POLYTECHNIC ENGINEERING

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

Syllabus of Examination - AICTE Pattern

Undergraduate Diploma Courses in Engineering & Technology

Department of Mechanical Engineering

Semester-IV

Course Code	DMEA-401
Course Title	Measurements & Metrology
Number of Credits	4 (L:3; T:1; P:0)

Course Objectives:

1 To study advances in technology, measurement techniques, types of instrumentation devices, innovations, refinements.
2 To study the principles of instrumentation, transducers & measurement of non-electrical parameters like temperature, pressure, flow, speed, force and stress.

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

1 Define accuracy, precision, calibration, sensitivity, repeatability and such relevant terms in metrology.
2 Distinguish between various types of errors.
3 Understand the principle of operation of an instrument and select suitable measuring device for a particular application.
4 Appreciate the concept of calibration of an instrument.
5 Analyze and interpret the data obtained from the different measurements processes and present it in the graphical form, statistical form.

UNIT-I: Introduction to measurements: Definition of measurement; Significance of measurement; Methods of measurements: Direct & Indirect; Generalized measuring system; Standards of measurements: Primary & Secondary; Factors influencing selection of measuring instruments; Terms applicable to measuring instruments: Precision and Accuracy, Sensitivity and Repeatability, Range, Threshold, Hysteresis, calibration; Errors in Measurements: Classification of errors, Systematic and Random error.
Measuring instruments: Introduction; Thread measurements: Thread gauge micrometre; Angle measurements: Bevel protractor, Sine Bar; Gauges: plain plug gauge, ring Gauge, snap gauge, limit gauge; Comparators: Characteristics of comparators, Types of comparators; Surface finish: Definition, Terminology of surface finish, Talysurf surface roughness tester; Co-ordinating measuring machine.

Unit-II: Transducers and Strain gauges: Introduction; Transducers: Characteristics, classification of transducers, two coil self-inductance transducer, Piezoelectric transducer; Strain Measurements: Strain gauge, Classification, mounting of strain gauges, Strain gauge rosettes-two and three elements.
Measurement of force, torque, and pressure: Introduction; Force measurement: Spring Balance, Proving ring, Load cell; Torque measurement: Prony brake, Eddy current, Hydraulic dynamometer; Pressure measurement: Mcloed gauge.

Unit-III: Applied mechanical measurements: Speed measurement: Classification of tachometers, Revolution counters, Eddy current tachometers; Displacement measurement: Linear variable Differential transformers (LVDT); Flow measurement: Roto meters, Turbine meter; Temperature measurement: Resistance thermometers, Optical Pyrometer.
Miscellaneous measurements: Humidity measurement: hair hygrometer; Density measurement: hydrometer; Liquid level measurement: sight glass, Float gauge; Biomedical measurement: Sphygmo monometer.

Unit-IV: Limits, Fits & Tolerances: Concept of Limits, Fits, and Tolerances; Selective Assembly; Interchangeability; Hole And Shaft Basis System; Taylor's Principle; Design of Plug; Ring Gauges; IS 919-1993 (Limits, Fits & Tolerances, Gauges} IS 3477-1973; concept of multi gauging and inspection.

Angular Measurement: Concept; Instruments For Angular Measurements; Working and Use of Universal Bevel Protractor, Sine Bar, Spirit Level; Principle of Working of Clinometers; Angle Gauges (With Numerical on Setting of Angle Gauges).

Screw thread Measurements: ISO grade and fits of thread; Errors in threads; Pitch errors; surement of different elements such as major diameter, minor diameter, effective diameter, pitch; Two wire method; Thread gauge micrometer; Working principle of floating carriage dial micrometer.

Unit-V: Gear Measurement and Testing: Analytical and functional inspection; Rolling test; Measurement of tooth thickness (constant chord method); Gear tooth vernier; Errors in gears such as backlash, runout, composite.

Machine tool testing: Parallelism; Straightness; Squareness; Coaxiallity; roundness; run out; alignment testing of machine tools as per IS standard procedure.

