



C09-EE-406/C09-CHST-406

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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 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

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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

10×5=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 :

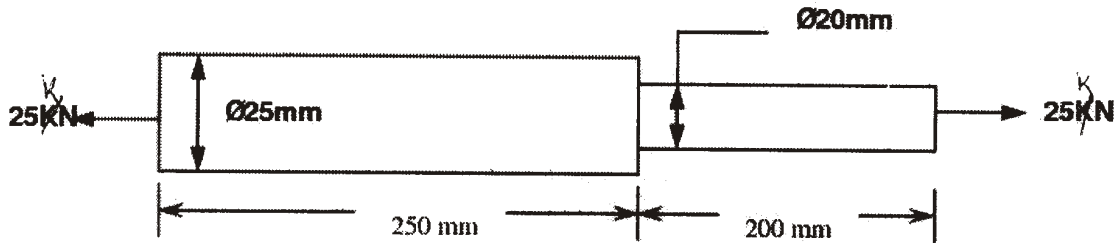
- (i) Diameter of the specimen = 20 mm
- (ii) Gauge length = 100 mm
- (iii) Extension at a load of 80 kN = 0.125 mm
- (iv) Load at yield point = 110 kN
- (v) Maximum load = 185 kN
- (vi) Final elongation = 30 mm
- (vii) Diameter of neck = 12.6 mm

Calculate the following :

2×5=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—
- (a) torque on the shaft; 4
 - (b) maximum shear stress induced; 3
 - (c) 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
