POLYTECHNIC ENGINEERING

Sri Satya Sai University of Technology And Medical Sciences, Sehore (M.P.)
Syllabus of Examination - AICTE Pattern
Undergraduate Diploma Courses in Engineering & Technology
Department of Mechanical Engineering
Semester-V

Course Code	DMEA-501
Course Title	Advanced Manufacturing Processes
Number of Credits	3 (L:3; T:0; P:0)

Course Objectives:
To learn about various unconventional machining processes, the various process parameters and their influence on performance and their applications.

Course outcomes:

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

CO1 Understand various classifications of manufacturing processes
CO2 Understand working principles of mechanical energy based processes
CO3 Understand working principles of electrical energy based processes
CO4 Understand working principles of chemical and electro-chemical energy based processes
CO5 Understand working principles of thermal energy based processes.

UNIT-I: Introduction: Unconventional machining Process – Need – classification – Brief overview.

UNIT II: Mechanical Energy Based Processes: Abrasive Jet Machining, Water Jet Machining, Abrasive ,Water Jet Machining, Ultrasonic Machining.(AJM, WJM, AWJM and USM). Working Principles – equipment used – Process parameters – MRR- Applications.

UNIT III: Electrical Energy Based Processes: Electric Discharge Machining (EDM)- working Principle– equipments – Process Parameters – Surface Finish and MRR- electrode / Tool – Power and control Circuits – Tool Wear – Dielectric – Flushing – Wire cut EDM – Applications.

UNIT IV: Chemical and Electro-Chemical Energy Based Processes: Chemical machining and Electro-Chemical machining (CHM and ECM)-Etchants – Maskant techniques of applying maskants - Process Parameters – Surface finish and MRR-Applications . Principles of ECM equipments-Surface Roughness and MRR Electrical circuit-Process Parameters ECG and ECH – Applications.

UNIT V: Thermal Energy Based Processes: Laser Beam machining and drilling (LBM), plasma Arc machining (PAM) and Electron Beam Machining (EBM). Principles – Equipment –Types - Beam control techniques – Applications. Introduction to manufacturing; Fundamental properties of materials including metals, polymers, ceramics and composites.

Reference Books:

1. Vijay.K. Jain “Advanced Machining Processes” Allied Publishers Pvt. Ltd., New Delhi, 2007
2. Pandey P.C. and Shan H.S. “Modern Machining Processes” Tata McGraw-Hill, New Delhi,2007.
3. Benedict. G.F. “Non-Traditional Manufacturing Processes”, Marcel Dekker Inc., New York,1987.
4. Mc Geough, “Advanced Methods of Machining”, Chapman and Hall, London, 1998.
5. Paul De Garmo, J.T.Black, and Ronald.A.Kohser, “Material and Processes in Manufacturing” Prentice Hall of India Pvt. Ltd., 8thEdition, New Delhi , 2001

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Course Code	DMEA-501
Course Title	Advanced Manufacturing Processes Lab
Number of Credits	3 (L:0; T:0; P:2)

Course Outcomes For practical

CO1: Understand the need and classification of unconventional machining processes and their advantages over conventional methods.
CO2: Analyze the working principles, equipment, and process parameters of mechanical energy-based processes such as AJM, WJM, AWJM, and USM.
CO3: Evaluate the performance and applications of electrical energy-based processes like EDM and Wire Cut EDM, including material removal rate and surface finish.
CO4: Demonstrate knowledge of chemical and electrochemical machining techniques, including process parameters, surface roughness, and applications.
CO5: Understand the principles and working mechanisms of thermal energy-based processes such as LBM, PAM, and EBM, and identify suitable applications.

List Of Experiments

1 Study and demonstration of Abrasive Jet Machining (AJM)

2 Study and demonstration of Water Jet Machining (WJM) Abrasive Water Jet Machining (AWJM)

3 Study and observation of Ultrasonic Machining (USM) setup and working .

4 Experiment on Electric Discharge Machining (EDM) for material removal rate (MRR).

5 Demonstration of Wire Cut EDM and surface finish evaluation.

6 Observation of Electrochemical Machining (ECM) setup and parameters.

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Course Code	DMEA-502
Course Title	Theory of Machines &Mechanisms
Number of Credits	3 (L:3; T:0; P:0)

Course Objectives:

1 To understand different types of cams and their motions and also to draw cam profiles for various motions.
2 To understand the mechanism of various types of drives available for transmission of power.
3 To understand the design of Brakes, Dynamometers, Bearings and Clutches and their function and working.
4 To understand the need for balancing of masses in the same plane
5 To Know different types of governors.

