



C09-EE-406/C09-CHST-406

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BOARD DIPLOMA EXAMINATION, (C-09)  
MARCH/APRIL—2018  
DEEE—FOURTH SEMESTER EXAMINATION  
GENERAL MECHANICAL ENGINEERING

Time : 3 hours ]

[ Total Marks : 80

PART—A

3×10=30

**Instructions** : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Define shear modulus and state its SI units. 2+1=3
2. Draw stress-strain diagram for mild steel and name the salient points. 3
3. Write the formulae for polar moment of inertia for solid shaft and hollow shaft. 1½+1½=3
4. A solid shaft is required to transmit a torque of 35820 N-m. The shear stress in the shaft must not exceed 60 N/mm<sup>2</sup>. Calculate the size of the shaft. 3
5. List the operations involved in operating an IC engine. 3
6. Write any three advantages of fire-tube boiler over water-tube boiler. 3
7. Draw a simple sketch of IC engine and label its parts. 3

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8. State the function of (a) spark plug and (b) fuel injection pump. 1½+1½=3
9. How are the impellers arranged to produce high head and to deliver high discharge in centrifugal pump? 3
10. State the functions of a lubricant.

**PART—B**

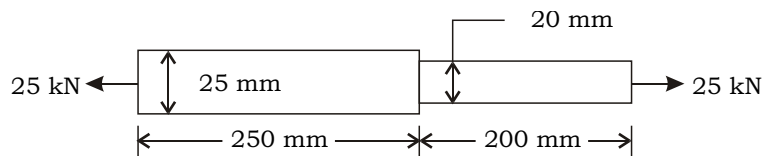
10×5=50

**Instructions :** (1) Answer *any five* questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. A steel bar is subjected to a tensile force as shown in the figure below. Determine the total elongation of the bar and stress in each section. Take  $E = 2 \times 10^5 \text{ N/mm}^2$  : 10



12. The following results are obtained from a tensile test on a MS specimen :

- (i) Diameter of the specimen = 20 mm
- (ii) Gauge length = 100 mm
- (iii) Extension at a load of 80 kN = 0.125 mm
- (iv) Load at yield point = 110 kN
- (v) Maximum load = 185 kN
- (vi) Final elongation = 30 mm
- (vii) Diameter of neck = 12.6 mm

Calculate (a) Young's modulus, (b) stress at yield point, (c) the ultimate tensile stress, (d) the percentage elongation and (e) the percentage reduction in area. 2×5=10

- 13.** A solid steel shaft 100 mm diameter transmits power at 150 r.p.m. If the maximum shear stress induced in it is  $25\text{N/mm}^2$ , calculate (a) the power transmitted in kW and (b) the value of shear stress at a radial distance of 30 mm from its centre. 5+5=10
- 14.** Explain with the help of a line sketch, the working principle of a four-stroke petrol engine. 10
- 15.** Describe the function of economizer with a neat sketch. 10
- 16.** Explain the working of Parson's reaction turbine with a neat sketch. 10
- 17.** Explain the working of Kaplan turbine with a neat sketch. 10
- 18.** What is priming in the centrifugal pump? Why is it necessary? 7+3=10

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