloys in practical applications.
3. To choose appropriate metallurgical processes to improve the properties of metals and alloys.
4. To understand the behavior and production of products using composite materials.

Outcomes:
After completion of course the student will be able to:
1. Make a right choice of metal or alloy to suit the functional behavior of a product.
2. Can modify the required properties of materials in easy way.
3. Identify problem areas in the production and usage of metals and alloy products and take corrective measures.
4. Predict the behavior of metals and alloys and suggest modifications to the designer, for increased life and low cost of products.

UNIT I
STRUCTURE OF MATERIALS: Mechanical properties of metals, Crystallization of metals, effect of grain size and grain boundaries on the properties of metals / alloys. Imperfections in crystals.

UNIT II

UNIT III
CAST IRONS AND STEELS: Structure and properties of white cast iron, malleable cast iron, grey cast iron, Spheroidal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steel, tool and die steels.

UNIT IV
NON-FERROUS METALS AND ALLOYS: Structure and properties of copper and its alloys, Aluminium and its alloys.

UNIT V
CERAMIC MATERIALS: Crystalline ceramics, glasses, ceramic tools, cermets.
Text Books:


References:

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(AUTONOMOUS)

II B.Tech – I Sem (ME)  
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(14AME05) THERMODYNAMICS

Objectives:
1. To understand the principles of thermodynamics and to be able to use it in accounting for the bulk behaviour of the simple physical systems.
2. To provide in-depth study of mixture of perfect gases, gas laws to find the partial pressures, enthalpy, entropy etc. at different states of gases,
3. To understand properties of pure substances, properties of steam, steam tables, mollier charts,
4. To enlighten the basic concepts of air standard cycles and vapour power cycles.

Outcomes:
After completion of the course, the student will be:
1. Familiar with principle of thermodynamics and can solve the problems related to various thermal engineering systems using the zeroth law, 1st and 2nd law of thermodynamics.
2. Able to understand the behavior of ideal and real gases at different states of the system and can find partial pressures, enthalpy and entropy
3. Able to understand the properties of steam and can solve problem using steam tables and mollier charts
4. Able to understand the working of different air standard cycles and vapour power cycles and can solve the related problems

UNIT I

BASIC CONCEPTS AND FIRST LAW: Basic concepts, macroscopic and microscopic approach, Thermodynamic systems and control volume. Property, state, path, process and cycle, thermodynamic equilibrium, quasi-static process, concept of continuum, Zeroth law of thermodynamics – concept of temperature and its measurement, types. Work and heat, modes of work. Path and point function, pdv- work in various quasistatic process, First law of thermodynamics – application to closed and open systems, energy, specific heat capacities, enthalpy, PMM-1, steady flow energy equation, steady flow process with reference to nozzle, boiler and turbine.

UNIT II

SECOND LAW: Second law of thermodynamics – Kelvin’s and Clausius statements of second law. Refrigerator and Heat pump, equivalence of kelvin’s and Clausius statements, PMM2, Reversibility and irreversibility, causes of irreversibility, Carnot cycle, reversed carnot cycle, Carnot theorem, corollary of carnots theorem, efficiency, COP. Thermodynamic temperature scale, Clausius theorem. Entropy, inequality of Clausius, entropy change in irreversible process, Principle of entropy, first and second laws combined, reversible adiabatic work in steady flow system, Calculations of work done, internal energy, entropy and heat transfer in non- flow and flow processes, Introduction to availability and exergy.

UNIT III

IDEAL AND REAL GASES
Gas mixtures – properties ideal and real gases, equation state, Avagadro’s Law, Vander Waal’s equation, specific heats, internal energy, enthalpy and entropy of an ideal gas, reversible adiabatic process, isothermal process, polytropic process, simple problems, compressibility factor, compressibility chart – Dalton’s law of partial pressure, internal energy, enthalpy and entropy of gas mixtures.
UNIT IV
PROPERTIES OF PURE SUBSTANCES AND STEAM POWER CYCLES:
STEAM POWER CYCLE: Standard Rankine cycle, layout of steam power plant, Methods for increasing efficiency, reheat and regenerative cycle. related problems.

