



USN _____
Date _____

Seventh Semester B.E. Degree Examination, Aug./Sept.2020
Automotive Engine Component Design and Auxiliary

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of machine DDHB is permitted.

Module-1

- 1 a. List out the components of Engine. Explain any three components of an Engine with a neat sketch. (08 Marks)
b. Write short notes on: i) Cast iron cylinder block ii) Aluminium cylinder block
iii) Cylinder liners. (08 Marks)

OR

- 2 a. The following data is given for the piston of a four stroke diesel engine:
Cylinder bore = 250mm
Bearing pressure at small end of C.R = 15MPa
Maximum gas pressure = 4MPa
Length of Piston pin in bush of small end = 0.45D
Ratio of inner to outer diameter of Piston pin = 0.6
Mean diameter of piston boss = $1.4 \times$ outer diameter of piston pin
Allowable bending stress for piston pin = 84N/mm^2
Calculate:
i) Outer diameter of piston pin ii) Inner diameter of piston pin
iii) Mean diameter of piston boss iv) Check the design for bending stress. (10 Marks)
b. Write a short notes on compensation of thermal expansion in pistons. (06 Marks)

Module-2

- 3 a. Derive an expression for cross-section of a connecting rod. (08 Marks)
b. Determine the dimensions of cross-sections of the connecting rod for a diesel engine with the following data:
Cylinder bore = 100mm
Length of connecting rod = 350mm
Maximum gas pressure = 4MPa
Factor of safety = 6 (08 Marks)

OR

- 4 Design a centre crank shaft for a single-cylinder vertical engine using the following data:
Cylinder bore = 125mm
(L/r) ratio = 4.5
Maximum gas pressure = 2.5MPa
Length of stroke = 150mm
Weight of flywheel cum belt pulley = 1kN
Total belt pull = 2kN
Width of hub for flywheel cum belt pulley = 200mm

The torque on the crankshaft is maximum when the crank turns through 25° from the top dead centre and at this position the gas pressure inside the cylinder is 2Mpa. The belts are in the horizontal direction. Assume suitable data and state the assumptions you make.

(16 Marks)

Module-3

- 5 a. Explain with a neat sketch the over-head valve operating mechanisms. (06 Marks)
- b. Design an exhaust valve for a horizontal diesel engine using the following data:
- Cylinder bore = 150mm
 Length of stroke = 275mm
 Engine speed = 500rpm
 Maximum gas pressure = 3.5MPa
 Seat angle = 45° , calculate
- Diameter of the valve port
 - Diameter of the valve head
 - Thickness of the valve head
 - Diameter of the valve system
 - Maximum lift of the valve. (10 Marks)

OR

- 6 a. Analyze the port timing of two stroke SI engine with a neat sketch. (08 Marks)
- b. What is scavenging process? List the different methods. Explain any one of them with a neat sketch. (08 Marks)

Module-4

- 7 a. Explain the following with a neat sketch:
- Baffle type Muffler
 - Wave cancellation Muffler
 - Resonance type Muffler Absorption type Muffler (10 Marks)
- b. Write short notes on spark arresters. (06 Marks)

OR

- 8 a. Explain Thermosyphon cooling system with a neat sketch. (08 Marks)
- b. Write short notes on: i) Air cooling ii) Water cooling and list out the advantages and disadvantages of the same. (08 Marks)

Module-5

- 9 a. Discuss the functions of lubrication system. (06 Marks)
- b. Explain briefly the:
- Petroil lubrication system
 - Dry sump lubrication system. (10 Marks)

OR

- 10 a. Describe the concept of supercharging on an engine with the help of a P-V-diagram. (08 Marks)
- b. Write short notes on turbocharging of two stroke and four stroke engines. (08 Marks)
