

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
M. Tech. Supplementary, Winter 2017 - 18 Examination

Semester: 2
Subject Code: 03206151
Subject Name: Internal Combustion Engine Design

Date: 08/01/2018
Time: 2.00 pm to 4.30 pm
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

- Q.1** A) Discuss the methodology used for IC engine design. (05)
B) What is the basic philosophy involved in the design of cooling system? (05)
C) Explain the significance of firing order. (05)

- Q.2 Answer the following questions. (Attempt any three) (Each five mark) (15)**
A) What do you understand by yawing and pitching moments? Give your justification whether these parameters depends on firing order or not.
B) What do you mean by critical speed, how it is produced in IC engine?
C) Enlist various material used for piston. Also describe the piston design properties.
D) Why connecting rods are made of I-Section? Also discuss the material used for connecting rod.

- Q.3** A) Write the procedure to design the cross-section of connecting rod. (07)
B) Following data is given for the piston of a four stroke diesel engine: Cylinder bore = 250 mm; (08)
Material of piston rings = Grey Cast Iron; Allowable tensile stress = 100 N/mm²; Allowable radial pressure on cylinder wall = 0.03 MPa; Thickness of piston head = 42 mm; Number of piston rings = 4. Design Piston Rings and Piston Barrel.

OR

- B) The following data is given for the connecting rod of a diesel engine: Cylinder bore = 85mm; (08)
Length of connecting rod = 350 mm; Maximum gas pressure = 3 MPa; Factor of safety against buckling failure = 5; Length of stroke = 140 mm; Mass of reciprocating parts = 1.5kg; Engine speed = 2000 rpm; Density of connecting rod = 7800 kg/m³. Calculate: i) Dimensions of the cross-section of connecting rod ii) Magnitude of whipping stress.

- Q.4** A) Discuss the effects of fin geometry on performance of automotive radiator. (07)

OR

- A) A four cylinder in-line marine engine has cranks at interval of 90°. The speed of engine is 200 rpm. Each crank is 600 mm long and mass of reciprocating parts of each cylinder is 200 kg. The outer cylinders are 4m apart and inner cylinders are 2m apart and are place symmetrically between the outer cranks. Determine the firing order of the cylinder for the best balancing of the reciprocating masses. What would then be the magnitude of unbalanced couple? (07)
- B) Enlist the design consideration for cylinder block and cylinder head. (08)