CBCS SCHEME

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15AU72

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

Time: 3 hrs. Max. Marks: 80

Note: 1. ***Answer any FIVE full questions..***
2. ***Use of Machine Design data handbook is permitted.***

1 a. What is a need of cylinder liner? Briefly explain dry type liner. **(06 Marks)**

b. The following data is given for a 4 stroke diesel engine :
Cylinder bore = 250mm, Length of stroke = 300mm, speed = 600 rpm, Indicated mean effective pressure = 0.6MPa, Mechanical efficiency = 80%, max gas pressure = 4 MPa, Fuel consumption = 0.25kg/BP/hr, Higher calorific value = 44000kJ/kg.
Assume that 5% of total heat developed in the cylinder is transmitted by piston. The piston is made of grey cast iron FG 200 (S_{ut} = 200N/mm^2) and K = 46.6 W/m/°C. The factor of safety is 5. The temperature difference between the center and the edge of the piston head is 220°C. Calculate :
i) Thickness of piston head by strength consideration
ii) Thickness of piston head by thermal consideration
iii) Which criteria decides the thickness of piston head? **(10 Marks)**

2 a. Name different types of Gaskets? Explain uses of gasket. **(06 Marks)**

b. The bore of a cylinder of 4-stroke diesel engine is 150mm. The max gas pressure inside the cylinder is limited to 3.5MPa. The cylinder head µ made of grey cast iron ($S_{\mu t}$ = 200 N/mm^2) and factor of safety is 5. Determine the thickness of the cylinder head, studs are used to fix the cylinder head to the cylinder and obtain a leak proof joint. They are made of steel (S_{yt} = 250 N/mm^2) and FOS is 5. Calculate :
i) Number of studs
ii) Nominal diameter of studs
iii) Pitch of studs. **(10 Marks)**

3 a. Explain bucking of connecting rod? **(06 Marks)**

b. Determine the dimensions of cross section of the connecting rod for a diesel engine with the following data.
Cylinder bore = 100mm, length of connecting rod = 350mm, Max gas pressure = 4MPa, FOS = 6. **(10 Marks)**

4 a. With neat sketch, explain vibration damper. **(06 Marks)**

b. The following data is given for a connecting rod engine speed = 1800rpm, Length of rod = 350mm, Length of stroke = 175mm, density of material = 7800 kg/m^3, Thickness of web or flange = 8mm. Assume the cross section is 'I', B = 4t, H = 5t. Calculate whipping stress in connecting rod. **(10 Marks)**

5 a. With a neat sketch, explain over head cam mechanism. **(08 Marks)**

b. State the necessity of valve rotator, with a neat sketch, explains free type of valve rotator. **(08 Marks)**

6 a. Name different flows of scavenging and explain any two types. **(08 Marks)**
b. Write a short notes on :
i) Delivery ratio
ii) Scavenging efficiency **(08 Marks)**

7 a. Explain briefly the components of an intake system of a engine. **(08 Marks)**
b. Write a short notes on :
i) Spark arrester
ii) Waste heat recovery **(08 Marks)**

8 a. With a neat sketch, explain thermostat water cooling system. **(08 Marks)**
b. State the advantages and limitation of water cooling system over air cooled system. **(08 Marks)**

9 a. With a neat sketch, explain pressure type of wet sump lubrication system used in automotive engine. **(10 Marks)**
b. Write a short note on additives and lubricity improver. **(06 Marks)**

10 a. State the limitations of super charging for petrol and diesel engines. **(06 Marks)**
b. With a neat sketch, explain turbo charger with an inter cooler for automotive engine. **(10 Marks)**

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