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

CO1 Know different machine elements and mechanisms.
CO2 Understand Kinematics and Dynamics of different machines and mechanisms.
CO3 Select Suitable Drives and Mechanisms for a particular application.
CO4 Appreciate concept of balancing and Vibration.
CO5 Develop ability to come up with innovative ideas.
CO6 Understand different types of cams and their motions and also draw cam profiles for various Motions.

UNIT I: Cams and Followers: Concept; Definition and application of Cams and Followers; Classification of Cams and Followers; Different follower motions and their displacement diagrams like uniform velocity, SHM, uniform acceleration and Retardation; Drawing of profile of radial cam with knife-edge and roller follower with and without offset with reciprocating motion (graphical method).

UNIT II: Power Transmission: Types of Drives – Belt, Chain, Rope, Gear drives & their comparison; Belt Drives - flat belt, V– belt & its applications; Material for flat and V-belt; Angle of lap, Belt length. Slip and Creep; Determination of Velocity Ratio, Ratio of tight side and slack side tension; Centrifugal tension and Initial tension; Condition for maximum power transmission (Simple numerical); Chain Drives – Advantages & Disadvantages; Selection of Chain & Sprocket wheels; Methods of lubrication; Gear Drives – Spur gear terminology; Types of gears and gear trains, their selection for different applications; Train value & Velocity ratio for compound, reverted and simple epicyclic gear train; Methods of lubrication; Law of gearing; Rope Drives – Types, applications, advantages & limitations of Steel ropes.

UNIT III: Flywheel and Governors: Flywheel - Concept, function and application of flywheel with the help of turning moment diagram for single cylinder 4-Stroke I.C. Engine (no Numerical); Coefficient of fluctuation of energy, Coefficient of fluctuation of speed and its significance; Governors - Types and explanation with neat sketches (Centrifugal, Watt and Porter); Concept, function and applications & Terminology of Governors; Comparison between Flywheel and Governor.

UNIT IV: Brakes, Dynamometers, Clutches & Bearings: Function of brakes and dynamometers; Types of brakes and Dynamometers; Comparison between brakes and dynamometers; Construction and working of i) shoe brake, ii) Band Brake, iii) Internal expanding shoe brake iv) Disc Brake; Concept of Self Locking & Self

energizing brakes; Numerical problems to find braking force and braking torque for shoe & band brakes; Construction and working of i) Rope Brake Dynamometer, ii) Hydraulic Dynamometer, iii) Eddy current Dynamometers; Clutches- Uniform pressure and Uniform Wear theories; Function of Clutch and its application; Construction and working of i) Single plate clutch, ii) Multiplate clutch, iii) Centrifugal Clutch iv) Cone clutch and v) Diaphragm clutch. (Simple numerical on single and Multiplate clutch); Bearings – i) Simple Pivot, ii) Collar Bearing, iii) Conical pivot. Torque & power lost in friction (no derivation). Simple numerical.

UNIT V: Balancing & Vibrations: Concept of balancing; Balancing of single rotating mass; Graphical method for balancing of several masses revolving in same plane; Concept and terminology used in vibrations, Causes of vibrations in machines; their harmful effects and remedies.

Reference Books:

1. Theory of machines – S.S .Rattan ,Tata McGraw-Hill publications.
2. Theory of machines – R.K.Bansal ,Laxmi publications
3. Theory of machines – R.S. Khurmi & J.K.Gupta , S.Chand publications.
4. Dynamics of Machines – J B K Das, Sapna Publications.
5. Theory of machines – Jagdishlal, Bombay Metro – Politan book Ltd.

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Course Code	DMEA-503
Course Title	Elective – II (**A** Industrial Engineering & Management)
Number of Credits	3 (L:3; T:0; P:0)

Course Objectives:
1To take the right decisions to optimize resources utilization by improving productivity of the Lands, Buildings, People, Materials, Machines, Money, Methods and Management effectively.
2 To eliminate unproductive activities under the control of the Management, Supervisor, worker and the Design of Products and Processes.
3To use the Charts to record the Activities of the people, materials and Equipment to find alternative methods which minimize waste and to implement the best method.