UNIT V
AIR STANDARD CYCLES

(Use of standard thermodynamic steam tables and Mollier diagram are permitted)

Text Books:

References:
Objectives:
1. To understand the different types of competing Production processes at the disposal of Mechanical Engineer.
2. To understand the science and technology of casting, welding, forming and plastics processing.
3. To understand latest advancements in manufacturing technology and their practical importance.
4. To study the different non destructive tests for different processes.

Outcomes:
After completion of the course, the student will be able to:
1. Choose the appropriate production process to suit the production of a product with specified surface topography.
2. Identify tooling requirements/constraints in production.
3. Suggest to the management new technologies at the disposal of modern engineer and plan for shop up gradation.
4. Upgrade their selves for the future updation of the production processes and technologies.

UNIT I
CASTING: Solidification of pure metal and alloys - Solidification of castings, Steps involved in making a casting– Types of patterns, Pattern making, Materials used for patterns, pattern allowances, Types of sand moulds and molding machines.
DESIGN OF CASTINGS: Principles of Gating, Gating ratio and design of Gating systems, Risers and Cores - Types, functions, and design, Introduction of foundry sands, sand properties and testing.

UNIT II
Soldering: Principle, procedure, classification and applications
Brazing: Principle, procedure, classification and applications
Cutting of Metals: Oxy Acetylene Gas cutting, plasma arc cutting, Cutting of ferrous and non-ferrous metals.

UNIT III
Hot working, cold working, warm working, strain hardening, recovery, recrystallisation and grain growth, Rolling – theory of rolling, types of Rolling mills and products, simple problems.
EXTRUSION OF METALS: Basic extrusion process and its characteristics, Types of extrusion.

UNIT IV
FORGING PROCESSES: Principles of forging, Tools and Dies, Types of Forging, Drop Forging, Roll forging, simple problems, forging defects.
SHEET METAL AND OTHER COLD WORKING PROCESSES: Blanking and piercing, Bending and forming, Drawing and its types, wire drawing and tube drawing, coining, embossing, hot and cold spinning, HERF(High Energy Rate Forming) Methods.
UNIT V
PROCESSING OF PLASTICS: Molding methods-Compression & Transfer molding, Injection, Blow, Rotary and Vacuum forming methods, Calendering operations, applications to thermosets and thermo plastics- Introduction to fiber reinforced plastics.

POWDER METALLURGY: Introduction, preparation of powder, Fundamental properties of Metal Powder, different fabrication methods.

Text Books:

References:
Objectives:
1. Understand the importance of Machine drawing.
2. Understand representation of conventional materials and common machine elements.
3. Add a standard title box to the drawing.
4. Understand the principles of assembling a machine part.

Outcomes:
After completion of the course, the student will be able to:
1. Represent common machine elements conventionally.
2. Dimension following the general rules.
3. Prepare sectional and additional views for the machine elements in general.
4. Assemble typical machine parts.

PART-A

I. MACHINE DRAWING CONVENTIONS:
Need for drawing conventions – introduction to IS conventions
a) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
b) Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
d) Common abbreviations & their meaning

II. DRAWING OF MACHINE ELEMENTS AND SIMPLE PARTS:
Selection of Views, additional views for the following machine elements and parts with proportions.
a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
b) Keys, cotter joints and knuckle joint.
c) Rivetted joints for plates
d) Flanged coupling and claw coupling & cast iron pipe joints.
e) Bushed journal, foot step bearing.

