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M.E. / M.TECH. DEGREE EXAMINATIONS, MAY 2019

Second Semester

IC18202-INTERNAL COMBUSTION ENGINE DESIGN*(Internal Combustion Engineering)***(Regulation 2018)****Time: Three Hours****Maximum : 100 Marks**

Answer ALL questions

PART A - (10 X 2 = 20 Marks)

1. What are the factors to be considered for the selection of materials?
2. What do you mean by fatigue limit?
3. List out the essential material properties for valve design.
4. What are the forces acting on connecting rod?
5. Why is elliptical arm section used in rim type flywheel?
6. What are the design consideration for a cooling system?
7. List down the types of scavenging.
8. Which valve is larger in a four stroke IC engine? Why?
9. List out various CAD tools for a working drawing.
10. Specify the significance of CAD system.

PART B - (5 X16 = 80 Marks)

11. (a) Explain in detail about Noise, Vibration and Harshness and its control methods with neat sketch. **(16)**

(OR)

- (b) Briefly explain about choice of materials and principle of similitude. **(16)**
12. (a) Design a cast iron piston for a single acting four stroke engine for the following **(16)**
specifications: cylinder bore = 100 mm, stroke = 130 mm, maximum gas pressure = 5 N/mm², brake mean effective pressure = 0.8 N/mm², fuel consumption = 0.2 kg/kW-hr, speed = 2000 rpm. Mechanical efficiency = 80%; Higher calorific value of fuel = 42 × 10³ kJ/kg. Any other data required for the design may be assumed.

(OR)

- (b) Design an overhung crankshaft for single-cylinder vertical engine using the following data: Cylinder bore=120 mm, ratio of connecting rod to crank radius = 5, Maximum gas pressure = 5MPa, Length of stroke =150 mm, Weight of flywheel cum belt pulley = 1 kN, Total belt pull = 2 kN, Width of hub for flywheel cum belt pulley = 250 mm. The torque on the crankshaft is maximum when the crank turns through 30° from the TDC and at this position the gas pressure inside the cylinder is 2 MPa. **(16)**

13. (a) Explain in detail about design consideration for computer controlled fuel injection system with a neat sketch. **(16)**

(OR)

- (b) Design cast iron flywheel used for a four stroke I.C engine developing 200 kW at 300 rpm. The hoop or centrifugal stress developed in the flywheel is 5.2 MPa, the total fluctuation of speed is to be limited to 3% of the mean speed. The work done during the power stroke is $\frac{1}{3}$ more than the average work done during the whole cycle. The maximum torque on the shaft is twice the mean torque. The density of cast iron is 7200 kg/m^3 . **(16)**

14. (a) (i) Explain the scavenging arrangement of a marine engine? **(8)**
 (ii) Discuss the design consideration for port arrangement in two stroke engine? **(8)**

(OR)

- (b) Explain the design procedure of inlet and exhaust port system for two stroke engine with port diagram. **(16)**

15. (a) Describe the procedure of developing and working drawing of connecting rod using CAD software. **(16)**

(OR)

- (b) List out the steps for preparing a working drawing of a multi-cylinder engine crankshaft. Also draw a typical crankshaft for a four cylinder CI engine. **(16)**