Course outcomes:
At the end of the course, the student will be able to:
CO1 Explain the different types of layout and plant maintenance with safety
CO2 List and explain the need of method study and work measurements
CO3 Explain the production planning and quality control, and its functions
CO4 Understand the basic principles, approaches and functions of management and identify Concepts to specific situations
CO5 List and explain the different financial sources and methods of inventory management.

UNIT-I: Plant Engineering: Plant; Selection of site of industry; Plant layout; Principles of a good layout; Types; Process; Product and Fixed position; Techniques to improve Layout; Principles of Material handling equipment; Plant maintenance; Importance; Break down maintenance; Preventive maintenance and Scheduled maintenance.

UNIT-II: Work Study: Productivity; Standard of living; Method of improving Productivity; Objectives; Importance of good working conditions.
Method Study: Definition; Objectives; Selection of a job for method study; Basic procedure for conduct of Method study; Tools used; Operation process chart; Flow process chart; Two handed process chart; Man Machine chart; String diagram and flow diagram.

Work Measurement: Definition; Basic procedure in making a time study; Employees rating factor; Application of time allowances: Rest, Personal, Process, Special and Policy allowances; Calculation of standard time; Numerical Problems; Basic concept of production study; Techniques of Work Measurement; Ratio delay study; Synthesis from standard data; Analytical estimating and Pre determined Motion Time System (PMTS).

UNIT-III: Production Planning and Control: Introduction; Major functions of Production Planning and Control; Pre planning; Methods of forecasting; Routing and Scheduling; Dispatching and Controlling; Concept of Critical Path Method (CPM); Types of Production: Mass Production, Batch Production and Job Order Production; Characteristics; Economic Batch Quantity (EBQ); Principles of Product and Process Planning; Make or Buy decision; Numerical problems.

UNIT-IV: Principles of Management: Definition of Management; Administration; Organization; F.W. Taylor's and Henry Fayol's Principles of Management; Functions of Manager; Types of Organization: Line, Staff,

Taylor's Pure functional types; Line and staff and committee type; Directing; Leadership; Styles of Leadership; Qualities of a good leader; Motivation; Positive and Negative Motivation; ModernManagement Techniques; Just In Time; Total Quality Management (TQM); Quality circle; Zero defect concept; 5S Concept; Management Information Systems.

UNIT-V: Material Management: Objectives of good stock control system; ABC analysis of Inventory; Procurement and Consumption cycle; Minimum Stock, Lead Time, Reorder Level-Economic Order Quantity problems; Supply Chain.

Reference Books:

1. Industrial Engineering & Management, S.C. Sharma, Khanna Book Publishing Co. (P) Ltd., Delhi
2. Industrial Engineering and Management, O.P. Khanna, Revised Edition, Dhanpat Rai Publications (P) Ltd., New Delhi – 110002.
3. Management, A global perspective, Heinz Weihrich, Harold Koontz, 10th Edition, McGraw Hill International Edition 1994.
4. Essentials of Management, 4th Edition, Joseph L.Massie, Prentice-Hall of India, New Delhi 2004.
5. Principles and Practices of Management, Premvir Kap
oor, Khanna Publishing House, N. Delhi

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Course Code	DMEA-503
Course Title	Elective – II (B Computer Aided Design And Manufacturing)
Number of Credits	3 (L:3; T:0; P:0)

Course Objectives: To provide an overview of how computers are being used in design, development of manufacturing plans and manufacture.
1 To understand concepts of drafting and modeling using CAD.
2 To understand the need for integration of CAD and CAM.
3 To understand the concepts of flexible manufacturing system.