Reference Books:

1. Mechanical measurements – Beckwith Marangoni and Lienhard, Pearson Education, 6th Ed.,2006.
2. Metrology & Measurement – Anand K Bewoor,Vinay kulakarni, Tata McGraw Hill, New Delhi,2009
3. Principles of Industrial instrumentation and control systems – Channakesava. R. Alavala,DELMAR cenage learning, 2009.
4. Principles of Engineering Metrology – Rega Rajendra, Jaico publishers, 2008
5. Dimensional Metrology – Connie Dotson, DELMAR, Cenage learning, 2007
6. Instrumentation measurement and analysis – B.C. Nakara, K.K. Chaudary, second edition,Tata cgraw Hill, 2005.
7. Engineering Metrology – R.K. Jain, Khanna Publishers, New Delhi, 2005.
8. A text book of Engineering Metrology – I.C. Gupta, Dhanpat Rai and Sons, New Delhi, 2005
9. Metrology for Engineers – J.F.W. Galyer and C. R. Shotbolt, ELBS
10. Engineering Metrology – K. J. Hume, Kalyani publishers

POLYTECHNIC ENGINEERING

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

Syllabus of Examination - AICTE Pattern

Undergraduate Diploma Courses in Engineering & Technology

Department of Mechanical Engineering

Semester-IV

Course Code	DMEA-402
Course Title	Strength of Materials
Number of Credits	3 (L:3; T:1; P:0)

Course Objectives:

1 To understand the concept of Simple Stresses and Strains.
2 To understand the concept of Strain Energy.
3 To understand the concept of Shear Force and Bending Moment Diagrams.
4 To understand the concept of Theory of Simple Bending and Deflection of Beams.
5 To understand the concept of Torsion in Shafts and Springs.
6 To understand the concept of Thin Cylindrical Shells.

Course outcomes:

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

1 Compute stress and strain values and find the changes in axial, lateral and volumetric dimensions of bodies of uniform section and of composite section under the influence of normal forces.
2 Calculate thermal stresses, in bodies of uniform section and composite sections.
3 Define resilience, proof – resilience and modulus of resilience and obtain expressions for instantaneous stress developed in bodies subjected to different loads.
4 Compute shear force and bending moment at any section of beam and draw the S.F. & B.M diagrams of for UDL and Point loads.
5 Calculate the safe load, safe span and dimensions of cross section.
6 Compare strength and weight of solid and hollow shafts of the same length and material and compute the stress and deflection of the closed coil helical spring.

UNIT-I: Simple Stresses and Strains: Types of forces; Stress, Strain and their nature; Mechanical properties of common engineering materials; Significance of various points on stress – strain diagram for M.S. and C.I. specimens; Significance of factor of safety; Relation between elastic constants; Stress and strain values in bodies of uniform section and of composite section under the influence of normal forces; Thermal stresses in bodies of uniform section and composite sections; Related numerical problems on the above topics.

Strain Energy: Strain energy or resilience, proof resilience and modulus of resilience; Derivation of strain energy for the following cases: i) Gradually applied load, ii) Suddenly applied load, iii) Impact/ shock load; Related numerical problems.

Unit-II: Shear Force & Bending Moment Diagrams: Types of beams with examples: a) Cantilever beam, b) Simply supported beam, c) Over hanging beam, d) Continuous beam, e) Fixed beam; Types of Loads – Point load, UDL and UVL; Definition and explanation of shear force and bending moment; Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method only for the following cases: a) Cantilever with point loads, b) Cantilever with uniformly distributed load, c) Simply supported beam with point loads, d) Simply supported beam with UDL, e) Over hanging beam with point loads, at the centre and at free ends, f) Over hanging beam with UDL throughout, g) Combination of point and UDL for the above; Related numerical problems.