PART-B

III. ASSEMBLY DRAWINGS:
Drawings of assembled views for the part drawings of the following using conventions and drawing proportions.
a) Engine Parts – Stuffing Box, Cross Head, Eccentrics, Petrol Engine Connecting Rod and Piston Assembly.
c) VALVES: Non Return Valve- Feed Check Valve and Air Cock.
NOTE: First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

Text Books:


References:


Note: THE END EXAM WILL BE FOR 3 HRS IN THE FOLLOWING PATTERN:

1. Four questions to be set from part-A and the student should answer any three with weightage of 10 marks each-30 marks.
2. One question to be set from part-B of assembly view of any component maximum of two views (Major view 30 marks Minor view 10 marks).
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(AUTONOMOUS)

II B.Tech –I Sem (ME)  

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(14AEE09) ELECTRICAL ENGINEERING AND ELECTRONICS ENGINEERING LAB

Objectives:
1. To test different types of DC machines
2. To know the speed control of DC machines
3. To know the characteristics of Diode, Transistor and SCR
4. To understand the principles of CE amplifier and CRO

Outcomes:
After completion of this course the student will be able to:
1. Find Efficiency of DC machines by different methods
2. Understand the speed control of DC shunt machine
3. Gain the knowledge of Diode, Transistor and SCR Characteristics
4. Gain the knowledge about Rectifiers and CRO operation

The following experiments are required to be conducted as compulsory experiments:

1. Swinburne’s Test on DC shunt machine and Predetermination of efficiency as motor and generator
2. Brake test on DC shunt motor. Determination of performance characteristics
3. Speed control of dc shunt motor  - Armature voltage control  
   - Field control
4. OC & SC tests on Single-phase transformer (Predetermination of efficiency and Regulation at given power factors and determination of equivalent circuit)
5. Brake test on 3-phase Induction motor (performance characteristics)
6. Regulation of alternator by synchronous impedance method
7. Forward and Reverse bias characteristics of PN Junction diode
8. Full Wave Rectifier with and without filters
9. Input and Output characteristics of Transistor in CE configuration
10. Characteristics of SCR
11. Frequency response in CE Amplifier
12. VI Characteristics or Zener Diode.
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(AUTONOMOUS)

II B.Tech – I Sem (ME)  
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(14AME08) PRODUCTION TECHNOLOGY AND METALLURGY LAB

Objectives:
1. To understand the various types of manufacturing processes to be used in real time.
2. To gain the practical exposure on casting, welding, forming and plastic processing.
3. To identify different materials and alloys structures
4. To understand the behavior of metals in heating and cooling

Outcomes:
After completion of this course the student will be able to:
1. Select the suitable manufacturing process to produce the desired components.
2. Understand the best practice to overcome the defects in manufacturing process.
3. Gain the knowledge of microscopes and different machinery used in metallurgy lab
4. Gain the knowledge about behavior of metals and alloys in different heat treatments

Group A: PRODUCTION TECHNOLOGY LAB
1. Pattern Design and making - for one casting drawing.
2. Sand properties testing - strength and permeability
3. Molding Melting and Casting
4. TIG/Plasma Welding Lap & Butt Joint
5. Spot Welding
8. Injection Molding and Blow Molding

Group B: METALLURGY LAB
1. Preparation and study of the Microstructure of pure metals like Cu and Al.
2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high Carbon steels.
4. Study of the Microstructures of Non-Ferrous alloys.
5. Study of the Microstructures of High speed steels.
6. Hardenability of steels by Jominy End Quench Test.
7. Hardness measurement of various heats treated and non treated steels.
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II B.Tech – II Sem (ME)  

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(14AHS12) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to Civil, ME & AE Branches)

Objectives:
1. Comprehend the fundamental concepts and theoretical principles of the Economics
2. The course equips the students to develop an economic way of thinking in dealing with practical business problems and challenges
3. Identify the basic economic events most common in business operations
4. Also enable the students by providing the basic knowledge of book keeping, accounting and make analysis of financial statements of a business organization.

Outcomes:
After the completion of the course student will be able to
1. Gain knowledge on managerial economics
2. Develop an understanding of economic principles and to enhance skills in high-level problem solving and critical thinking
3. Evaluate the economic environment and the impact of governmental economic policies on consumers and financial institutions.
4. Know the application of financial accounting in the field of Engineering.