Course outcomes:
At the end of the course, the student will be able to:
CO1 Develop mathematical models to represent curves and surfaces and Model engineering components using solid modeling techniques.
CO2 Understand geometric transformation techniques in CAD.
CO3 Develop programs for CNC to manufacture industrial components.
CO4 Understand the application of computers in various aspects of Manufacturing viz., Design, Proper planning, Manufacturing cost, Layout & Material Handling system.
CO5 Utilize Flexible manufacturing system tools.
UNIT-I: Fundamentals of CAD/CAM: Automation; Design process; Application of computers for design; Benefits of CAD; Computer configuration for CAD applications; Design workstation; Graphic terminal; CAD Software: Definition of system software and application software; CAD database and structure.
Geometric Modeling: 3D-Wire frame modeling; Wire frame entities and their definitions; Interpolation and Approximation of curves; Concept of Parametric and Non-parametric representation of curves; Curve fitting techniques.
Unit-II: Surface Modeling: Algebraic and Geometric form; Parametric space of surface; Blending functions; Parametrization of surface patch; Subdividing; Cylindrical surface; Ruled surface; Surface of revolution; Spherical surface; Composite surface; Bezier surface; Solid Modelling: Definition of cell composition and spatial occupancy enumeration; Sweep representation; Constructive solid geometry; Boundary representations.
Unit-III: NC Control Production Systems: Numerical control; Elements of NC system; NC part programming; Methods of NC part programming; Manual part programming, Computer assisted part programming; Post processor; Computerized part program.
Unit-IV: Group Technology: Part families; Parts classification and coding; Production analysis; Machine cell design; Computer aided process planning: Retrieval type and Generative type; Machinability data systems; MRP and its Benefits.
Unit-V: Flexible manufacturing system: F.M.S equipment; Layouts; Analysis methods and benefits; Computer aided quality control; Automated inspection: Off-line, On-line, Contact, Non-contact; Coordinate measuring machines; Machine vision; CIM system and Benefits.
Reference Books:
1. CAD/CAM Principles and Applications, P.N.Rao, Tata McGraw-Hill
2. Computer Aided Design and Manufacturing, Groover M.P. & Zimmers Jr , Prentice hall of India
3. CAD/CAM/CIM, RadhaKrishna P. & Subramanyam, Wiley Eastern Ltd.

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Course Code	DMEA-504
Course Title	Elective – III ((**A** Industrial Production Technology)
Number of Credits	3 (L:3; T:0; P:0)

Course Objectives:
1 To understand basic production processes and technologies of relevance to the manufacturing industry and related sectors, particularly in the production, process and development areas.
2 To select, operate and control the appropriate processes for specific applications and production processes, surface finishing processes and plastic processes.

Course outcomes:
At the end of the course, the student will be able to:
CO1 Use the basic machine tools like lathe, drilling and milling.
CO2 Understand and select the gear cutting processes.
CO3 Demonstrate understanding of metal cutting principles and mechanism
CO4 Identify cutting tool geometry of single point and multipoint cutting tool
CO5 Demonstrate concepts and use of jigs and fixtures.

UNIT-I: Theory of Metal Cutting: Theory of Metal Cutting: Cutting tool material-High carbon Steel-High Speed Steel-Stellites-Cemented carbides-ceramics-Composition and applications for the above-Single point cutting tool-nomenclature-tool life- Chip Breakers.
Drilling Machines: Drills-Flat drills-Twist drills-Nomenclature-Types of drilling machines-Bench type-Floor type-Radial type-Gang drill-Multi-spindle type-Principle of operation in drilling-Speeds and feeds for various materials-drilling holes-methods of holding drill bit-drill chucks-socket and sleeve-drilling-operation-reaming-counter sinking-counter boring-spot facing-tapping-deep hole drilling.
Boring Machines: Boring machines-horizontal and vertical types-fine boring machines-boring tools.

UNIT-II: Reciprocating Machines: Planer: Types of planers-description of double housing planer specifications- principles of operation-drives-quick return mechanism-feed mechanism- work holding devices and special fixtures-types of tools various operation.
Shaper: Types of shapers-specifications-standard-plain-universal principles of operations-drives-quick return mechanism-crank and slotted link-feed mechanism-work holding devices-Special fixture-various operations.
Slotter: Types of slotters-specifications-method of Operation-Whitworth quick return mechanism-feed mechanism-work holding devices-types of tools.

UNIT-III: Milling Machines: Types-column and knee type-plain-universal milling machine-vertical milling machine-specification of milling machines principles of operation-work and tool holding devices-arbor-stub arbor spring collet-adapter-milling cutters-cylindrical milling cutter-slitting cutter side milling cutter-angle milling cutter-T-slot milling cutter-woodruff milling cutter-fly cutter-nomenclature of cylindrical milling cutter-milling process conventional milling-climb milling-milling operations-straddle milling-gang milling-vertical milling attachment.
Gear Generating Processes: Gear shaper-Gear hobbing-Principle of operation only-Gear finishing processes-Burnishing-Shaving-Grinding and Lapping; Gear materials-Cast iron, Steel, Alloy steels, Brass, Bronze, Aluminum and Nylon.

