CBCS SCHEME

Seventh Semester B.E. Degree Examination, Feb./Mar.2022
Automotive Engine Components Design & Auxiliary Systems

Time: 3 hrs.   Max. Marks: 100

Note: 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Use of Design data hand book is allowed.*

Module-1

1 a. With simple sketches, explain the merits and limitations of,
   (i) Separate and Integral cylinder heads.
   (ii) Wet and Dry cylinder liners.   **(10 Marks)**

   b. A vertical four stroke CI engine has the following specifications:
   Brake power = 4.5 kW, Speed = 1200 rpm, imep = 0.35 N/mm^2, $\eta_{mech} = 0.80$.
   Determine the dimensions of the cylinder.   **(10 Marks)**

OR

2 a. With sketches, explain any four methods used to compensate thermal expansion in pistons.
                                                                        (08 Marks)

   b. Determine the thickness of head of a cast iron piston for a single acting 4-stroke engine for
   the following specifications: Cylinder bore = 100 mm, Stroke = 120 mm, bmep = 0.65 MPa,
   Maximum gas pressure = 5 MPa, Fuel consumption = 0.227 kg/kW-hr, Speed = 2200 rpm
   and Calorific value = 41870 kJ/kg.   **(12 Marks)**

Module-2

3 a. With a neat sketch, describe the function, material and construction of a connecting rod.
                                                                        (10 Marks)

   b. A reciprocating pump is used to raise the water against a heap of 165 kg, pump diameter is
   450 mm and piston rod is 1400 mm long. Calculate the diameter of the piston rod. Use
   Rankine constant $K = \dfrac{1}{7500}$, FOS = 10, pressure on the piston = 1.61 MPa.   **(10 Marks)**

OR

4 a. Describe the functions, materials and construction of a Crankshaft.   **(10 Marks)**
   b. Design an overhung Crankpin for an engine having the following particulars:
   Cylinder diameter = 300 mm, Stroke = 500 mm, Maximum explosion pressure = 1.8 MPa,
   Speed = 200 rpm, Permissible bending stress for pin = 1000 MPa and
   Permissible bending stress = 85 MPa.   **(10 Marks)**

Module-3

5 a. Explain with a neat sketch an over head value operating mechanism.   **(10 Marks)**
   b. Explain with a neat sketch value timing importance in an engine.   **(10 Marks)**

OR

6 a. With suitable sketches, explain the working of a two-stroke petrol engine. **(10 Marks)**
   b. With a neat sketch, explain theoretical scavenging process.   **(10 Marks)**

Module-4

7 a. Write a note on IC engine manifolds with neat sketches showing inlet and exhaust manifolds for a multi-cylinder engine. **(12 Marks)**

   b. With neat sketches, explain any two types of muffles used in IC engines. **(08 Marks)**

OR

8 a. Compare air cooling and water cooling systems. **(08 Marks)**

   b. Explain with a sketch, the functioning of thermostat assisted cooling system. **(12 Marks)**

Module-5

9 a. Enlist and discuss the important properties of a lubricant (any five). **(10 Marks)**

   b. Discuss different types of lubricating oil filters commonly used. **(10 Marks)**

OR

10 a. Explain supercharging with a diagram of thermodynamic cycle. **(10 Marks)**

   b. Explain turbocharging of two stroke engine with a neat sketch. **(10 Marks)**

* * * * *