



CBCS SCHEME

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15AU72

Seventh Semester B.E. Degree Examination, June/July 2019 Automotive Engine Components Design and Auxiliary Systems

Time: 3 hrs.

Max. Marks: 80

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of design data handbook is permitted.*

Module-1

- 1 a. Explain the various types of cylinder liners? (04 Marks)
b. A four stroke diesel engine has the following specifications:
Brake power = 5 kW; Speed = 1200 rpm; Indicated mean effective pressure = 0.35 N/mm^2 ;
Mechanical efficiency = 80%.
Determine : 1. Bore and length of the cylinder ; 2. Thickness of the cylinder head and
3. Size of studs for the cylinder head. (12 Marks)

OR

- 2 Design a cast iron piston for a single acting four stroke engine for the following data:
Cylinder bore = 100mm, Stroke = 125 mm, max 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 = $42 \times 10^3 \text{ kJ/kg}$, Speed = 2000 rpm,
Any other data required for the design may be assumed. (16 Marks)

Module-2

- 3 Design a connecting rod for four stroke petrol engine, with the following data : Piston
diameter = 0.10m, Stroke = 0.14m, Length of connecting rod, centre to centre = 0.315m,
weight of reciprocating parts = 18.2 N, Speed = 1500 rpm with possible over speed of 2500,
compression ratio = 4:1, probable maximum explosion pressure = 2.45 MPa. (16 Marks)

OR

- 4 Design a side or overhung crankshaft for a 250mm × 300 mm gas engine. The weight of the
flywheel is 30 kN and explosion pressure is 2.1 N/mm^2 . The gas pressure at the maximum
torque is 0.9 N/mm^2 , when the crank angle is 35° from I.D.C. The connecting rod is
4.5 time the crank radius. Design the crankshaft when the crank is at dead centre. (16 Marks)

Module-3

- 5 Design a rocker arm for the exhaust valve of a four stroke I.C. Engine from the following
data:
Diameter of the valve head = 80 mm, Lift of the valve = 25mm, Mass of associated parts
with valve = 0.4 kg, Angle action of cam shaft = 110° RPM of the crank shaft = 1500.
From the probable indicator diagram it has been observed that greatest back pressure when
the exhaust valve opens is 0.4 N/mm^2 and the greatest suction pressure is 0.02 N/mm^2 below
atm. The rocker arm is to be of I-section and the effective length of each arm may be taken
as 180 mm. The angle between two arms being 135° . (16 Marks)

OR

- 6 a. Define following :
(i) Delivery ratio (ii) Scavenging efficiency (iii) Trapping efficiency. (09 Marks)
b. What are the different types of pumps used for scavenging? Explain. (07 Marks)

Module-4

- 7 a. Differentiate between the intake and exhaust manifold. (03 Marks)
b. Enumerate the different types of mufflers? Sketch and explain any two mufflers. (08 Marks)
c. Sketch and explain a heavy duty air filter. (05 Marks)

OR

- 8 a. Mention the effects of overcooling of an engine. (03 Marks)
b. Compare the merits and demerits of air cooling and water cooling. (08 Marks)
c. What is thermostat? Explain with sketch any one type. (05 Marks)

Module-5

- 9 a. Explain
(i) Boundary lubrication (ii) Hydrodynamic lubrication (08 Marks)
(iii) Elasto-hydrodynamic lubrication
b. List and explain the important properties of lubricating oils. (04 Marks)
c. Mention the different oil filter. Explain the cartridge type oil filter. (04 Marks)

OR

- 10 a. What is supercharging? List the advantages and disadvantages. (06 Marks)
b. Explain the effects of supercharging on :
(i) Power output
(ii) Mechanical efficiency
(iii) Fuel consumption. (10 Marks)
