GUJARAT TECHNOLOGICAL UNIVERSITY

Syllabus for Bachelor of Vocation (B.Voc), 3rd Semester
Branch: Automobile Servicing
Subject Name: Automobile Engines
Subject Code: 1130103

With effective from academic year 2018-19

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory		Tutorial/ Practical		
L	P	OJT	C	University exams (ESE)	Progressive Assessment (PA)	External Practical /viva Exam(ESE)	Internal evaluation Practical /viva Exam(PA)	
3	-	-	3	50	-	-	-	50

Course Content:

Unit No.	Content	Hrs.
1	**UNIT1** (A) Fundamentals of Thermodynamics: Internal energy, Enthalpy, Mechanical Equivalent of Heat, Conservation of energy. First and Second Law of thermodynamics. P-V diagram. Reversible process. Various thermodynamic processes. Entropy, General case for change of entropy of a gas. Change of entropy during various processes. Temperature-entropy diagram. Simple numerical problem (B) Air standard cycles: Otto cycle, Diesel cycle, Air standard efficiency of Otto and Diesel cycle. Effect of compression ratio on efficiency. Simple numerical problems. Graphical representation of ideal and actual cycle. Comparison between actual and ideal cycles. Reasons for variation. Mean effective pressure. Work done during the cycle.	**08**
2	**UNIT2** (A) I.C. Engines' operation: Working of two stroke cycle and four stroke cycle petrol and diesel engines. Valve timing diagrams. Port timing diagrams. Classification of I.C. Engines. (B) Reciprocating Engine Details: Construction, function, material and manufacturing process of: (a) Cylinder Block- 2-stroke air cooled and 4-stroke water cooled cylinder liner (wet and dry), cylinder head, gaskets. Different cylinder arrangements. Cylinder wear. Forms of combustion chamber in petrol engine. Location of spark plug. Combustion chamber in Diesel engines. Turbulence in Combustion chambers.	**12**
3	**UNIT3** Engines Details (continued) (b) Piston-plain, split skirt, auto-thermic, cam-ground, Anodising and Tinning of piston, Piston clearance (c) Piston rings-different types (d) Piston pin; different methods of fitting piston pin (e) Valves: Poppet, Rotary, reed, Poppet Valve arrangement, Overhead and side valve operating mechanism. Valve clearance. Hydraulic tappet. Sodium cooled valves. Valve seat inserts (f) Connecting rod, Section of connecting rod. Bearing metal for big and small end of connecting rod (g) Crank shaft. Left hand, right hand crankshaft. Balancing of crank shaft (General idea about static and dynamic balancing, problems excluding). Main bearings. Crankshaft end play. Vibration damper. Flywheel (h) Camshaft, Camshaft drive timing gears (i) Inlet and exhaust manifold, Mufflers, Exhaust pipe (j) Variable Valve Timing (VVT)	**12**
4	**UNIT4** (A) Rotary Engine. Principle and operation. Engine cooling. Advantages and limitations. (B) Internal combustion Turbines. Principle of working, Classification, Brayton cycle. Cycle efficiency. Friction effect. Optimum	**4**

	compression ratio. Simple numerical problems, Deviation of practical cycles. Methods to improve efficiency, Turbine characteristics, combustion chamber, Fuel injection, Ignition Gas turbine Fuels, Materials. Turbine blades.	
5	**UNIT5** (A) Supercharging and scavenging. Necessity of supercharging, Rotary compressors, Turbocharger requirement, Effect of supercharging on power output, mechanical losses, fuel consumption, detonation, Limitations of supercharging. Methods and classification of scavenging process. Performance of different scavenging systems. (B) Engine specifications, specifications of engines of Indian vehicles - four wheelers, three wheelers and two wheelers.	**6**
	Total Hours:	**42**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
5	15	15	10	5

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Bloom's Taxonomy)

Reference Books:

1. Automotive Engines, A.K. Babu, Khanna Publishing House
2. Thermal Engineering I & II: Sarao, Gambhir & Aggarwal
3. Automobile Engineering II: Kirpal Singh
4. Basic Automobile Engineering: CP Nakra
5. Automobile Engineering: RB Gupta