

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
M.Tech. Summer 2017 - 18 Examination

Semester: 2**Subject Code: 03206151****Subject Name: Internal Combustion Engine Design****Date: 18/05/2018****Time: 2:00pm to 4:30pm****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. Explain Engine Torque v/s Speed characteristics. (05)
B. Describe the procedure to obtain engine displacement. (05)
It is expected to design a new spark-ignition engine for an automobile application. The engine is to have a rated power of 100 kW at 5500 rpm. A literature study has suggested that the specific fuel consumption at rated power will be approximately 300 gm/kW-hr. Finally, a volumetric efficiency of 86% at rated speed is assumed. Estimate displacement for these assumptions.
C. Explain: Engine Mapping. (05)
- Q.2** Answer the following questions. (Attempt any three) (15)
A. With neat sketch explain various lubricated joints in an engine.
B. Explain following process of engine development with suitable example: Rig Testing.
C. Describe step by step procedure for finding out dimensions of a I – section of a connecting rod.
D. With a neat sketch show typical temperature values found in an SI engine operating at normal steady state conditions.
- Q.3** A. A four cylinder in-line marine engine has cranks at interval of 90° . The speed of engine is 200 rpm. (07)
Each crank is 600 mm long and mass of reciprocating parts of each cylinder is 200 kg. The outer cylinders are 4 m apart and inner cylinders are 2 m apart and are placed symmetrically between the outer cranks. Determine the firing order of the cylinders for the best balancing of the reciprocating masses. What would then be the magnitude of unbalanced couple?
B. Describe the steps involved in the Engine Development Process. (08)

OR

- B. The cylinder of a four-stroke diesel engine has the following specifications: (08)
Brake power = 5 kW; Speed = 600 rpm; Indicated mean effective pressure = 0.5 MPa.
Clearly state and make suitable assumptions calculate: (i) bore and length of the cylinder liner, (ii) thickness of the cylinder liner, (iii) thickness of the cylinder head, (iv) size, number and pitch of studs.
- Q.4** A. Describe in detail the procedure for design of a centre crankshaft when the crank is at the top dead centre position and subjected to maximum bending moment and no torsional moment. (07)

OR

- A. Explain Thermal Mapping. (07)
- B. Design a cast iron piston for a single acting four-stroke diesel engine with the following data: (08)
Cylinder bore = 300 mm; Length of stroke = 450 mm; Speed = 300 rpm; Indicated mean effective pressure = 0.85 MPa; Maximum gas pressure = 5 MPa; Fuel consumption = 0.30 kg per BP per hr; Higher calorific value of fuel = 44 000 kJ/kg. Assume suitable data if required and clearly state the assumptions you make.