UNIT – I
INTRODUCTION TO MANAGERIAL ECONOMICS: Managerial Economics: Definition, Nature and Scope – Demand analysis: Law of demand, Demand determinants, Elasticity of Demand: Definition, Types, Measurement and Significance – Demand forecasting methods (Survey methods, Statistical methods, Expert opinion method, Test marketing, Controlled experiments, Judgmental approach)

UNIT – II

UNIT – III

UNIT – IV
CAPITAL AND CAPITAL BUDGETING: Capital and its Significance – Types of capital – Estimation of fixed and working capital requirements – Methods and sources of raising capital – Capital Budgeting Methods: Payback Method, Accounting Rate of Return (ARR), and Net Present Value (NPV) Method (Simple Problems).
UNIT –V

Text Books:


References:

Objectives:
To make the students to learn about the
1. Basic principles of mechanisms related to straight line motions and curved motions.
2. Velocity and acceleration calculations for the various mechanisms using theoretical & graphical methods.
4. Power transmission like gear and gear trains.

Outcomes:
After completion of the course, the student will be able to:
1. Gets the basic understanding about the simple mechanisms, working principles there by to apply the required mechanism depending upon the functional requirements in the product design.
2. Gets the familiarity to calculate the velocity and acceleration of mechanisms.
3. Gets the basic principles and procedures to design the CAM mechanism, hook mechanism and steering mechanism.
4. Gets the basic knowledge about gear and their applications.

UNIT I
MECHANISMS AND MACHINES: Elements or Links – Classification, Rigid Link, flexible and fluid link, Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs, lower and higher pairs, closed and open pairs, constrained motion – completely, partially or successfully constrained and incompletely constrained motions, machine, kinematic chain – inversion of mechanism, inversions of quadric cycle chain, single and double slider crank chains.

UNIT II

UNIT III
VELOCITY AND ACCELERATION IN MECHANISMS:
Analysis of simple mechanisms (Single slider crank mechanism and four bar mechanism) – Velocity by Instantaneous center method, Kennedy’s theorem, Velocity by relative velocity method, Acceleration diagrams, Coriolis acceleration – Klein’s construction.

UNIT IV
CAMs AND FOLLOWERS: Introduction, Types of followers and cams, Terminology, Types of follower motion - Uniform velocity, Simple harmonic motion and uniform acceleration and retardation, Maximum velocity and acceleration during outward and return strokes in the above 3 cases. Construction of cam profiles, Tangent cam with roller follower, Circular arc cam with flat surface follower.
UNIT V

GEARS: Introduction, types, terminology, law of gearing, velocity of sliding, Form of teeth - cycloidal and involute profiles, Length of path and arc of contact, contact ratio, phenomena of interferences, rack and pinion.

GEAR TRAINS: Introduction, Types, Train value, Simple and reverted wheel train, Epicyclic gear Train, Methods of finding train value or velocity ratio, Epicyclic gear trains, differential gear.

Text Books:

References:
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(AUTONOMOUS)

II B.Tech – II Sem (ME)  
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(14AME10) THERMAL ENGINEERING

Objectives:  
To make the students to learn about the  
1. Basic working principles of I.C. Engines and compressors and performance tests of C.I. and S.I. Engines.  
2. Different types of boilers and basic principles and design calculations related to nozzles and condensers.  
3. Basic principles and constructions of velocity diagrams for impulse and reaction turbines.  
4. Working principles of gas turbines and jet propulsion systems.

Outcomes:  
After completion of the course, the student will be able to:  
1. Learn about the I.C. Engines, compressors, which are mostly used as prime movers in automobile and industries respectively.  
2. Learn about the basic theory of boilers, nozzles, condensers used in the thermal power plants.  
3. Get the experience to construct the velocity diagrams for both impulse and reaction turbines which is prime requirement to design the steam turbines.  
4. Get the basic knowledge and process design calculations and procedures related to gas turbine and jet propulsion systems used in power plants and air craft and rocket engines.

UNIT I

UNIT II

UNIT III
BOILERS : Classification based on Working principles & Pressures of operation, L.P & H.P. Boilers, Mountings and Accessories, Boiler efficiency, Principle of Draught, types, height and diameter of the chimney, Condition for maximum discharge through a chimney, Efficiency of a chimney, Artificial Draught.

