Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Technology and Science

Choice Based Credit System (CBCS) Scheme in light of NEP2020

Diploma in Automobile Engineering

SEMESTER III (2024-2027)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTME301N	DC	Manufacturing Process I	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

(A) To develop a problem oriented in depth knowledge of Manufacturing Process.

(B) To address the underlying concepts, methods and application of different Manufacturing Processes.

Course Outcomes (COs):

1. The student will be able to identify different areas of Manufacturing Processes.
2. Students will be able to apply basics of metal machining processes very well with the detailed signature of tools.
3. The student will be able to find the applications of all the areas in day-to-day life.

Syllabus

UNIT-I **8 Hrs.**

Importance of Manufacturing:

Economic and technological definition of manufacturing, Classification of manufacturing processes, Selection of Manufacturing process.

UNIT -II **8 Hr.**

Metal Joining Processes:

Welding, Classification of welding andallied processes.Principle of welding, soldering and Brazing. Gas welding and gas cutting. Arc welding and classification.

UNIT – III **7 Hr.**

Forming and Shaping Processes:

Metal working, Hot and coldworking, Rolling, Principle and operations,Forging, Forging operations,extrusion. Wire and tube drawing processes.

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UNIT – IV **8 Hr.**

Metal Casting:

Introduction of casting process; Definition of pattern, their types and allowances;Molding-Definition, types of molds, molding sand and its composition, characteristicsand defects of mold; Function of runners, risers, gateand Core.Casting defects, causes, elimination and applications.

UNIT -V **7 Hr.**

Super Finishing Processes:

Introduction, Grinding, Lapping, Horning, Buffing, Barrel Finishing, Powdercoating, Polishing

Reference Books:

1. *Metal Cutting principles, by M C Shaw, Oxford University press, 1960.*
2. *Production Technology - H.M.T. By HMT, 2001.*
3. *Workshop Technology Vol. II by Raghuvanshi, Dhanpat rai Pub, 2006.*
4. *Production Technology by R.K. Jain, Khanna Pub,2001.*
5. *Manufacturing Technology Vol.-1 by P.N.Rao,TMH Pub, 2018.*

List of practical: -

1. Performance of various flames in oxy acetylene gas welding.
2. To join the given two work pieces as a required type of joint by gas welding process.
3. To make rectangular tray from the given sheet metal.
4. Analysis of various parameters in rolling process.

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DTME301N	DC	Manufacturing Process I	60	20	20	30	20	3	0	2	**4**

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5. An Experiment in Powder Metallurgy- Sintering of Cu.
6. Parameter demonstrates in Plastic Injection Molding Process.
7. Influence of main parameters of forging process.
8. Pattern design and making.
9. Sand mould making and casting for split piece pattern.

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DTME302	DC	BASIC THERMODYNAMICS	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Course Educational Objectives (CEOs):

(A) This subject aims at introduction of basic concepts, laws & principles of thermodynamics. (B) It covers the zeroth, first and second law of thermodynamics and heat transfer. (C) It also includes the basic principles and applications of air compressors & steam generation & steam process.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes.

1. To understand the laws of thermodynamics and its applications.
2. To understand the different modes of heat, transfer in practical applications.
3. To understand the working and applications of various air compressors.
4. To understand the process of steam generation & steam process.

Syllabus

UNIT-I **8 Hr.**

Dimensions & Basic concepts of thermodynamics: Basic and Derived units for commonengineering variables and properties like mass, length, time, temperature, area, volume, velocity, acceleration, force, pressure, work, heat, energy, power system, surroundings, boundary, universe, control volume, Properties (intensive, extensive), process, path, cycle, working substance, cyclic process, reversible, irreversible process, Thermodynamic equilibrium, zeroth law of thermodynamics, temperature & its measurement.