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UNIT-IV: Abrasive Process and Broaching: Abrasive Process: Types and classification-specifications- rough grinding – pedestal grinders- portable grinders- belt grinders-precision grinding cylindrical grinder-centerless grinders – surface grinder- tool and cutter grinder - planetory grinders- principles of operations-grinding wheels abrasives- natural and artificial diamond wheels-types of bonds-grit, grade and structure of wheels-wheel shapes and sizes-standard marking systems of grinding wheels-selection of grinding wheel-mounting of grinding wheels-Dressing and Truing of wheels-Balancing of grinding wheels.
Broaching: Types of broaching machine-horizontal, vertical and continuous broaching-principles of operation-types of broaches classification- broach tool nomenclature-broaching operations-simple examples.

UNIT-V: Jigs & Fixtures: Definitions and concept of Jig and fixture-Advantages of jigs and fixtures-elements of jigs and fixtures-locating devices-'V' locators-fixed stop locators-adjustable stop locators- clamping devices strap clamp, screw clamp-cam action clamp-types of jigs-box drill jig indexing drill jig-types of fixtures-keyway milling fixture-string milling fixture.
Press Working: Types of presses-mechanical and hydraulic presses press tools and accessories-press working operations-bending operations angle bending-channel bending -curling-Drawing-shearing operations - blanking, piercing, trimming-notching-lancing-shaving-parting off.
Non-Conventional Machining Processes: Construction, working and applications of Ultrasonic machining-chemical machining-electro chemical grinding-electrical discharge machining-plasma arc machining-LASER machining-Advantages – Disadvantages.

Reference Books:

1. Elements of Workshop Technology- Vol. I & II, Hajra Choudry & Battacharya, , Ed. 11, published
2. Production Technology, HMT, , Edn. 18, Tata McGraw Hill Publishing Co.
3. Manufacturing process, Myro N Begman, Edn. 5, Tata McGraw Hill Publishing Co. Ltd.
4. Workshop Tech Vol I,II, III, WAJ. Chapman, published by Viva Books Pvt. Ltd. New Delhi
5. Production processes, NITTTR, published by 5, Tata McGraw Hill Publishing Co. Ltd.

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Course Code	DMEA-504
Course Title	Elective – III ((**B** Tool Engineering)
Number of Credits	3 (L:3; T:0; P:0)

Course Objectives:
1 To understand the concepts of cutting tools and cutting forces involved in metal cutting process.
2 To understand tool angles of various cutting tools & their importance.
3 To understand and evaluate the tool wear and tool life with the help of Taylors tool life equation.
4 To understand the types of press, forming dies and their constructions.
5 To understand the designing of strip layout for given component.

Course outcomes:
At the end of the course, the student will be able to:
CO1 Select cutting tools and its material using data book and manufacturer's catalogue.
CO2 Estimate tool wear and tool life.
CO3 Use press tools and dies effectively.
CO4 Design strip layout for given component.
CO5 Decide appropriate cutting fluid for machining process improvement.

UNIT-I: Jigs and fixtures: – Necessity for jigs and fixtures - Elements of fixtures, design considerations, locators, types of locators, clamping and guiding devices, swarf disposal methods

UNIT-II: Work holding devices for flat, round and irregular surface: Design of drill jigs, bush specifications. Fixture for lathe operations, milling, broaching and welding fixtures, fixtures for CNC machines, modular fixtures.

UNIT-III: Press working: tools, blanking and piercing tools, load variation during blanking-Calculation of press tonnage for blanking and piercing. Types of dies, simple, compound, combination and progressive dies- Design of compound and progressive dies. Bending and drawing dies: Bending allowances, bending methods. Bending pressure-calculation of blank size and press tonnage for drawing, metal flow during drawing operations - Fine blanking, Embossing and Coining.

