



C09-EE-406/C09-CHST-406

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BOARD DIPLOMA EXAMINATION, (C-09)
OCT/NOV—2015
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 (a) stress, and (b) strain. 1½+1½
2. 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 $E = 2 \times 10^5 \text{ N/mm}^2$.
3. Write any three assumptions made in deriving the torsion equation.
4. A solid shaft is to transmit 350 kW and 110 r.p.m., if the maximum shear stress induced must not exceed 90 N/mm^2 . Find the diameter of the shaft.
5. Write down the classification of IC engines.
6. State the function of a carburetor.
7. List out any six important boiler mountings.
8. State any three advantages of gas turbine over IC engines.

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1

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9. What are the differences between single-stage and multi-stage centrifugal pumps?
10. Write down the classification of lubricants.

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 readings are obtained from a tensile test of a specimen :

Diameter of the specimen = 20 mm

Gauge length = 100 mm

Extension at a load of 100 kN = 0.15 mm

Load at yield point = 120 kN

Maximum load = 200 kN

Final length = 170 mm

Diameter of neck = 12.6 mm

Calculate—

- (a) Young's modulus;
(b) stress at yield point;
(c) % elongation;
(d) % reduction in area;
(e) working stress taking factor of safety 3.

12. A bar of 16 mm diameter is subjected to a pull of 27 kN. The measured extension over gauge length of 80 mm is 0.12 mm and the change in diameter is 0.007 mm. Find the Poisson's ratio and the modulus of elasticity.

- 13.** A solid steel shaft 50 mm diameter transmits power at 75 r.p.m. if the maximum allowable shear stress in it is 40 N/mm^2 .

Calculate—

- (a) angle of twist per meter length of shaft when $G = 80 \text{ kN/mm}^2$;
(b) the value of shear stress at a radial distance of 10 mm from the centre.
- 14.** Explain the working principle of 4-stroke diesel engine with neat sketch.
- 15.** Describe the working of any one type water-tube boiler with a neat sketch.
- 16.** Draw a neat sketch of constant pressure gas turbine and explain its working principle.
- 17.** Explain the working of Kaplan turbine with a neat sketch.
- 18.** Draw a simple sketch showing the installation of a centrifugal pump indicating various components and hydraulic heads.
