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BOARD DIPLOMA EXAMINATION, (C-20)

MAY—2023

DEEE - FOURTH SEMESTER EXAMINATION

GENERAL MECHANICAL ENGINEERING

Time : 3 Hours ]

[ Total Marks : 80

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**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. A steel rod 20 mm diameter and 600 mm long is subjected to an axial pull of 40 kN. Determine the elongation of the rod if  $E = 2 \times 10^5 \text{ N/mm}^2$ .
2. Define Hooke's law and Poisson's ratio.
3. Write down torsion equation and expand the terms involved with units.
4. Define polar moment of inertia. Find the polar moment of inertia of a circle of radius 250 mm.
5. Write any three advantages of 2-stroke engine over 4-stroke engine.
6. State the functions of (a) piston rings and (b) connecting rod.
7. What is the function of a boiler?
8. State the function of (a) economiser and (b) safety valve.
9. How are impellers arranged to produce high head and to deliver high discharge in centrifugal pump?
10. Write the differences between single acting and double acting reciprocating pumps.

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**PART—B**

8×5=40

- Instructions :** (1) Answer **all** questions.  
(2) Each question carries **eight** marks.  
(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

- 11.** (a) Explain in detail about tensile test on mild steel specimen with salient points in stress-strain diagram.

**(OR)**

- (b) A bar of 25 mm diameter is subjected to a pull of 50 kN. The measured extension over a gauge length of 200 mm is 0.08 mm and the change in diameter is 0.0028 mm. Then calculate the Poisson's ratio and the values of three elastic moduli Young's modulus, Modulus of rigidity and Bulk Modulus.

- 12.** (a) A solid steel shaft 100 mm diameter transmits power at 150 rpm. If the maximum shear stress induced in it is  $25 \text{ N/mm}^2$ , calculate (i) the power transmitted in kW and (ii) the value of shear stress at a radial distance of 30 mm from its centre.

**(OR)**

- (b) Find the diameter of solid circular shaft required to transmit 750 kW at 250 rpm. It is specified that the maximum shear stress must not exceed  $50 \text{ N/mm}^2$  and angle of twist must not exceed 2 degrees in a length of 2 m. Take  $G = 0.8 \times 10^5 \text{ N/mm}^2$ .

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- 13.** (a) Explain the working of coil ignition system with a neat sketch.

**(OR)**

- (b) Explain the working principle of 4-stroke petrol engine with a neat sketch.

- 14.** (a) Explain the working of Pelton wheel with a neat sketch.

**(OR)**

- (b) Explain the working of De-Laval steam turbine with a neat sketch.

15. (a) Name the parts of a centrifugal pump with a neat sketch and mention their functions.

**(OR)**

- (b) What is a hydraulic pump? Explain the working of a double acting reciprocating pump with a neat sketch.

**PART—C**

10×1=10

- Instructions :** (1) Answer the following question.  
(2) The question carries **ten** marks.  
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

16. List out various boiler mountings and accessories. Explain about any two boiler mountings and any two boiler accessories along with neat sketches.

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