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Fifth Semester B.E. Degree Examination, June/July 2015
Automotive Engine 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. Discuss briefly the historical development of automobiles. (10 Marks)
- b. With neat sketches, briefly explain the theoretical and actual valve timing diagram for four stroke SI engine. (10 Marks)
- 2 a. With suitable sketches, explain the working of a two stroke petrol engine. (08 Marks)
- b. Explain the different types of Scavenging systems, with neat sketches. (12 Marks)
- 3 a. Discuss the salient features of
i) Cylinder block and head ii) Crank case. (08 Marks)
- b. Determine the dimensions of a cylinder for a vertical four stroke CI engine from following data: BP = 4.5kW, Speed = 1400rpm, $I_{mep} = 0.35$ MPa, $\eta_{mech} = 80.10$ (12 Marks)
- 4 a. With the help of suitable sketches, explain the various types of mufflers used in IC engines. (10 Marks)
- b. Define firing order. Briefly discuss the factors to be considered for deciding the optimum firing order of an engine. (10 Marks)

PART – B

- 5 a. What is Piston clearance? Why it is necessary? (06 Marks)
- b. Design a cast iron piston for a 4-stroke single acting engine from the following data:
Cylinder bore = 100mm, Stroke length = 120mm, Gas pressure = 5 MPa, $B_{mep} = 0.5$ MPa,
Speed = 2200 rpm, Fuel consumption = 0.15 kg/kW/hr. (14 Marks)
- 6 a. Describe the functions, materials used and construction of a connecting rod. (06 Marks)
- b. Design a connecting rod of an IC engine running at 1800 rpm and developing a maximum pressure of 3.15 N/mm². Diameter of Piston = 100mm, Mass of reciprocating parts per cylinder = 2.25 kg, Length of connecting rod = 380mm, Stroke of Piston = 190mm, Compression ratio = 6:1. Take a FOS of '6' for the design. Take length to diameter ratio for bearing as 1.3 and small end bearing as 2 and corresponding bearing pressure as 10 N/mm² and 15 N/mm². Density of connecting rod material = 8000 kg/m³ and allowable stresses in bolt as 60 N/mm² and in cap as 80 N/mm². Use Rankines formula for which numerator constant may be taken as 320 N/mm² and denominator constant as $1/7500$. The rod is to be of I-section. (14 Marks)
- 7 a. Describe the functions, materials used and construction of a crankshaft. (10 Marks)
- b. Explain the vibration damper, with a neat sketch. (06 Marks)
- c. Write a short note on manufacturing of a crankshaft. (04 Marks)
- 8 a. With the help of neat sketch, discuss the temperature distribution in poppet valve. (08 Marks)
- b. Explain the following with a neat sketch:
i) Valve seats and guides ii) Valve springs. (12 Marks)