UNIT-IV: Tool for forging, Design of drop forging dies: - Rolling, strip rolling theory, stress distribution in rolling, Roll separation force and torque. Forces acting on single point and multiple point cutting tools

UNIT-V: CAD for tooling: Turret press FMS-Computer applications (CAD / CAM) in short metal press work – Quick die change method – Single minute exchange of dies- group tooling –Design of single point tools – Plastic as a tooling materials – Fluidized bed fixturing.

Reference Books:
1. Tool Design – Cysil Donaldson TMH
2. Tool Design – Cole G.B.
3. Die Design Hand Book – ASTME
4. Jigs and Fixtures – Calving-Hoose
5. Jig and Fixture Design Hand Book – William and Boyes

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Course Code	DOE-505
Course Title	Open Elective –I (A) Economic Policies In India
Number of Credits	3 (L:3: T:0: P:0)

Course Objectives:
The objective of this course is to familiarize the students of different streams with the basic concepts, structure, problems and issues concerning Indian economy.

Course outcomes:

At the end of the course, the student will be able to:
1 Understand Indian economics policy, planning strategies
2 It will enable to students to comprehend theoretical and empirical development across countries and region for policy purposes
3 Development Economics as a discipline encompasses different approaches to the problems of unemployment, poverty, income generation, industrialization from different perspectives
4 Able to identify the problems and capable to decide the application for future development
5 Analyze economic issues and find solutions to complex economic problems and take correct economic judgment

UNIT-I: Basic features and problems of Indian Economy: Economic History of India; Nature of Indian Economy, demographic features and Human Development Index, Problems of Poverty, Unemployment, Inflation, income inequality, Black money in India.

UNIT-II: Sectoral composition of Indian Economy: Issues in Agriculture sector in India, land reforms Green Revolution and agriculture policies of India,

UNIT-III: Industrial development, small scale and cottage industries, industrial Policy, Public sector in India, service sector in India.

UNIT-IV: Economic Policies: Economic Planning in India, Planning commission v/s NITI Aayog, Five Year Plans, monetary policy in India, Fiscal Policy in India, Centre state Finance Relations, Finance commission in India. LPG policy in India

UNIT-V: External sector in India: - India's foreign trade value composition and direction, India Balance of payment since 1991, FDI in India, Impact of Globalization on Indian Economy, WTO and India.

Reference Books:
1. Dutt Rudder and K.P.M Sunderam (2017). Indian Economy. S Chand & Co. Ltd. New Delhi.
2. Mishra S.K & V.K Puri (2017). Indian Economy and –Its Development Experience. Himalaya Publishing House.
3. Singh, Ramesh, (2016): Indian Economy, Tata-McGraw Hill Publications, New Delhi.
4. Dhingra, I.C., (2017): March of the Indian Economy, Heed Publications Pvt. Ltd.
5. Karam Singh Gill, (1978): Evolution of the Indian Economy, NCERT, New Delhi
6. Kaushik Basu (2007): The Oxford Companion to Economics of India, Oxford University Press.

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Course Code	DOE-505
Course Title	Open Elective –I (B) Disaster Management
Number of Credits	3 (L:3: T:0: P:0)

Course Objectives:

Following are the objectives of this course:

1 To learn about various types of natural and man-made disasters.
2 To know pre- and post-disaster management for some of the disasters.
3 To know about various information and organisations in disaster management in India.
4 To get exposed to technological tools and their role in disaster management..

Course outcomes:

After competing this course, student will be:

CO1 Acquainted with basic information on various types of disasters
CO2 Knowing the precautions and awareness regarding various disasters
CO3 Decide first action to be taken under various disasters
CO4 Familiarised with organisation in India which are dealing with disasters
CO5 Able to select IT tools to help in disaster management

Unit – I: Understanding Disaster

Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity– Disaster and Development, and disaster management.

Unit – II: Types, Trends, Causes, Consequences and Control of Disasters

Geological Disasters (earthquakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, pest attacks, forest fire)

Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters.

Unit- III: Disaster Management Cycle and Framework

Disaster Management Cycle – Paradigm Shift in Disaster Management.
Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness.
During Disaster – Evacuation-Disaster Communication-Search and Rescue -Emergency Operation Centre Incident Command System – Relief and Rehabilitation
Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure
Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Stretegy, Hyogo Framework of Action.