UNIT -II **9 Hr.**

First law & Second Law of Thermodynamic: First law of thermodynamics & Joules experimentfirst law applied to a process & cyclic process. Internal energy & enthalpy Determination of heattransfer, work transfer, internal energy change for the following

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process` i) Isobaric, ii) Isochoric, iii) Isothermal, iv) Adiabatic, v) Polytrophic, Steady flow energy equation for open system. Limitations of First law of thermodynamics, Concept of heat reservoir & heat sink, heat engine, heat pump & refrigerator, Thermal efficiency of heat engine, cop of refrigerator & heat pump. Kelvin Planck`s&Clausius statements of second law of thermodynamics.

UNIT-III **8 Hr.**

Pure substance: phase transformation at constant pressure, p-v diagram for water, and various states of steam Enthalpy changes during steam formation, properties of steam & properties diagrams. Process of steam, constant pressure, constant volume, reversible adiabatic, Isothermal, polytrophic& throttling process.

UNIT-IV **8 Hr.**

Vapour power cycle: Carnot cycle its limitation, Rankine cycle, modified Rankine cycle their representation on P-V and T-S and H-S Planes.

Air Standard cycles: Air Standard cycles- definition andpurpose standard efficiency, Carnot, Otto Diesel dual Derivation of air Standard efficiency and their comparison and limitation of each cycle.

UNIT -V **8 Hr.**

I.C. Engine-Introduction, classification I.C. Engine Components and theirfunction, working of two stroke and four- stroke cycle engines and their comparison. Indicator diagram, Calculation of IHP, BHP thermal efficiency, Mechanical efficiency and relative efficiency.

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Reference Books:

1. *Engineering Thermodynamics by P.K. Nag, McGraw-Hill Education 2011.*
2. *Thermal Engineering by R.K. Rajput, Laxmi Publication House, 2010.*
3. *Engineering Thermodynamics by Onkar Singh,New Age International Publication,2013.*
4. *A Textbook of Engineering Thermodynamics by V.M. Domkundwar, Dhanpat Rai & Company, 2008.*
5. *Engineering Thermodynamics by Jones and Dugan, PHI Learning Pvt. Ltd. 2001.*

List of Practical's:

1. Study of positive displacement work (PdV work) and Heat transfer for various processes.
2. Study of First Law of Thermodynamic.
3. Study of second Law of thermodynamic.
4. Determination of efficiency of Otto cycle.
5. Determination of efficiency of Diesel cycle.
6. Study of Properties of gases and gas mixtures.
7. Study of entropy of system.

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DTME303	DC	STRENGTH OF MATERIALS	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

(A) To gain knowledge of different types of stresses, strain and deformation induced in the mechanical components due to external loads. (B) To study the distribution of various stresses in the mechanical elements such as beams, shafts etc. (C) To study effect of various loading conditions of column and gain knowledge of theories of failure.

Course Outcomes (COs):

On completion of this course the students will be able to understand

1. Define and memorize mechanical properties of material & select appropriate material for a given working Conditions.
2. Explain simple stresses, bending stress, shear stress, torsion stress, principle stresses, thin and thick cylinder, shaft, springs, columns and theories of failures.
3. Calculate and design structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behavior of materials.
4. Design of shaft and pressure vessels.
5. Justify bending equation and torsion equation and use it to solve the numerical.

Syllabus

UNIT-I **8 Hrs.**

Introduction: Mechanical Properties; Define Stress and strain; tensile, compressive stresses and shear stresses; Stress-Strain Diagram; Poisson's Ratio, Modulus of elasticity, Modulus of rigidity and Bulk modulus; Factor of safety; Deformation due to self-weight; bars of varying sections; composite sections; principle of superposition and strain energy.

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UNIT-II **7 Hrs.**

Compound Stresses:principal stresses, normal and shearstress, Mohr's circle, Thermal Stressand its applications, Introduction ofthin-walledcylindrical pressure vessel; Hoop's and longitudinal stress in thin-walled cylindrical pressure vessel.