Unit-III: Theory of Simple Bending and Deflection of Beams: Explanation of terms: Neutral layer, Neutral Axis, Modulus of Section, Moment of Resistance, Bending stress, Radius of curvature; Assumptions in theory of simple bending; Bending Equation $M/I = \sigma/Y = E/R$ with derivation; Problems involving calculations of bending stress, modulus of section and moment of resistance; Calculation of safe loads and safe span and dimensions of cross-section; Definition and explanation of deflection as applied to beams; Deflection formulae without proof for cantilever and simply supported beams with point load and UDL only (Standard cases only); Related numerical problems.

Unit-IV: Torsion in Shafts and Springs: Definition and function of shaft; Calculation of polar M.I. for solid and hollow shafts; Assumptions in simple torsion; Derivation of the equation $T/J=f_s/R=G\theta/L$; Problems on design of shaft based on strength and rigidity; Numerical Problems related to comparison of strength and weight of solid and hollow shafts; Classification of springs; Nomenclature of closed coil helical spring; Deflection formula for closed coil helical spring (without derivation); stiffness of spring; Numerical problems on closed coil helical spring to find safe load, deflection, size of coil and number of coils.

Unit-V: Thin Cylindrical Shells: Explanation of longitudinal and hoop stresses in the light of circumferential and longitudinal failure of shell; Derivation of expressions for the longitudinal and hoop stress for seamless and seam shells; Related numerical Problems for safe thickness and safe working pressure.

Reference Books:

1. Strength of Materials – D.S. Bedi, Khanna Book Publishing Co. (P) Ltd., Delhi, 2017
2. Strength of Materials – B.C.Punmia, Ashok Kumar Jain & Arun Kumar Jain, Laxmi Publications, New Delhi, 2013
3. Strength of Materials – S. Ramamrutham, Dhanpat Rai & Publication New Delhi
4. Strength of Materials – R.S. Khurmi, S.Chand Company Ltd. Delhi
5. A Text Book strength of Material– R.K. Bansal, Laxmi Publication New Delhi

POLYTECHNIC ENGINEERING

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

Syllabus of Examination - AICTE Pattern

Undergraduate Diploma Courses in Engineering & Technology

Department of Mechanical Engineering

Semester-IV

Course Code	DMEA-402
Course Title	Strength of Materials Lab
Number of Credits	1 (L:0; T:0; P:2)

List of practical to be performed:

I .Study of Universal testing machine.

II Determination of Rockwell's Hardness Number for various materials like mild steel, high carbon steel, brass, copper and aluminum.

III Finding the resistance of materials to impact loads by Izod test and Charpy test.

IV Torsion test on mild steel – relation between torque and angle of twist determination of shear modulus and shear stress.

V Finding Young's Modulus of Elasticity, yield points, percentage elongation and percentage reduction in area, stress strain diagram plotting, tests on mild steel.

VI Determination of modulus of rigidity of mild steel using Torsion apparatus,

VII To determine the stiffness of the spring and modulus or rigidity of the spring wire..

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Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

Syllabus of Examination - AICTE Pattern

Undergraduate Diploma Courses in Engineering & Technology

Department of Mechanical Engineering

Semester-IV

Course Code	DMEA-403
Course Title	Thermal Engineering - II
Number of Credits	3 (L:3; T:0; P:0)

Course Objectives:

1 To understand the working and applications of Gas turbines & Jet Propulsion.
2 To understand the methods of computing various properties of steam.
3 To understand the working of various Steam Boilers, functions of various accessories and mountings of boilers.
4 To understand the Working of Steam Nozzles and Steam turbines.
5 To understand the necessity of compounding and governing of a turbine.

Course outcomes:

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

1 Explain the working cycle of gas turbines, and the working of Jet and Rocket Engines apart from identifying the fuels used for Jet and Rocket propulsion.
2 Compute the work done, enthalpy, internal energy and entropy of steam at given conditions using steam tables and Mollier chart.
3 Distinguish between water tube and fire-tube boilers and explain the function all the mountings and accessories.
4 Calculate Velocity of steam at the exit of nozzle in terms of heat drop analytically and by using Mollier chart.
5 State the necessity of governing and compounding of a turbine.
6 Explain the principle of working of a steam turbine and distinguish between the impulse turbines and reaction turbines.