UNIT IV
STEAM CONDENSERS: Requirements of steam condensing plant, Classification of condensers, working principle of different types, vacuum efficiency and condenser efficiency.

STEAM NOZZLES: Function of nozzle, applications, types, Flow through nozzles, thermodynamic analysis, assumptions, condition for maximum discharge, critical pressure ratio. Related problems, supersaturated flow,
UNIT V
STEAM TURBINES: Classification of Steam Turbines, Impulse Turbines-Mechanical details, Methods of reducing rotor speed, Velocity diagram, power developed, axial thrust, blade or diagram efficiency, condition for maximum efficiency. De-Laval Turbine, its features. Related problems Reaction Turbines-Mechanical details, principle of operation, thermodynamic analysis of a stage, degree of reaction, velocity diagram, Parson’s reaction turbine, condition for maximum efficiency. Related problems, difference between Impulse and reaction turbines.

Text Books:

References:
Objectives:
1. The aim of this course is to introduce and explain basic fundamentals of Fluid Mechanics, which is used in various applications of Engineering.
2. To understand fluid properties, hydrostatic law, flow measurement and its applications in Industries and to obtain the loss of flow in a flow system.
3. To understand the dimensional analysis and boundary layer concepts.
4. To understand the working principles of hydraulic machinery.

Outcomes:
After completion of this course the student will be able to:
1. Apply how to find frictional losses in a pipe when there is a flow between two places.
2. Able to know types of flow and its measurements and applications.
3. Able to identify the suitable pump required for different purposes.
4. Able to classify the turbines and design criteria based on water availability

UNIT I
FLUID PROPERTIES AND STATICS:
Dimensions and units - Definition of a fluid - Physical properties of fluids Density - Specific weight - Specific volume - Specific gravity - Compressibility - Vapour pressure - Surface tension and capillarity - Viscosity.
Pascal’s law - Pressure variation in a static fluid - Atmospheric, gauge and absolute pressures - Measurement of pressure - Piezometer - U-tube and inverted U-tube manometers - Bourdon’s pressure gauge - Hydrostatic forces on plane and curved surfaces - Buoyancy - Buoyant Force and Centre of Buoyancy - Metacentre and Metacentric Height - Stability of Submerged and Floating Bodies - Determination of Metacentric Height.

UNIT II
FLUID KINEMATICS AND FLUID DYNAMICS
Types of flow, velocity field, one and two-dimensional flow analysis, circulation and vorticity, stream function and velocity potential function, potential flow, standard flow patterns, combination of flow patterns, flow net. Continuity equation, Euler’s equation of motion, Bernoulli’s equation and applications (Venturimeter and orifice meter). Impulse momentum equation and applications (pipe bend).

UNIT III
PELL FLOW: Reynold’s experiment - Reynold’s number - Minor losses in pipe flow - Darcy–Weisbach equation - Variation of friction Factor - Moody’s chart - Pipes in series - Pipes in parallel.

UNIT IV
Dimensional Analysis as a tool in design of experiments, identification of non dimensional numbers and their significance, dimensional analysis methods. Boundary Layer Theory - Formation, growth and separation of boundary layer - Integral momentum principles to compute drag and lift forces- Mathematical models for boundary layer flows.
UNIT V

HYDRAULIC TURBINES: Elements of hydroelectric power plants - Heads and efficiencies of turbines – Classification of turbines – Pelton wheel – Modern Francis turbine – Kaplan turbine. Main components and working principle - Expressions for work done and efficiency – Working proportions and design of each.


Text Books:

References:
Objectives:
1. To understand the different types of linear and angular measuring instruments.
2. To understand concept of tolerance system for machine components.
3. To understand the importance of thread measurement.
4. To understand the requirement of alignment tests on machine tools.

Outcomes:
After completion of the course, the student will be able to:
1. Gain the basic knowledge of measuring instruments.
2. Design inspection procedure in manufacturing systems.
3. Supervise the inspectors in the shop floor.
4. Use of appropriate machine tool alignment test and trends in measuring machines.