UNIT-III **7 Hrs.**

Bending: Define bending and their assumptions; Pure bending; bending equation; Section Modulus; deformation and stress occur due to bending;bending of composite sections; shear stresses in beam for different section.

UNIT-IV **7 Hrs.**

Torsion: Define torsion and their assumptions; Torsion Equation; Polar Modulus;Torsion of circular shafts-solid and hollow;Strength of Shaft for varying sections and composite shaft; combined bending and torsion.

UNIT-V **8 Hrs.**

Columns and Theories of Failure: Buckling load; Types of end conditions for column; Euler'scolumn theory and its limitations;Define Theories of failures-Maximum principal stress theory, Maximum principal strain theory, maximum shear stress theory, maximum strain energy theory and maximum shear strain energy theory.

Reference Books:

1. *Strength of Materials, Dr. R.K. Bansal, Lakshmi Publications, New Delhi, 2016.*
2. *Strength of Materials, Basavaraj and Mahadevappa, Khanna Publishers, New Delhi, 2003.*
3. *Strength of Materials—S. Ramamrutham, Dhanpat Rai Pvt. Ltd.,2017.*

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4. *Mechanics of Materials—S. S. Rattan, TMH Pvt. Ltd. 2010.*
5. *Strength of Materials, Subramanyam, Oxford University Press, Edition, 2005.*

List of Practical's:

1. Perform Brinell and Rockwell Hardness tests to find BHN and RHN for given specification.
2. Perform Izod/ Charpy impact test.
3. Perform Fatigue test.
4. Perform Torsion test.
5. To find tensile strength of given specimen by tensile test on MS and CI usingUTM.
6. Perform Direct/cross Shear test on MS and CI by UTM.

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DTME307	AEC	TOOL ENGINEERING LAB	0	0	0	30	20	0	0	4	**2**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

The practical should be conducted in such a manner that students are able to acquire (A)Re-sharpen given cutting tool. (B) Interpret designation system of cutting tool and tool holder. (C) Select locating and clamping devices for given component. (D) Select and design jig and fixture for given simple component. (E) Classify and explain various press tools and press tools operations. (F). Select a die for a given simple component.

Course Outcomes (COs):

The practical should be conducted in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

1. Re-sharpen given cutting tool.
2. Interpret designation system of cutting tool and tool holder.
3. Select locating and clamping devices for given component.
4. Select and design jig and fixture for given simple component.
5. Classify and explain various press tools and press tools operations.
6. Select a die for a given simple component.

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DTME307	AEC	TOOL ENGINEERING LAB	0	0	0	30	20	0	0	4	**2**

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List of Practical's:

S.N.	Unit No.	Practical Exercises	Approx. Hours. required
1	I	**Preparatoryactivity:** a. Tabulatemostcommonlyusedlimits,fitsandtolerance values. b. TabulateBISdesignationandapplicationsofmost commonly used tool materials. c. Tabulatemachiningprocessesandsurfacefinish achieved. d. Demonstratemodelsof/actualjigs,fixturesandprogressive cutting dies.	04
2	II	**Cuttingtoolsre-sharpening.** a. Draw the cutting tool with nomenclature taken for re-sharpening. b. Re-sharpenanyonecuttingtoolfrom following. i. Drill. ii. Sideand facemilling cutter. iii.Centredrill,typeA. c.Freehand sketchsetupsforgrindingeachangle.	04

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3	III	**Designoffixture:** Facultywill demonstrate working of anyone fixture.Faculty will assign one simple component for designing of fixture. Develop the design and: a. Sketchthecomponent. b. Prepareproductiondrawingsofallpartsof fixture (Details).	06
4	IV	**Designofjig:** Facultywill demonstrate working of anyone jig. Facultywill assignonesimplecomponentfordesigningofjig.Developthe design and: a. Sketchthecomponent. b. Prepare production drawings of all parts of jig (Details).	06
5	V	**Designofprogressivedie:** Faculty will demonstrate working of various press tools operations. Faculty will assign one simple component for designing of progressive cutting die. Develop the design and: a. Drawthe component. b. Drawscrapstriplayout. c. Calculatetonnage andcentreof pressure. d. Workout dimensionsofpunchesand die.	08
		TOTAL HOURS	**28**