UNIT-I: Gas Turbines: Air-standard Brayton cycle; Description with p-v and T-S diagrams; Gas turbines Classification: open cycle gas turbines and closed cycle gas turbines; comparison of gas turbine with reciprocating I.C. engines and steam turbines. Applications and limitations of gas turbines; General lay-out of Open cycle constant pressure gas turbine; P-V and T-S diagrams and working; General lay-out of Closed cycle gas turbine; P-V and T-S diagrams and working.

Jet Propulsion: Principle of jet propulsion; Fuels used for jet propulsion; Applications of jet propulsion; Working of a turbojet engine; Principle of Ram effect; Working of a Ram jet engine; Principle of Rocket propulsion; Working principle of a rocket engine; Applications of rocket propulsion; Compar ison of jet and rocket propulsions.

Unit-II: Properties of Steam: Formation of steam under constant pressure; Industrial uses of steam; Basic definitions: saturated liquid line, saturated vapour line, liquid region, vapour region, wet region, superheat region, critical point, saturated liquid, saturated vapour, saturation temperature, sensible heat, latent heat, wet steam, dryness fraction, wetness fraction, saturated steam, superheated steam, degree of superheat; Determination of enthalpy, internal energy, internal latent heat, entropy of wet, dry and superheated steam at a given pressure using steam tables and Mollier chart for the following processes: Isochoric process, Isobaric process, Hyperbolic process, Isothermal process, Isentropic process, Throttling process, Polytropic process; Simple direct problems on the above using tablesand charts; Steam calorimeters: Separating, throttling, Combined Separating and throttling calorimeters – problems.

Unit-III: Steam Generators: Function and use of steam boilers; Classification of steam boilers with examples; Brief explanation with line sketches of Cochran, Babcock and Wilcox Boilers; Comparison of water tube and fire tube boilers; Description with line sketches and working of modern high pressure boilers Lamont and Benson boilers; Boiler mountings: Pressure gauge, water level indicator, fusible plug, blow down cock, stop valve, safety valve, (dead weight type, spring loaded type, high pressure and low water safety alarm); Boiler accessories: feed pump, economiser, super heater and air pre-heater; Study of steam traps & separators; Explanation of the terms: Actual evaporation, equivalent evaporation, factor of evaporation, boiler horse power and boiler efficiency; Formula for the above terms without proof; Simple direct problems on the above; Draught systems (Natural, forced & induced).

Unit-IV: Steam Nozzles: Flow of steam through nozzle; Velocity of steam at the exit of nozzle in terms of heat drop using analytical method and Mollier chart; Discharge of steam through nozzles; Critical pressure ratio; Methods of calculation of cross-sectional areas at throat and exit for maximum discharge; Effect of friction in nozzles and Super saturated flow in nozzles; Working steam jet injector; Simple numerical problems.

Unit-V: Steam Turbines: Classification of steam turbines with examples; Difference between impulse & reaction turbines; Principle of working of a simple De-lavel turbine with line diagrams- Velocity diagrams; Expression for work done, axial thrust, tangential thrust, blade and diagram efficiency, stage efficiency, nozzle efficiency; Methods of reducing rotor speed; compounding for velocity, for pressure or both pressure and velocity; Working principle with line diagram of a Parson's Reaction turbine–velocity diagrams; Simple problems on single stage impulse turbines (without blade friction) and reaction turbine including data on blade height. Bleeding, re-heating and re-heating factors (Problems omitted); Governing of steam turbines: Throttle, By-pass & Nozzle control governing.

Reference Books:

1. A Course in Thermal Engineering – S. Domkundwar & C.P. Kothandaraman, Dhanpat Rai & Publication, New Delhi
2. Thermal Engineering – R.K. Rajput, Laxmi Publication New Delhi
3. Thermal Engineering – P.L. Ballaney, Khanna Publishers, 2002
4. Treatise on Heat Engineering in MKS and SI Units – V.P. Vasandani & D.S. Kumar, Metropolitan Book Co. Pvt. Ltd, New Delhi.

