

CBCS SCHEME

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15AU72

Seventh Semester B.E. Degree Examination, Jan./Feb. 2021

Automotive Engine Components Design and Auxiliary System

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With a neat sketch, explain different types of cylinder head. (08 Marks)
- b. The bore of a cylinder of the 4-stroke diesel engine is 150mm. The maximum gas pressure inside the cylinder is limited to 3.5MPa. The cylinder head is made of grey cast iron FG 200 ($S_{ut} = 200\text{N/mm}^2$) and factor of safety 45. Evaluate the thickness of cylinder head. studs are used to fix the cylinder head to the cylinder and obtain a leak proof joint. They are made of steel Fe E250 ($S_{yt} = 250\text{N/mm}^2$) and factor of safety is 5. Calculate :
- Number of studs
 - Nominal diameter of studs
 - Pitch of studs. (08 Marks)

OR

- 2 Design a cast iron piston for a single acting four stroke diesel engine with following data :
- | | |
|-----------------------------------|-------------------------|
| Cylinder bore | = 300mm |
| Length of stroke | = 450mm |
| Speed | = 300rpm |
| Indicated mean effective pressure | = 0.85MPa |
| Maximum gas pressure | = 5 MPa |
| Fuel consumption | = 0.30 kg per BP per hr |
| Higher calorific value of fuel | = 44000 kJ/kg. |
- Assume suitable data if required and state the assumptions you make. (16 Marks)

Module-2

- 3 a. Evaluate the dimensions of cross-section of connecting rod for diesel engine with following data :
- | | |
|--------------------------|---------|
| Cylinder bore | = 100mm |
| Length of connecting rod | = 350mm |
| Maximum Gas pressure | = 4 MPa |
| Factor of safety | = 6. |
- (10 Marks)
- b. Illustrate with suitable sketch the buckling of connecting rod. (06 Marks)

OR

- 4 a. Design an overhung crankshaft for a 300 × 350mm single cylinder vertical engine using following data :
- | | |
|---|--------------------------|
| Maximum gas pressure | = 2.5 MPa |
| (L/r) ratio | = 4.5 weight of flywheel |
| Cam belt pulley | = 10 kN |
| Total belt pull | = 5kN |
| Width of hub for flywheel Cam-belt pulley | = 150mm. |
- The belts are in horizontal directions. Assume suitable data and state the assumption you make. Assume crank is at TDC and maximum bending moment and no torsional moment. (12 Marks)
- b. Write a note on type of crankshaft. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. Write a note on following with sketch :
i) Valve cooling (08 Marks)
ii) Valve springs. (08 Marks)
- b. With a neat sketch explain over head valve operating mechanism. (08 Marks)

OR

- 6 a. With a neat sketch explain the different types of scavenging system. (08 Marks)
- b. With a neat sketch explain the port timing diagram of four stroke diesel engine. (08 Marks)

Module-4

- 7 a. Write a note on :
i) Absorber type muffler (08 Marks)
ii) Baffle type muffler. (08 Marks)
- b. With a neat sketch explain inlet and exhaust manifold. (08 Marks)

OR

- 8 a. What do you mean by area of heat flow? Explain. (04 Marks)
- b. Write note on :
i) Antifreeze solution
ii) Thermodynamics of forced circulation
iii) Piston and cylinder temperature. (12 Marks)

Module-5

- 9 a. Explain with sketch, positive crank case ventilation system. (06 Marks)
- b. With neat sketch, explain full pressure type of wet sump lubrication system used in automotive engine. (10 Marks)

OR

- 10 a. Compare the supercharger with turbo charger. (06 Marks)
- b. Explain with suitable sketch, turbo charger with an inter cooler for an automotive engine. (10 Marks)
