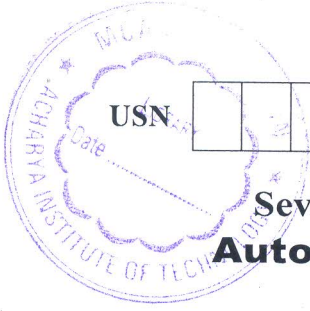


CBCS SCHEME



USN

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

15AU72

Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 Automotive Engine Components Design & Auxiliary Systems

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. What is a need of cylinder liner? Briefly explain two type liners. (08 Marks)
b. The bore of a cylinder of 4 stroke diesel engine is 150 mm. The maximum gas pressure inside the cylinder is limited to 3.5 MPa. The cylinder head is made of grey Cast Iron FG200 ($S_{ut} = 200 \text{ N/mm}^2$) and FOS is 5. Studs are used to fix cylinder head, made of steel ($S_{yt} = 250 \text{ N/mm}^2$) and FOS is 5. Find (i) Thickness of cylinder head (ii) Number of studs (iii) Nominal diameter of studs $K = 0.162$. (08 Marks)

OR

- 2 a. With a neat sketch, explain any two methods of compensation of thermal expansion in piston. (08 Marks)
b. The following data is given for the piston of a 4 stroke diesel engine:
Bore = 250 mm ; maximum gas pressure = 4 MPa ;
Bearing pressure at small end of connecting rod = 15 MPa ;
Length of piston pin in bush of small end = $0.45D$;
Ratio of inner to outer diameter of piston pin = $0.6m$;
Mean diameter of piston boss = $1.4 Y$; Outer diameter of piston pin.
Allowable bending stress for piston pin = 84 N/mm^2 .
Calculate :
(i) Outer diameter of piston pin
(ii) Inner diameter of piston pin
(iii) Check the design for bending stresses. (08 Marks)

Module-2

- 3 a. Derive the equation for Buckling of connecting rod. (08 Marks)
b. Determine the dimensions of cross section of the connecting rod for a diesel engine. With the following data :
Cylinder bore = 10 mm ; Length of connecting rod = 350 mm ;
Maximum gas pressure = 4 MPa ; FOS = 6 ; $\sigma_c = 330 \text{ N/mm}^2$ (08 Marks)

OR

- 4 a. With a neat sketch, explain vibration dampers. (06 Marks)
b. Design a centre Crankshaft at Top dead centre position. (10 Marks)

Module-3

- 5 a. What is a need of valve rotator? With neat sketch, explain free type valve rotators. (08 Marks)
b. With neat sketch, explain valve timing diagram of 4 stroke engine. (08 Marks)

OR

- 6 a. With neat sketch, explain working of 2 stroke SI engine with PV diagram. (08 Marks)
b. Explain following Scavenging parameters with suitable equations :
(i) Delivery ratio
(ii) Trapping Efficiency
(iii) Relative cylinder charge
(iv) Scavenging efficiency (08 Marks)

Module-4

- 7 a. With neat sketch, explain Baffle and absorber type muffler. (08 Marks)
b. With a neat sketch, explain spark arresters. (08 Marks)

OR

- 8 a. With neat sketch, explain thermo siphon cooling system. (08 Marks)
b. State the advantages and limitations of Air Cooling system. (08 Marks)

Module-5

- 9 a. With neat sketch, explain pressure feed (wet sump) type of lubrication system. (08 Marks)
b. Explain any 4 types of lubricants used in lubrication system. (08 Marks)

OR

- 10 a. With a neat sketch, explain turbo charger with an inter cooler for automotive engine. (10 Marks)
b. Explain supercharging. States the purpose of supercharging. (06 Marks)