POLYTECHNIC ENGINEERING

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

Syllabus of Examination - AICTE Pattern

Undergraduate Diploma Courses in Engineering & Technology

Department of Mechanical Engineering

Semester-IV

Course Code	DMEA-403
Course Title	Thermal Engineering - II Lab
Number of Credits	1 (L:0; T:0; P:2)

List of practical to be performed:

I Study of high pressure boiler with model

II Study of boiler mountings and accessories

III Conduct performance test on VCR test rig to determine COP of the refrigerator

IV Conduct performance test on multi stage reciprocating compressor

V Conduct Morse test to determine the indicated power of individual cylinders

VI Conduct Performance test on 2-S CI/SI engine.

VII Conduct Performance test on 4-S CI/SI engine.

VIII Conduct Heat balance test on CI/SI engine..

IX Conduct Economical speed test on 4-S CI/SI engine.

X Thermal conductivity test on 1) Thick slab 2) Composite wall 3) Thick cylinder

XI Leak detection of refrigeration equipment

XII Conduct performance test on A/C test rig to determine COP of the refrigerator

POLYTECHNIC ENGINEERING

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

Syllabus of Examination - AICTE Pattern

Undergraduate Diploma Courses in Engineering & Technology

Department of Mechanical Engineering

Semester-IV

Course Code	DMEA-404
Course Title	Refrigeration & Air-conditioning
Number of Credits	3 (L:3: T:0: P:0)

Course Objectives:

1 To understand the basics of Refrigeration cycles.
2 To understand basics of vapour compression and vapour absorbtion systems.
3 To identify components and refrigerants and lubricants of a refrigeration system.
4 To understand control strategies for refrigeration system.
5 To understand the basics about air conditioning systems.

Course outcomes:

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

1 Define refrigeration and types of Refrigeration cycles
2 Explain Vapour Compression and Vapour Absorbtion System working principles
3 Identify the components required for refrigeration system.
4 Identify the controlling components for a refrigeration system.
5 Explain the working principles of Air-conditioning.

UNIT-I: Introduction to Refrigeration: Definition of Refrigeration; Refrigerating effect-unit of refrigeration-Coefficient of performance; Types of Refrigeration-Ice, dry ice, Steam jet, Throttling, Liquid nitrogen refrigeration; Carnot refrigeration Cycle; Air refrigeration- Bell - Coleman cycle, PV& TS diagram; Advantage and disadvantages in air refrigeration; Simple problems

Unit-II: Refrigeration systems: Basic Components, Flow diagram of working of Vapour compression cycle; Representation of the vapour compression cycle on P-H, T-S & P-V Diagram; Expression for Refrigerating effect, work done and power required; Types of Vapour Compression cycle; Effects of super heating and under cooling, its advantages and disadvantages; Simple Vapour absorptions cycle and its flow diagram; Simple Electrolux system for domestic units; Comparison of Vapour absorption and vapour compression system; Simple problems on vapour compression cycle.

Unit-III: Refrigeration equipments: Compressor - types of compressors; Hermetically sealed and Semi hermetically sealed compressor; Condensers - Air Cooled, water cooled, natural and forced draught cooling system; Advantages and disadvantages of air cooled and water cooled condensers; Evaporators -natural, convection, forced convection types.

Refrigerants and lubricants: Introduction to refrigerants; Properties of good refrigerants; Classification of refrigerants by group number and commonly used refrigerants in practice; Detection of refrigerants leakage; Charging the system with refrigerant; Lubricants used in refrigeration and their properties.

Unit-IV: Refrigerant flow controls: Capillary tube; Automatic Expansion valve; Thermo static expansion valve; High side and low side float valve; Solenoid valve; Evaporator pressure regulator.

Application of refrigeration: Slow and quick freezing; Cold storage and Frozen storage; Dairy refrigeration; Ice making industry; Water coolers.

