

CBCS SCHEME

USN

--	--	--	--	--	--	--	--	--	--

17AU72

Seventh Semester B.E. Degree Examination, Jan./Feb. 2021 Automotive Engine Components Design and Auxiliary System

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of data handbook is permitted and assume suitable data if necessary.

Module-1

- 1 a. Discuss different types of cylinder liners. What are their comparative advantages? Discuss various liner troubles. (10 Marks)
- b. Determine the dimensions of a cylinder for a vertical 4 stroke SI engine from the following data :
- | | |
|---------------|-------------------------|
| Brake power | = 4.5kW |
| Speed | = 1200rpm |
| imep | = 0.35N/mm ² |
| η_{mech} | = 0.80. |
- (10 Marks)

OR

- 2 a. What are the functions which the Piston rings are required to perform? With the help of suitable sketches. Explain the constructional features of various types of Piston rings. (10 Marks)
- b. Determine the thickness of head of a cast iron piston for a single acting 4-stroke engine from the following data :
- | | |
|----------------------|--------------------------|
| Cylinder bore | = 100mm |
| Stroke | = 120mm |
| BMEP (P_m) | = 0.65 N/mm ² |
| Maximum gas pressure | = 5 N/mm ² |
| Fuel consumption | = 0.227 kg/BP |
| Speed | = 2200 rpm |
| Calorific value | = 41870 kJ/kg. |
- (10 Marks)

Module-2

- 3 a. With neat sketch illustrate the function, material and construction of a connecting rod. (10 Marks)
- b. Determine the cross section of a connecting rod (I section) for a high speed IC engine using following data :
- | | |
|--------------------------------------|----------|
| Cylinder bore | = 125mm |
| Length of connecting rod | = 300mm |
| Max gas pressure | = 3.5MPa |
| Assume compressive stress σ_c | = 330MPa |
| fos | = 5. |
- (10 Marks)

OR

- 4 a. Write a justification note on selection of materials and heat treatment of a crank shaft. (10 Marks)
- b. A force of 120kN acts tangentially on the crank pin of an overhang crank. The axial distance between the centre of the crankshaft journal and the crank pin is 400mm and the crank is 500mm long.
Determine : i) Diameter and length of the crankpin journal
ii) Diameter of the shaft journal
- Given that : Safe bearing pressure = 5 MPa
Bending stress = 65 MPa
Principal stress in the shaft journal = 65MPa. (10 Marks)

Module-3

- 5 a. Describe in-detail various types of variable valve timing technologies. Discuss also their practical applications. (10 Marks)
- b. Determine the valve lift and valve dimensions of an engine from the following data :
- Max. gas pressure = 5N/mm^2
Cylinder bore diameter = 80mm
Gas velocity = 1500m/min
Mean – Piston speed = 300m/min
Allowable stress = 42N/mm^2
Valve seat angle = 33° . (10 Marks)

OR

- 6 a. Describe with a neat sketch, the working principle of 2 stroke SI engine with PV diagram. (10 Marks)
- b. Define scavenging and compare the different scavenging systems of 2 stroke engine. (10 Marks)

Module-4

- 7 a. List the various types of air filters, explain an oil bath-air cleaner with a neat sketch. (10 Marks)
- b. Write comprehensive note on : i) Spark arresters ii) Waste heat recovery. (10 Marks)

OR

- 8 a. Clarify the necessity of engine cooling. Summarize the consequences of over cooling and overheating of an engine. (10 Marks)
- b. Name different methods of engine cooling. Illustrate your answer with a sketch of the pump circulation water cooling system. (10 Marks)

Module-5

- 9 a. Enumerate the functions of a lubrication system and analyze the factors effecting consumption of lubricating oils. (10 Marks)
- b. Explain the full pressure type of dry sump lubrication system with a neat sketch. And mention their merits. (10 Marks)

OR

- 10 a. Explain the concept of supercharging and turbocharging with the help of a neat thermodynamic cycle. (10 Marks)
- b. Describe need for supercharger and explain modifications required in engine for supercharging. (10 Marks)