Unit– IV: Disaster Management in India

Disaster Profile of India – Mega Disasters of India and Lessons Learnt.
Disaster Management Act 2005 – Institutional and Financial Mechanism,
National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national),Non-Government and Inter Governmental Agencies

Unit– V: Applications of Science and Technology for Disaster Management

Geo-informatics in Disaster Management (RS, GIS, GPS and RS).
Disaster Communication System (Early Warning and Its Dissemination).
Land Use Planning and Development Regulations, Disaster Safe Designs and Constructions,

Structural and Non Structural Mitigation of Disasters
S&T Institutions for Disaster Management in India

Reference Books:

1. Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management
2. Bhandani, R. K., An overview on natural & man-made disasters and their reduction, CSIR, New Delhi
3. Srivastava, H. N., and Gupta G. D., Management of Natural Disasters in developing countries, Daya Publishers, Delhi
4. Alexander, David, Natural Disasters, Kluwer Academic London
5. Ghosh, G. K., Disaster Management, A P H Publishing Corporation
6. Murthy, D. B. N., Disaster Management: Text & Case Studies, Deep & Deep Pvt. Ltd.

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Course Code	DMEA-506
Course Title	Summer Internship-II
Number of Credits	2 (L:0: T:0: P:0)

Course Outcomes:

At the end of this course students will gain the ability to

CO1. Apply manufacturing practices such as machining, welding, CNC operations, or assembly processes to real industrial tasks under supervision.
CO2. Interpret mechanical drawings, CAD models, or technical documents and assist in the design, drafting, or modification of mechanical components using software like AutoCAD, Solid Works, or CREO.
CO3. Observe and understand maintenance procedures for mechanical equipment, including breakdown analysis, preventive maintenance, and condition monitoring systems.
CO4. Analyze thermal systems such as boilers, compressors, HVAC systems, or IC engines by observing parameters, maintenance schedules, or performance logs.
CO5. Demonstrate awareness of safety standards, material handling practices, and workplace regulations relevant to mechanical industries (like ISO, OSHA, or 5S practices).
CO6. Document daily work activities, prepare project reports, and present technical findings in a structured format with clarity and professionalism.
CO7. Develop interpersonal and professional skills by engaging with multidisciplinary teams, supervisors, and company staff, showcasing time management, punctuality, and effective communication.

Guidelines:

1. **Objective:**
   Gain practical exposure to mechanical engineering applications, bridge theory with real-world practices, and enhance industry readiness.
2. **Duration & Timing:**
   Internship should last **4–6 weeks** during the **summer break** after the 4th semester.
3. **Industry Types:**
   Internship can be done in **manufacturing units, design firms, thermal plants, MSMEs, workshops**, or **government/PSU organizations**.
4. **Key Activities:**
   Observe and assist in **manufacturing processes, maintenance tasks, CAD/design work, quality inspection**, or **thermal system analysis**.
5. **Submission Requirements:**
   Submit a **detailed internship report**, **company certificate**, and deliver a **presentation** summarizing your learning and contributions.
6. **Conduct & Evaluation:**
   Maintain discipline, follow safety rules, be punctual, and show professional behavior. Evaluation will be based on **technical learning, report quality, presentation, and discipline.**

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POLYTECHNIC ENGINEERING

Sri Satya Sai University of Technology And Medical Sciences, Sehore (M.P.)
Syllabus of Examination - AICTE Pattern
Undergraduate Diploma Courses in Engineering & Technology
Department of Mechanical Engineering
Semester-V

Course Code	DMEA-507
Course Title	Major Project-I
Number of Credits	1 (L:0: T:0: P:2)

Course Outcomes:

Build projects as per industry and society demands.

Guidelines:

1. Project Selection

- Choose a practical and mechanical-related topic (like design, manufacturing, thermal, maintenance, etc.).
- Work in a team of **3–5 students** with guidance from a faculty mentor.

2. Literature Survey

- Study similar projects or technologies from books, internet, or journals.
- Understand existing solutions and identify improvements.

3. Define Problem & Plan

- Clearly define the **project title, aim, and objectives**.
- Prepare a **basic design or layout**.
- List tools, materials, and software to be used.

4. Work Schedule

- Make a **week-wise plan** (who will do what and when).
- Plan for material purchase or design work (for Phase 2).

5. Report Content (Phase 1)

- Title & team info
- Certificate
- Introduction & objectives
- Literature review
- Project plan & tools
- Timeline chart
- Conclusion & references

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