Unit-V: Air conditioning: Introduction to Air conditioning; Factors affecting Air conditioning; Psychometric chart and its use; Psychometric process-sensible heating and cooling, Humidifying and dehumidifying; Adiabatic saturation process; Equipments used in air conditioning cycle; Air conditioning units and plants.

Refrigeration and Air-conditioning tools: Tools used in refrigeration and Air conditioner installation; Installation procedure; Faults in refrigeration and air conditioning system; Servicing procedure.

Reference Books:

1. Refrigeration and Air Conditioning – Sadhu Singh, Khanna Book Publishing Co., New Delhi
2. Refrigeration and Air Conditioning – S. Domakundawar, Dhanpat Rai publications.
3. Refrigeration and Air Conditioning – A.S.Sarao & G.S. Gabi, 6th edition, Satya Prakashan publications, New Delhi, 2004.
4. Principles of Refrigeration – Roy J.Dossat, 5th edition, Pearson Publications, 2001.
5. Refrigeration and Air Conditioning – M.Zakria Baig, Premier/ Radiant Publishing House.
6. Refrigeration and Air Conditioning – C.P Arora, Tata McGraw Hill Education, 2000.

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Syllabus of Examination - AICTE Pattern

Undergraduate Diploma Courses in Engineering & Technology

Department of Mechanical Engineering

Semester-IV

Course Code	DMEA-404
Course Title	Refrigeration & Air-conditioning lab
Number of Credits	1 (L:0; T:0; P:2)

List of practical to be performed:

1. General Study of vapor compression refrigeration system.
2. General Study of Ice Plant
3. General Study and working of cold st
4. General Study One tone Thermax refrigeration unit.
5. General Study of Water cooler
6. General Study of Psychrometers (Absorption type)
7. General Study of window Air Conditioner.
8. General Study and working of Vapor compression Air conditioning Testrig.
9. Experimentation on Cold Storage of Calculate COP & Heat Loss.
10. Experimentation on Vapor compression Air Conditioning test rig.

POLYTECHNIC ENGINEERING

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

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Undergraduate Diploma Courses in Engineering & Technology

Department of Mechanical Engineering

Semester-IV

Course Code	DMEA-405
Course Title	Program Elective-I (A) Automobile Engineering
Number of Credits	4 (L:4: T:0: P:0)

Course Objectives:

1 To understand the basic structure and components of an automobile.
2 To understand the concepts of cooling and lubricating systems.
3 To understand the concepts of Ignition and transmission and steering systems.
4 To understand the classification and necessity of suspension system.
5 To identify different special vehicles.

Course outcomes:

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

1 Identify the components of an automobile with their working
2 Explain the concepts of cooling and lubricating systems
3 Explain the concepts of Ignition and Transmission and steering systems.
4 Identify different suspension systems and their applications.
5 Differentiate the special vehicles according to the usage

UNIT-I: Introduction to basic structure of an automobile: Basic engine components; Cylinder block; Cylinder head; Gaskets; cylinder liners, types of cylinder liners; Piston and piston pin; piston rings, types of piston rings; Connecting rod; Crank shaft; Cam shaft; Crankcase; Engine valves; Flywheel and Governer.

Unit-II: Cooling and lubrication system: The necessity of cooling system; Types of cooling system- air cooling and water cooling; Air cooling system; Types of water cooling system –Thermo syphon system and pump circulation system; Advantages and disadvantages of air cooling and water cooling systems; The components of water cooling system –fan, radiator, pump and thermostat; The necessity of lubrication system; S.A.E rating of lubrication system; Types of lubrication system; Petrol lubrication and high pressure lubrication system.

Fuel feed system: Conventional fuels and alternative fuels: Cetane and octane numbers; Types of carburettors Working of simple carburetor Multi point and single point fuel injection systems; Different fuel transfer pumps; Working of S.U electrical and A.C mechanical pump; Fuel filters; Fuel injection pump; Fuel injectors.