UNIT I
SYSTEMS OF LIMITS AND FITS: Introduction, Definitions, fits and their types – unilateral and bilateral tolerance system, hole and shaft basis systems – interchangeability and selective assembly. Systems of limits and fits as per BIS System for plain work.

UNIT II
LENGTH STANDARDS: Line and end standards, wavelength standards, slip gauges.
MEASUREMENT OF ANGLES AND TAPERS: Bevel protractor, Angle gauges, spirit level, sine bar, sine centers, sine table: use of rollers and spheres to determine tapers.
OPTICAL MEASURING INSTRUMENTS: Tool maker’s microscope and its application, optical flat and interferometers.
STRAIGHTNESS, FLATNESS AND SQUARENESS MEASUREMENT: Autocollimator, Use of spirit level –engineer’s square-square block level.

UNIT III
MEASUREMENT THROUGH COMPARATORS: Mechanical, Optical, Electrical, Electronic, Pneumatic comparators and their uses.
SURFACE ROUGHNESS MEASUREMENT: Difference between surface roughness and surface waviness, Numerical assessment of surface finish – $R_t$, $R_z$, $R_a$ and RMS values, Methods of measurement of surface finish-profilograph, Talysurf, BIS symbols for indication of surface finish.

UNIT IV
SCREW THREAD MEASUREMENT: Elements of screw threads, errors in screw threads, measurement of major, minor and effective diameter(Two wire method and Three wire method, Screw thread micro meter), angle and pitch measurement.
GEAR MEASUREMENT: Gear measuring instruments, Parkinson’s Rolling Gear tester, Gear tooth profile checking, Measurement of diameter, pitch, pressure angle and tooth thickness.

UNIT V
MACHINE TOOL ALIGNMENT TESTS: Requirements of Machine Tool Alignment Tests, Alignment tests on lathe, milling, drilling machines.
MEASURING MACHINES: End Bar Measuring Machine, Coordinate measuring machines (CMM) - Various types, applications, advantages, possible errors in CMM. Computer
controlled coordinate measuring machines and universal measuring machines- a brief outline only.

**Text Books:**

**References:**
(14AME12) MACHINE TOOLS

II B.Tech – II Sem (ME)  

Objectives:
1. To understand the features and types of machine tools used in production floors.
2. To understand the capabilities of machine tools in meeting the product requirements.
3. To understand the functional capabilities and involved economics of using the production machines.
4. To understand the tool movement under different operation conditions.

Outcomes:
After completion of the course, the student will be able to:
1. Select the appropriate machining process to meet desired shape.
2. Select the suitable machining parameters to attain the dimension requirements.
3. Identify the economic machining parameters to meet the productivity requirement.
4. Develop the sequence of operations to attain the required shape.

UNIT I
ELEMENTS OF METAL CUTTING: Cutting process, Geometry of single point tools as per ASA, types of chips – built up edge and its effects, chip breakers, Merchant’s circle diagram, cutting forces – effect of cutting speed, feed, depth of cut, Taylor’s tool life equation, simple problems, and coolants on machinability, Tool materials.

UNIT II

UNIT III
DRILLING AND BORING: Specifications, types, operations performed, tool holding devices, twist drill and types. Boring machines – Fine boring machines, Jig Boring machines.

SHAPING, SLOTTING AND PLANING: Their Principles of working, Principal parts, specification, classification, Operations performed, Kinematic schemes of the shaping sloting and planning machines, machining time calculations.

Broaching: Basic principles of broaching, Nomenclature of tool/construction and Operation of Broaching, Different Types of Broaches and Their Applications, Broaching Machines

UNIT IV
MILLING: Specifications, classifications of milling machines, Principal features of horizontal, vertical and universal milling machines, machining operations, Types and geometry of milling cutters, methods of indexing.

GEAR MANUFACTURING: Methods of manufacturing gears, formed tooth process, template process, generating process, bevel gear generator and gear finishing.

