



C09-EE-406/C09-CHST-406

3478

**BOARD DIPLOMA EXAMINATION, (C-09)**  
**OCT/NOV—2016**  
**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. A cylindrical bar is 20 mm in diameter and 1 m long. During the tensile test it was found that the longitudinal strain is 4 times the lateral strain. Calculate the bulk modulus if its elastic modulus is  $1 \times 10^5 \text{ N/mm}^2$ . 3

2. Define Poisson's ratio and write the mathematical expression.  $1\frac{1}{2}+1\frac{1}{2}=3$

3. A solid shaft is to transmit 350 kW power at 110 r.p.m. The maximum shear stress is induced must not exceed  $90 \text{ N/mm}^2$ . Find the diameter of the shaft. 3

4. A steel rod 2.4 m long and 15 mm diameter is used as a long wrench to unscrew a plug at the bottom of a pool of water. If it requires 60 N-m of torque to loose the plug, compute the angle of twist of the rod. Take  $G = 0.08 \times 10^5 \text{ N/mm}^2$ . 3

5. Define (a) BDC, (b) TDC and (c) stroke length.  $1+1+1=3$

- \* 6. List out any six parts of petrol engine.  $\frac{1}{2} \times 6 = 3$
7. What are the functions of the following boiler accessories? 1+1+1=3
- (a) Economizer
- (b) Air preheater
- (c) Superheater
8. What is the function of governor? 3
9. Write the classification of bearings. 3
10. Write the classification of multistage centrifugal pump. 3

**PART—B**

$10 \times 5 = 50$

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

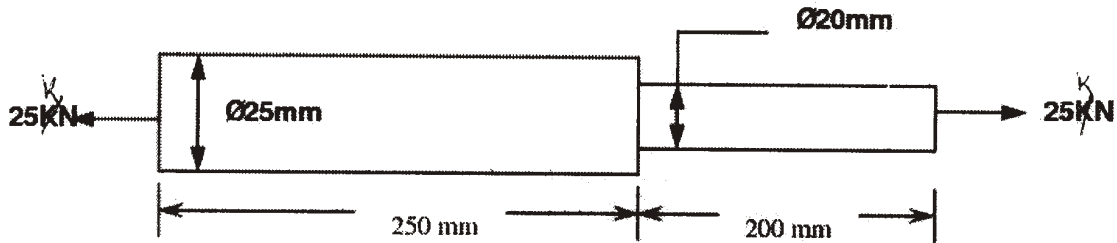
- (i) Diameter of the specimen = 20 mm
- (ii) Gauge length = 100 mm
- (iii) Extension at a load of 80 kN = 0.125 mm
- (iv) Load at yield point = 110 kN
- (v) Maximum load = 185 kN
- (vi) Final elongation = 30 mm
- (vii) Diameter of neck = 12.6 mm

Calculate the following :

$2 \times 5 = 10$

- (a) Young's modulus
- (b) Stress at yield point
- (c) The ultimate tensile stress
- (d) The percentage elongation
- (e) The percentage reduction in area

- \* 12. 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



13. A solid shaft of 100 mm diameter transmits 75 kW power at 150 RPM. Taking modulus of rigidity of  $0.85 \times 10^5 \text{ N/mm}^2$ , determine—
- torque on the shaft; 4
  - maximum shear stress induced; 3
  - shear stress at a radius of 30 mm. 3
14. Explain the working of Parsons reaction turbine with a neat sketch. 10
15. Explain the working of Francis turbine with a neat sketch. 10
16. (a) Differentiate between fire-tube and water-tube boilers. 5  
 (b) List the various mountings used in boiler. 5
17. Explain the four-stroke CI engine with a neat sketch. 10
18. Draw a line diagram of a centrifugal pump indicating various components and hydraulic heads. 7+3=10

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