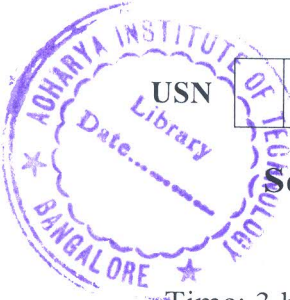


CBCS SCHEME



18MEA252

Second Semester M.Tech. Degree Examination, June/July 2019 Automobile System Design

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. What is the need of aerodynamically profiled body and explain.
i) Drag force
ii) Lift force
iii) Side force
iv) Pitching moment
v) Yawing moment. (12 Marks)
- b. Explain an engine spray formation. (08 Marks)

OR

- 2 a. What do you mean by direct injection system? Explain any two types of petrol injection system for SI engine. (10 Marks)
- b. With neat sketch, explain air injection system for diesel engines. (10 Marks)

Module-2

- 3 a. What are the requirements of a good combustion chamber for SI engines? (08 Marks)
- b. Explain any two different types of indirect combustion chambers of CI engines. (12 Marks)

OR

- 4 A four stroke diesel engine has the following specifications:
Brake power = 7.5kW
Speed = 1400rpm
Indicated Mean effective pressure = 0.35N/mm²
Maximum pressure = 3.5N/mm²
Mechanical efficiency = 80%
If the cylinder is made of cast iron, determine the cylinder dimensions. (20 Marks)

Module-3

- 5 Design a suitable cast iron piston for a single acting four stroke diesel engine from the following data:
Maximum gas pressure = 3.5MPa
Fuel consumption = 0.20kg/Brake power in kW/hour
Indicated Mean effective pressure = 0.85MPa
Speed = 300rpm.
Maximum permissible tension for cast iron for the design of head thickness is 30MPa and for the piston pin material is 120MPa. Bearing pressure for piston pin should not exceed 20MPa. Cylinder bore diameter is 300mm and length of stroke is 450mm. Assume further data required for the design. (20 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.

OR

- 6 Design a connecting rod for a petrol engine from the following data:
 Cylinder bore or diameter of piston = 100mm
 Length of connecting rod = 350mm
 Maximum gas pressure = 3N/mm^2
 Length of stroke = 150mm
 Engine speed = 1500rpm
 Weight of reciprocating parts = 25N
 Compression ratio 4:1
 Assume further data required for the design. (20 Marks)

Module-4

- 7 a. Explain the following gear boxes:
 i) Sliding – Mesh gear box
 ii) Constant-Mesh gear box. (10 Marks)
- b. Sketch a section through a sliding type gear box with four forward and one reverse speeds and explain clearly how the different speed ratios will be obtained in the following cases:
 Gear ratio on top gear = 1:1
 Gear ratio on third gear = 1.38:1
 Gear ratio on second gear = 2.24:1
 Gear ratio on first gear 3.8:1
 Gear ratio on reverse gear 3.8:1
 Assume counter shaft or layout shaft speed is half that of the engine speed and smallest gear is not to have less than 15 teeth. (10 Marks)

OR

- 8 a. Define the following related to vibrations:
 i) Damped natural frequency
 ii) Logarithmic decrement
 iii) Free vibration
 iv) Cycle
 v) Resonance
 vi) Forced vibration. (06 Marks)
- b. Explain vehicle vibration with
 i) Single degree of freedom
 ii) Free vibration. (14 Marks)

Module-5

- 9 a. What are the functions of automobile cooling system? (06 Marks)
 b. Describe with neat sketches forced circulation system and Thermo-Syphon water cooling system employed in cooling systems of automobiles. (14 Marks)

OR

- 10 a. Explain the following related to common emission control system:
 i) Crankcase emission control
 ii) Exhaust emission control. (10 Marks)
- b. Write a note on exhaust emissions testing. (10 Marks)

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