Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Technology and Science
Choice Based Credit System (CBCS) in light of NEP-2020
Diploma in Automobile Engineering
(2023-2026)

COURSE CODE	CATE-GORY	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*				
DTAU301	DC	**Automobile Engines**	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): This course provides a fundamental understanding (A) To impart the knowledge of the working of IC engines. (B) To impart the knowledge of fuel injection and ignition system. (C) To impart the detail knowledge of fuel combustion. (D) To develop the knowledge of cooling and lubrication system of IC engines. (E) To impart the ability of determination of engine performances through testing.

Course Outcomes (COs): After completion of this course the students are expected to be able to demonstrate following knowledge, skills, and attitudes

1. Demonstrate the working of IC engines.
2. Describe the fuel injection and ignition system.
3. Explain the fuel combustion within IC engine.
4. Understand the cooling and lubrication system.
5. Evaluate Engine performance.

Syllabus

UNIT-I **8 Hrs.**

Air Standard Cycles: Internal combustion engines, classification and applications of I.C. Engines, I.C. engine components and terminology, four stroke and two stroke engines.

UNIT-II **8 Hrs.**

Carburetion: Mixture requirements for various operating conditions, types of carburettors.
Fuel Injection System: Functional requirements of an injection system, types of injection.
Ignition System: Requirements of ignition system, firing order, ignition timing.

UNIT-III **8 Hrs.**

Combustion in S.I. engines: Stages of combustion in S.I. engines, knock in S.I. engines, effects of engine variables on knock.
Combustion In C.I. engines: Stages of combustion in C.I. engines, knock in C.I. engines.

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTAU301	DC	**Automobile Engines**	60	20	20	30	20	3	0	2	4

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UNIT-IV **8 Hrs.**

Lubrication and Cooling Systems: Functions of a lubricating system, types of lubrication system, properties of lubricant, engine performance and lubrication, necessity of engine cooling, different types of cooling systems.

UNIT-V **8 Hrs.**

Engine measurements and Testing: Fuel and air consumption, speed, temperature of coolant and exhaust, noise, and emission measurement. Pollutants from S.I. and C.I. engines, Methods of emission control, alternative fuels for I.C. Engines

Textbooks:

1. J.B. Heywood, "Internal Combustion Engine Fundamentals", 5thedition, McGraw-Hill, 2018.
2. Paul W. Gill & James H. Smith, "Fundamentals of Internal Combustion Engines", 4th edition, Oxford & I BH Pub. Ltd. 2007.
3. V.M. Domkundwar "A Course in Internal Combustion Engines ", 3rd edition, Dhanpat Rai Publication 2018.

References:

1. V Ganesan, ""Internal Combustion Engines", 2nd edition, Tata McGraw-Hill.
2 ML. Mathur & R.P. Sharma, "Internal Combustion Engines ", 4th edition, Dhanpat Rai.

List of Experiments.

1. To study the working of 2 stroke and 4 stroke petrol (S.I.) engine
2. To study the working of 2 stroke and 4 stroke diesel (C.I.) engine
3. To study valve/port timing diagram of I.C. Engines.
4. To study fuel injection and ignition system of both S.I. & C.I. engines.
5. To study the different lubrication systems of I.C. engine.

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COURSE CODE	CATE-GORY	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*				
DTME302	DC	BASIC THERMODYNAMICS	60	20	20	30	20	2	1	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 common engineering 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 experiment first law applied to a process & cyclic process. Internal energy & enthalpy. Limitations of First law of thermodynamics, Concept of heat reservoir & heat sink, heat engine, heat pump & refrigerator. 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

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DTME302	DC	BASIC THERMODYNAMICS	60	20	20	30	20	2	1	2	4

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adiabatic, Isothermal, polytrophic& throttling process.

UNIT-IV **8 Hr.**

Gas power cycle: Carnot cycle and its limitation.
Air Standard cycles: definition and purpose standard efficiency, Carnot, Otto & Diesel. Derivation of air Standard efficiency and their comparison and limitation of Otto & Diesel cycle.

UNIT -V **8 Hr.**

I.C. Engine-Introduction, classification I.C. Engine Components and their function, working of two stroke and four- stroke cycle engines and their comparison. Mechanical efficiency and relative efficiency, Cooling and lubrication of I.C. Engines

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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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTME303	DC	STRENGTH OF MATERIALS	60	20	20	30	20	2	1	2	4

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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 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.

UNIT-II **7 Hrs.**

Compound Stresses: principal stresses, normal and shear stress, Mohr's circle, Thermal Stress and its applications.

UNIT-III **7 Hrs.**

Bending: Define bending and their assumptions; Pure bending; bending equation; Section Modulus.

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DTME303	DC	STRENGTH OF MATERIALS	60	20	20	30	20	2	1	2	4

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UNIT-IV **7 Hrs.**

Torsion: Define torsion and their assumptions; Torsion Equation; Polar Modulus; Torsion of circular shafts-solid and hollow.

UNIT-V **8 Hrs.**

Columns and Strut: Buckling load; Types of end conditions for column; Euler's column theory and its limitations.

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.*
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 using UTM.
6. Perform Direct/cross Shear test on MS and CI by UTM.

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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*				
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;
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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.

List of Practical's:

S.N.	Unit No.	Practical Exercises	Approx. Hours. required
1	I	**Preparatory activity:** a. Tabulate most commonly used limits, fits and tolerance values. b. Tabulate BIS designation and applications of most commonly used tool materials. c. Tabulate machining processes and surface finish achieved. d. Demonstrate models of actual jigs, fixtures and progressive cutting dies.	04

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTME307	AEC	TOOL ENGINEERING LAB	0	0	0	30	20	0	0	4	2

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2	II	**Cutting tools re-sharpening.** a. Draw the cutting tool with nomenclature taken for re- sharpening. b. Re-sharpen any one cutting tool from following. i. Drill. ii. Side and face milling cutter. iii. Centre drill, type A. c. Free hand sketch setups for grinding each angle.	04
3	III	**Design of fixture:** Faculty will demonstrate working of anyone fixture. Faculty will assign one simple component for designing of fixture. Develop the design and: a. Sketch the component. b. Prepare production drawings of all parts of fixture (Details).	06
4	IV	**Design of jig:** Faculty will demonstrate working of anyone jig. Faculty will assign one simple component for designing of jig. Develop the design and: a. Sketch the component. b. Prepare production drawings of all parts of jig (Details).	06

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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;
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5	V	**Design of progressive die:** 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. Draw the component. b. Draw scraps trip layout. c. Calculate tonnage and centre of pressure. d. Workout dimensions of punches and die.	08
		Total Hours	**28**

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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DTME308	AEC	COMPUTER AIDED DRAFTING LAB	0	0	0	30	20	0	0	4	2

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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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 stream-line 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.

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.

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DTME308	AEC	COMPUTER AIDED DRAFTING LAB	0	0	0	30	20	0	0	4	2

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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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.

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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