Unit-III: Ignition system: Introduction to ignition system; Battery Ignition systems and magneto Ignition system; Electronic Ignition system; Construction and working of lead acid battery; Elements of charging system; Elements of starting system; Types of lights used in the automobile:

Transmission and steering system: General arrangement of clutch; Principle of friction clutches; Constructional details of Single plate clutch; Constructional details of multi-plate clutch; Constructional details of centrifugal clutch; Necessity for gear ratios in transmission; Types of gear boxes; Working of sliding mesh gear box; Working of constant mesh gear box; Working of propeller shaft Working of propeller shaft; Working of universal joint; Working of differential; Types of rear axle; Purpose of front axle; Necessity of steering system; Caster, camber and king pin inclination; Rack and pinion steering system; Power steering.

Unit-IV: Suspension system: Necessity of suspension system; Torsion bar suspension systems; Leaf spring and coil spring suspension system; Independent suspension for front wheel and rear wheel; Working of telescopic shock absorber; Functions of brakes; Types of brakes; Working of internal expanding brake; Working of disc brake

Unit-V: Special vehicles: Introduction to Special vehicles; Tractor; Motor grader; Scrappers; Excavators; Duper trucks.

Reference Books:

1. Automobile Engineering Vol I, II, Kirpal Singh, Standard Publishers Distributors, Delhi. 2012.
2. Automobile Mechanics, A.K. Babu, S.C. Sharma, Khanna Publications, New Delhi
3. Automotive Mechanics: Principles and Practices, Joseph Heitner, East West Press
4. Automotive Mechanics, S. Srinivasan, 2nd Edition, Tata McGraw Hill
5. Automobile Engineering Vol I and Vol II, K. M. Gupta, Umesh Publications.
6. Automotive Engineering, Jain and Asthana, Tata McGraw Hill..

POLYTECHNIC ENGINEERING

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

Syllabus of Examination - AICTE Pattern

Undergraduate Diploma Courses in Engineering & Technology

Department of Mechanical Engineering

Semester-IV

Course Code	DMEA-405
Course Title	Program Elective-I (B) Power Plant Engineering
Number of Credits	4 (L:4: T:0: P:0)

Course Objectives:

1 To understand the present scenario of power in India.
2 To recognize various load terminologies used in power plants.
3 To understand hydro working principles
4 To understand working of Diesel, Gas and Nuclear power plants.
5 To understand the issues and safety precautions in power plants.

Course outcomes:

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

1 Familiarised with the present and future power scenario of India.
2 Enlist various load terminologies in power plants
3 Working and classifications in hydro power plant
4 Working principles of Diesel, Gas and Nuclear power plants.
5 Understand the issues and necessity of safety concepts of power plants.

UNIT-I: Introduction to Power plant: Introduction to power plant; Indian Energy scenario in India; Location of power plant; Choice of Power plant; Classification of power plants.

Unit-II: Economics of power plant: Terminology used in power plant: Peak load, Base load, Load factor, Load curve; Various factor affecting the operation of power plant; Methods of meeting the fluctuating load in power plant; Load sharing- cost of power-tariff methods; Performance and operating characteristics of power plant.

Unit-III: Hydro power plant: Introduction to Hydro electric power plant; Rainfall, Runoff and its measurement, Hydrograph, flow duration curve; Selection of sites for hydro electric power plant; General layout of Hydro electric power plant and its working; Classification of the Plant-Run off river plant, storage river plant, pumped storage plant; Advantages and disadvantages of hydro electric power plant.

Unit-IV: Diesel and Gas turbine plant: The layout of diesel power plant; Components and the working of diesel power plant; Advantages and disadvantages of diesel power plant; Gas turbine power Plant-Schematic diagram, components and its working; Combined cycle power generation- Combined gas and steam turbine power plant operation .

Nuclear power plant: Introduction; Nuclear Power-Radio activity-Radioactive charge-types of reactions; Working of a nuclear power plant; Thermal fission Reactors- PWR, BWR and gas cooled reactors; Advantages and Disadvantages of Nuclear power plant.

