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**Fifth Semester B.E. Degree Examination, Dec.2016/Jan.2017**  
**Automotive Engines and Components**

Time: 3 hrs.

Max. Marks:100

**Note: 1. Answer any FIVE full questions, selecting atleast TWO questions from each part.**  
**2. Use of Design data hand book is permitted.**

**PART – A**

- 1 a. Give a brief history of automobile. (06 Marks)  
b. Compare SI and CI engine. (04 Marks)  
c. With a neat sketch explain the working principle of four stroke petrol engine. (10 Marks)
- 2 a. Briefly explain theoretical scavenging processes. (06 Marks)  
b. With a neat sketch explain the different types of scavenging system. (06 Marks)  
c. With a neat sketch explain the port timing diagram of four stroke diesel engine. (08 Marks)
- 3 a. With neat sketch explain dry liners and wet liners. (06 Marks)  
b. A four stroke diesel engine has the following specifications. Brake power = 5 KW, speed = 1200 rpm, indicated mean effective pressure = 0.35 MPa, mechanical efficiency = 80%. Determine : i) bore and length of the cylinder ii) thickness of the cylinder head. [Taking  $C = 0.1$  and  $\sigma_t = 42$  MPa]. (10 Marks)  
c. List the main components of IC engine. (04 Marks)
- 4 a. Write a note on :  
i) Absorber type muffler  
ii) Baffle type muffler  
iii) Resonance type muffler (12 Marks)  
b. With a neat sketch explain inlet and exhaust manifold. (08 Marks)

**PART – B**

- 5 a. Write a note on :  
i) Auto-thermic piston  
ii) Cam ground piston. (06 Marks)  
b. With a neat sketch explain the working of the compression ring. (04 Marks)  
c. Determine the thickness of piston head, radial thickness of piston ring and diameter of piston pin for the following data :  
i) Cylinder bore = 100mm, ii) Maximum gas pressure = 5 MPa iii) IMEp = 0.75 MPa  
iv) mechanical efficiency = 80% v) fuel consumption = 0.15 kg per brake power per hour, Higher calorific value of fuel = 42000 kJ/kg, speed = 2000 rpm. (Assume  $\sigma_t$  for cast iron = 38 MPa). (10 Marks)
- 6 a. Write the different forces acting on the Connecting Rod. (04 Marks)  
b. Write a note on :  
i) Offset connecting rod  
ii) Piston pin bearing. (08 Marks)  
c. With a neat sketch explain the construction of connecting rod. (08 Marks)

- 7 a. Briefly explain types, material and manufacturing of an IC engine crank shaft. (06 Marks)  
b. Briefly explain bearing pressure and stress in crankshaft. (04 Marks)  
c. A force of 120 kN acts tangentially on the crankpin of an overhang crank. The axial distance between the centre of the crankshaft journal and the crankpin is 400 mm and the crank is 500 mm long. Determine : i) diameter and length of the crankpin ii) diameter of the shaft journal. Assume safe bearing pressure = 5 MPa, bending stress = 65 MPa, principal stress in the shaft journal = 65 MPa. (10 Marks)
- 8 a. Write a note on following with sketch : i) valve cooling ii) valve springs. (08 Marks)  
b. With a neat sketch explain overhead valve operating mechanism. (08 Marks)  
c. The conical valve of an IC engine is 60 mm in diameter and is subjected to a maximum gas pressure of 4 MPa. The safe stress in bending for the valve material is 46 MPa. The valve is made of steel for which  $K = 0.42$ . The angle at which the valve disc seat is tapered is  $30^\circ$ . Determine : i) thickness of the valve head ii) maximum lift of the valve. (04 Marks)

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