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Reference Books:

1. *Fundamentals of tool design by ASTME published by PHI, 2010.*
2. *Jigs and fixture by P. H. Joshi published by TMGH, 2010.*
3. *D Smith, David A. (EDT) Smith, Dies Design Handbook, Society of Manufacturing Engineers, 1990.*
4. *N K Mehta, Metal Cutting & Tool Design, Tata McGraw-Hill Education, 2014.*
5. *Design of Jigs, Fixtures and Press Tools By: K Venkataraman, K. Venkataraman Publisher: Wiley, 2015.*

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SEMESTER III (2024-2027)

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTME308	AEC	COMPUTER AIDED DRAFTING LAB	0	0	0	30	20	0	0	2	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

Students will be skilled in creating and editing 2D shapes, managing layers for mechanical assemblies, using blocks and templates, and setting up prints while adhering to industry standards.

Course Outcomes (COs):

After completion of this course the student are expected to be able to demonstrate following knowledge skills and attitudes. The student will be able to

1. Students will be able to create and edit 2D shapes and objects.
2. Students will effectively organize mechanical assembly drawings by creating and managing layers for different components.
3. Students will be proficient in creating and utilizing blocks, attributes, and templates to streamline the drafting process.
4. Students will dimension mechanical drawings, customize dimension styles, set up prints, and collaborate on drawings, adhering to industry standards.

List of Practical's:

1. Create a detailed 2D drawing of a mechanical partusing basic drawing commands (line, circle, arc).

2. Design a complex mechanical component using advanced draw commands like polyline, spline, region, and boundary.

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Shri Vaishnav Institute of Technology and Science

Choice Based Credit System (CBCS) Scheme in light of NEP2020

Diploma in Automobile Engineering

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3. Modify an assembly drawing by using commands such as fillet for rounding edges, chamfer for bevelled edges, and offset for creating parallel curves.

4. Organize a mechanical assembly drawing by creating layers for different components (e.g., bolts, nuts, plates) and assign appropriate colours and linetypes.

5. Create static blocks of standard mechanical parts (e.g., bolts, nuts) and dynamic blocks of parts that can change sizes (e.g., adjustable clamps).

6. Use the Autodesk Design Center to import standard parts (e.g., bearings) into a new drawing. Customize a tool palette with frequently used mechanical components.

7. Add annotations and specifications to a mechanical drawing using single-line and multi-line text commands. Create and apply different text styles for clarity.

8. Apply different hatch patterns to sectional views of mechanical components. Edit hatch properties to distinguish between different materials.

9. Dimension a mechanical drawing (e.g., an engine part) using linear, radial, and angular dimensions. Customize dimension styles to adhere to industry standards.

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10. Add multileader annotations to highlight specific features in a mechanical drawing, such as material type or surface finish. Customize the multileader style.

11. Create an isometric drawing of a mechanical assembly (e.g., a gearbox) using isometric snap and grid to represent 3D objects on a 2D plane.

12. Import a raster image of a hand-drawn mechanical sketch into AutoCAD, scale it, and trace over it to create an accurate vector drawing.

13. Set up a layout with multiple viewports to display different views (e.g., front, top, and side) of a mechanical part. Customize the plot settings and plot the drawing to a PDF or printer.

Reference Books:

1. *AutoCAD 2024: A Problem-Solving Approach, Basic and Intermediate by Sham Tickoo, CADCIM Technologies.*
2. *AutoCAD 2024 For Dummies by Bill Fane and David Byrnes, Wiley.*
3. *Mastering AutoCAD 2024 and AutoCAD LT 2024 by Brian C. Benton and George Omura, Sybex.*

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