Unit-V: Environmental impact of Power plant: Social and Economical issues of power plant; Green house effect; Acid precipitation-Acid rain, Acid snow, Dry deposition, Acid fog; Air, water, Thermal pollution from power plants; Radiations from nuclear power plant effluents.

Power plant safety: Plant safety concept; Safety policy to be observed in power plants; Safety practices to be observed in boiler operation; Safety in oil handling system; Safety in Chemical handling system; Statutory provision related to boiler operation.

Reference Books:

1. Power plant Engineering-P.K. Nag 4th edition, Tata McGraw Hill Education, 2014.
2. Power plant Engineering – Frederick T. Morse, Litton Educational Publishing Inc. 1953.
3. A Course in Power Plant Engineering – Subhash C. Arora, S. Domakundwar, Dhanpat Rai, 1984.
4. Power Plant Engineering – P.C. Sharma, S.K.Kataria & sons, 2009.
5. Power System Engineering – R.K. Rajput, Firewell Media,2006.

POLYTECHNIC ENGINEERING

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

Syllabus of Examination - AICTE Pattern

Undergraduate Diploma Courses in Engineering & Technology

Department of Mechanical Engineering

Semester-IV

Course Code	DMEA-406
Course Title	Minor Project
Number of Credits	2 (L:0: T:0: P:4)

Course Outcomes:

To provide students with a comprehensive experience for applying the knowledge gained so far by studying various courses. To develop an inquiring aptitude and build confidence among students by working on solutions of small industrial problems. To give students an opportunity to do something creative and to assimilate real life work situation in institution. To adapt students for latest development and to handle independently new situations. To develop good expressions power and presentation abilities in students.

The focus of the Minor Project is on preparing a working system or some design or understanding of a complex system using system analysis tools and submit it the same in the form of a write up i.e. detail project report. The student should select some real life problems for their project and maintain proper documentation of different stages of project such as need analysis market analysis, concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan. Each student is required to prepare a project report and present the same with a demonstration of the working system

Guidelines:

Minor Project should cater to a small system required in laboratory or real life.

- After interactions with course coordinator and based on comprehensive literature survey/need analysis, the student shall identify the title and define the aim and Preambles of Minor project.

- Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and submit the proposal within first week of the semester.

- The student is expected to exert on design, development and testing of the proposed work as per the schedule.

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Undergraduate Diploma Courses in Engineering & Technology

Department of Mechanical Engineering

Semester-IV

Course Code	DMEA-407
Course Title	Mandatory Course(Essence of Indian Knowledge and Tradition)
Number of Credits	0 (L:2: T:0: P:0)

Course Objectives:

1 To explore the intersections between modern scientific principles and traditional Indian knowledge systems, highlighting their complementarities and unique contributions.

2To provide students with a comprehensive understanding of holistic health care practices, including Yoga and Ayurveda, and their applications in promoting well-being.

3To impart knowledge about the historical and cultural significance of the Vedas and other ancient Indian texts, fostering an appreciation for their enduring relevance in contemporary society.

Course outcomes:

1 Students will be able to critically analyze and apply concepts from both modern science and Indian knowledge systems to contemporary health and wellness challenges.

2 Students will gain practical knowledge and skills in Yoga and other holistic health practices, enabling them to incorporate these methods into their personal and professional lives for enhanced well-being.

3 Students will demonstrate an understanding of the historical and philosophical underpinnings of the Vedas and other Indian scriptures, appreciating their influence on modern thought and practices in holistic health care.

1.Modern Science

2 .Indian Knowledge System

3 Yoga

4 Holistic Health care

5. वेद,

Reference Books:

1. Cultural Heritage of India-Course Material by V. Sivaramakrishna-Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2. Modern Physics and Vedant by Swami Jitatmanand - Bharatiya Vidya Bhavan
3. The wave of Life by Fritzof Capra
4. Tarkasangraha of Annam Bhatta, Inernational by V N Jha- Chinmay Foundation, Velliarnad,Amaku,
5. Science of Consciousness Psychotherapy and Yoga Practices by RN Jha - Vidyanidhi Prakasham, Delhi, 2016

THE END