UNIT V
GRINDING: Theory of grinding, classification of grinding machines, cylindrical and surface grinding machines, Tool and cutter grinding machines, Grinding wheel- Different types of abrasives, bonds, specification, selection of a grinding wheel.

LAPPING, HONING AND BROACHING: Constructional features, comparison of grinding, lapping and honing, machining time calculations.

Non-traditional machining processes – Introduction to Abrasive jet machining, USM, EDM.
Text Books:

References:
SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

II B.Tech – II Sem (ME)  
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(14ACE22) STRENGTH OF MATERIALS AND FLUID MECHANICS, HYDRAULIC MACHINERY LAB

Objectives:
1. To understand testing procedures of mild steel by tension, direct shear, torsion, hardness tests.
2. To understand the concept of modulus elasticity, and to know how to measure deflection of beams.
3. To understand the calibration of ventrimer, orificemete and determination of closed conduit pipe losses.
4. To understand the performance of pelton, Francies turbines and centrifugal pumps.

Outcomes:
After completion of the course the student will be able to
1. Find Young’s modulus, torsional rigidity of mild steel rods.
2. Know the hardness of mild steel and HYSD specimens.
3. Find the co-efficient of venture meter, orifice meter and friction factor.
4. Find efficiency of pelton, francis turbines, centrifugal pumps.

PART A
STRENGTH OF MATERIALS LAB

1. To study the stress-strain characteristics of mild steel rod using universal testing machine.
2. To find the direct shear strength of rod using compressive testing machine.
3. To find the modulus of elasticity of given material by measuring deflection in beams.
4. To find the modulus of rigidity of given material using torsion testing machine.
5. To find the modulus of rigidity of given material using spring testing machine.
6. To find Brinnell’s hardness and Rock well hardness numbers of given material.

PART B
FLUID MECHANICSLAB

1. Calibration of Venturi meter.
2. Calibration of Orifice meter
3. Determination of friction factor for a given pipe
4. Determination of loss of head due to sudden contraction in a pipe line.

PART C
HYDRAULIC MACHINERY LAB

1. Performance test on Pelton Wheel Turbine
2. Performance test on Francis Turbine
3. Performance test on Single stage Centrifugal Pump
4. Performance test on Multi stage Centrifugal Pump.
Objectives:
1. To understand the requirement of alignment tests on machine tools
2. To understand concept of tolerance system for machine components.
3. To understand the features and types of machine tools used in production floors.
4. To understand the tool movement under different operation conditions.

Outcomes:
After completion of the course, the student will be able to:
1. Use appropriate machine tool alignment test and trends in measuring machines.
2. Design inspection procedure in manufacturing systems.
3. Select the appropriate machining process to meet desired shape.
4. Develop the sequence of operations to attain the required shape.

1. Measurement of lengths, heights, diameters and bores by vernier calipers, micrometers and dial bore indicators etc.
2. Use of gear tooth vernier and checking the chordal addendum and chordal height of spur gear.
3. Alignment test on the lathe and milling machine, Finding the flatness of surface plate using spirit level.
4. Angle and taper measurements by Bevel protractor, Sine bars, etc.
5. Thread measurement by Two wire/ Three wire method.
6. Surface roughness measurement by Talysurf instrument.
7. Job on Step turning and taper turning on lathe machine.
8. Job on Thread cutting and knurling on lathe machine.
10. Job on Shaping and Planning.
11. Job on Slotting.
12. Job on Milling
II B.Tech – II Sem (ME)  
(14AH15) QUANTITATIVE APTITUDE AND REASONING - I

Objectives:
The main objectives of this course are
1. To learn the concepts of coding and decoding of letters and numbers.
2. To interpretation data using the graphs.
3. To understand the basic concepts of probability.
4. To Comprehend the relation between time and distance in real life problems.

Outcomes:
After completion of the course the student will be able to
1. Strengthen their ability to meet the challenges in solving Time and distance problems.
2. Apply Data interpretation to solve the problems on Line, Bar, Pie graphs.
3. Develop the thinking ability and apply Venn diagram and binary logic.
4. Apply the number series and letter analogies in problems on verbal analogy.

