

**P.E.S. College of Engineering, Mandya - 571 401***(An Autonomous Institution affiliated to VTU, Belagavi)***Fourth Semester, B.E. - Automobile Engineering****Semester End Examination; July / August - 2022****Automotive Engines and Components**

Time: 3 hrs

Max. Marks: 100

Course Outcome*The Students will be able to:**CO1: Classify Heat engine and Analyze actual working principle of Heat engines.**CO2: Analyze engine block and its auxiliaries and Determine major dimensions of the same**CO3: Analyze Piston-rings-pin and Determine major dimensions of the same**CO4: Analyze Connecting rod, crank shaft & Flywheel. Determine major dimensions of the same.**CO5: Analyze valve operating mechanism and Determine major dimensions of the same. Study of engine components of state of the art technologies.***Note:** i) **PART-A** is compulsory. One question from each unit for maximum of 2 marks.ii) **PART-B** Answer any **TWO** sub questions (from a, b, c) from each unit for a Maximum of 18 marks.

| Q. No. | Questions | Marks |
|---------------------|--|-----------|
| I: PART - A | | |
| I a. | Define scavenging. | 2 |
| b. | Name any two materials used in the exhaust manifold. | 2 |
| c. | How to compensate for the piston thermal expansion? | 2 |
| d. | Why connecting rod are made of I sections? | 2 |
| e. | How the dual valves are more suitable than the single valve? | 2 |
| II: PART - B | | 90 |
| UNIT - I | | 18 |
| 1 a. | Sketch and describe the operating principle of four stroke CI engine using pressure volume diagram. | 9 |
| b. | List the characteristics of Four stroke SI and CI engines. Also mention the cylinder arrangements with its applications. | 9 |
| c. | Discuss the theoretical process of scavenging with appropriate graph. | 9 |
| UNIT - II | | 18 |
| 2 a. | List and discuss the primary consideration in the designing of CI engine combustion chamber. | 9 |
| b. | Demonstrate and discuss various types of cylinder liners, as well list applications of the same. | 9 |
| c. | Discuss the various types of engine mounting in brief. Similarly list their merits, demerits and applications. | 9 |

UNIT – III

18

- 3 a. Discuss the temperature distribution of pistons with suitable diagram. Also discuss the piston slap. 9
- b. A 4-cylinder four-stroke petrol engine develops 14.7 kW at 1000 rpm, the mean effective pressure is 5.5 bars. Calculate the bore and stroke of the engine, if the length of stroke is 1.5 times the bore. 9
- c. Discuss the function, types, materials and manufacturing details of the engine components given below; 9
 - i) Piston
 - ii) piston pin
 - iii) Piston rings

UNIT - IV

18

- 4 a. Explain the assembly of piston, piston pin, connecting rod and crankshaft together with lubrication, using a neat schematic diagram. 9
- b. Describes the terminology of the multi-cylinder crankshaft with a neat sketch. In addition, discuss the various design considerations of the crankshaft. 9
- c. The turning moment diagram for a multi cylinder IC engine is drawn to the following scales 1 cm = 15° crank angle, 1 cm = 3 k Nm. During one revolution of the crank the areas with reference to the mean torque line are 3.52, (-) 3.77, 3.62, (-) 4.35, 4.40 and (-) 3.42 cm². Determine mass moment of inertia to keep the fluctuation of mean speed within ± 2.5% with reference to mean speed. Engine speed is 200 rpm. 9

UNIT - V

18

- 5 a. Sketch and describe mechanisms for actuating the overhead and side mounted valve. Brief report with valid reason, which one is most preferred. 14
- b. Write a brief note about cam shaft. 4
- c. An eight-cylinder, four-stroke engine of 9 cm bore and 8 cm stroke with a compression ratio of 7 is tested at 4500 rpm on a dynamometer which has 54 cm arm. During a 10 min test the dynamometer scale beam reading was 42 kg and the engine consumed 4.4 kg of gasoline having a calorific value of 44000 kJ/kg. Air 27 °C and 1 bar was supplied to the carburetor at the rate of 6 kg/min. Find; 14
 - i) The brake power delivered
 - ii) The brake mean effective pressure
 - iii) The brake specific fuel consumption
 - iv) The brake specific air- consumption
 - v) The brake thermal efficiency
 - vi) The volumetric efficiency
 - vii) The air-fuel ratio

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