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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belgaum)
Fourth Semester, B.E. - Automobile Engineering
Semester End Examination; June/July - 2015
Automotive Engines and Components

Time: 3 hrs   *Max. Marks: 100*

Note: Answer **FIVE** full questions, selecting **ONE** full question from each **Unit**.

UNIT - I

1. a.	Write a note on History of Automobiles.	4
b.	Give the classifications of Heat Engines.	4
c.	With a neat sketch, explain the working principle of Four stroke S.I. Engine.	8
d.	Differentiate between SI and CI engines.	4
2 a.	Explain the merits and demerits of Petrol Engines.	6
b.	Discuss the differences between ideal and actual valve timing diagram of a four stroke SI engines, duly mentioning the effects of mechanical and dynamic factors.	8
c.	Give the comparison for two stroke and four stroke engines.	6

UNIT - II

3 a. Describe the following with respect to function and constructional materials used for;   **12**

   i) Cylinder Block   ii) Cylinder Head   iii) Crank case

b. With a neat sketch explain functionalities of different parts of cylinder block.   **8**

4 a. Sketch and Explain: **8**

   i) Effect of firing order on exhaust manifold in a multi cylinder engine   ii) Reactive muffler.

b. Explain the factors considered while tuning exhaust and intake manifolds.   **6**

c. A four stroke diesel engine has the following specifications: Brake power = 5 kW; Speed = 1200 r.p.m.; Indicated mean effective pressure-0.35 N/mm^2; Mechanical efficiency = 80%. Determine: **6**

   (i) bore and length of the cylinder   (ii) thickness of the cylinder head.

UNIT - III

5 a. With a neat sketch explain the functionalities of parts of petrol engine piston.   **8**

b. Describe the methods of expansion control in piston.   **6**

c. Determine the thickness of a head of the cast iron piston for a single acting four stroke engine for the following data ; Cylinder bore = 100 mm ; Stroke = 125 mm ; Maximum gas pressure = 5 N/mm^2 Indicated mean effective pressure = 0.75 N/mm^2; mechanical efficiency = 80% ; Fuel consumption = 0.15 kg per brake power per hour; Higher calorific value of fuel = 42103 kJ/kg; Speed=2000r.p.m.   **6**

6. a What are the functions of piston rings to be performed in an engine?   **6**

b. With a neat sketch, explain the functions of cylinder liners. What is the difference between dry and wet liners? 6

c. What are the essential requirements to be satisfied by materials for the following automobile engine components; i) Piston   ii) Piston rings   iii) Cylinder block   iv) Crank Shaft 8

UNIT - IV

7 a. Why connecting rod is necessary in multi cylinder engines? 2

b. With a neat sketch explain different arrangements of connecting piston and connecting rod. 8

c. Design a I - Section of the connecting rod for an I.C. engine running at 1800 r.p.m. and developing a maximum pressure of 3.15 N/mm^2 The diameter of the piston is 100 mm ; mass of the reciprocating parts per cylinder 2.25 kg; length of connecting rod 380 mm; stroke of piston 190 mm and compression ratio 6 : 1. Take a factor of safety of 6 for the design. Take length to diameter ratio for bearing as 1.3and small end bearing as 2 and the corresponding bearing pressures as 10 N/mm^2 and 15 N/mm^2.The density of material of the rod may be taken as 8000 kg/m^3 and the allowable stress in the bolts as 60 N/mm^2 and in cap as 80 N/mm^2. The rod is to be of I-section for which you can choose your own Proportions. 10

8 a. What do you understand by engine balancing? 4

b. What are the methods of minimizing the crank shaft torsional vibrations, Explain briefly. 8

c. Sketch a typical crank shaft used for a four cylinder engine. Indicate clearly the position of pins and journals and the provision for lubrication, What are the materials used for crank shafts? 8

UNIT - V

9 a. With a neat sketch, explain variable valve timing mechanism. 6

b. Explain the advantages of using sodium cooled valve. 4

c. Design the various components of the valve mechanism for a horizontal diesel engine for the following data: Bore =140 mm ; Stroke = 270 mm ; Power = 8.25 kW ; Speed - 475 r.p.m.; Maximum gas pressure = 3.5 N/mm^2. 10

10a. Explain the functions of timing gears and timing chain. 4

b. List various types of side cam shaft and over head cam shaft mechanisms. Explain with simple sketches any two in each case. 6

c. Write a note on Morse test. 4

d. During 15 minutes trial of an internal combustion engine of 2-stroke single cylinder type the total 4 kg fuel is consumed while the engine is run at 1500 rpm. Engine is cooled employing water being circulated at 15 kg/min with its inlet and exit temperatures as 27°C and 50°C. The total air consumed is 150 kg and the exhaust temperature is 400°C. The atmospheric temperature is 27°C. The mean specific heat of exhaust gases may be taken as 1.25 kJ/kg K. The mechanical efficiency is 0.9. Determine the brake power, brake specific fuel consumption and indicated thermal efficiency. Also draw energy balance on per minute basis. Brake torque is 300 Nm and the fuel calorific value is 42 MJ/kg. 4

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