Syllabus for Quantitative Aptitude

Competency 1:

1.1 Numbers
Classification of numbers - Divisibility rules - Finding the units digit - Finding remainders in divisions involving higher powers -LCM and HCF Models.
1.2 Decimal Fractions
1.3 Simplification
1.4 Square Roots & Cube Roots
1.5 Average
Definition of Average - Rules of Average - Problems on Average - Problems on Weighted Average - Finding Average using assumed mean method.
1.6 Problems on Numbers
1.7 Problems on Ages
1.8 Surds & Indices
1.9 Percentage
Introduction - Converting a percentage into decimals - Converting a Decimal into a percentage - Percentage equivalent of fractions - Problems on Percentages
1.10 Profit And Loss & True Discount
Problems on Profit and Loss percentage - Relation between Cost Price and Selling price - Discount and Marked Price -Two different articles sold at same Cost Price - Two different articles sold at same Selling Price - Gain% / Loss% on Selling.
1.11 Ratio and proportion
Definition of Ratio - Properties of Ratios - Comparison of Ratios - Problems on Ratios - Compound Ratio - Problems on Proportion, Mean proportional and Continued Proportion.

Competency 2:

2.1 Partnership
Introduction-Relation between capitals, Period of Investments and Shares
2.2 Chain Rule
2.3 Time & work
Problems on Unitary method - Relation between Men, Days, Hours and Work - Problems on Man-Day-Hours method – Problems on alternate days - Problems on Pipes and Cisterns.

2.4 **Time & Distance**
Relation between speed, distance and time – Converting kmph into m/s and vice versa - Problems on average speed - Problems on relative speed – Problems on trains - Problems on boats and streams - Problems on circular tracks – Problems on races.

2.5 **Mixtures and Allegations**
Problems on mixtures - Allegation rule - Problems on Allegation

2.6 **Simple Interest**
Definitions - Problems on interest and amount – Problems when rate of interest and time period are numerically equal.

2.7 **Compound Interest**
Definition and formula for amount in compound interest - Difference between simple interest and compound interest for 2 years on the same principle and time period.

2.8 **Logarithms**

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**Syllabus For Reasoning**

Competency 3:

3.1 **Cubes**
Basics of a cube - Formulae for finding volume and surface area of a cube - Finding the minimum number of cuts when the number of identical pieces are given - Finding the maximum number of pieces when cuts are given - Problems on painted cubes of same and different colors - Problems on cuboids - Problems on painted cuboids - Problems on diagonal cuts

3.2 **Venn diagrams**
Representing the given data in the form of a Venn diagram – Problems on Venn diagrams with two sets - Problems on Venn diagrams with three sets - Problems on Venn diagrams with four sets

3.3 **Binary Logic**
Definition of a truth-teller - Definition of a liar - Definition of an alternator - Solving problems using method of assumptions - Solving analytical puzzles using binary logic.

Competency 4:

4.1 **Number and letter series**
Difference series - Product series - Squares series - Cubes series - Alternate series - Combination series - Miscellaneous series - Place values of letters.

4.2 **Number and Letter Analogies**
Definition of Analogy - Problems on number analogy - Problems on letter analogy - Problems on verbal analogy.

**Odd man out**
Problems on number Odd man out - Problems on letter Odd man out – Problems on verbal Odd man out.

Competency 5:

5.1 **Coding and decoding**
Coding using same set of letters - Coding using different set of letters - Coding into a number - Problems on R-model.
5.2 **Direction sense**
Solving problems by drawing the paths - Finding the net distance travelled - Finding the direction - Problems on clocks - Problems on shadows - Problems on damaged compass - Problems on direction sense using symbols and notations

5.3 **Critical Reasoning**
Problems on assumption - Problems on conclusions - Problems on inferences - Problems on strengthening and weakening of arguments - Problems on principle - Problems on paradox

5.4 **Lateral reasoning puzzle**
Problems on common balance - Problems on digital balance - Problems on coins - Problems on lockers - Problems on heights - Digit puzzles using basic arithmetic operations.

**Text Books:**

**References:**