C09–EE–**406**

3478

BOARD DIPLOMA EXAMINATION, (C–09)
OCT/NOV—2014
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. Draw the stress-strain diagram for mild steel and locate the salient points on it.

2. A hole of 20 mm diameter is to be pierced in a steel plate. If the ultimate shear stress of the plate is 400 N/mm^2 and the force exerted by the punch is 251 kN. Find the thickness of the plate.

3. Define torsion and write the torsion equation.

4. A solid circular shaft running at 500 r.p.m. transmits 400 kW. Corresponding shear stress produced is 150 N/mm^2. Calculate the suitable diameter of the shaft.

5. Compare SI and CI engines.

6. What is the function of a boiler?

7. What is steam turbine? How is it classified?

8. What is draft tube? State its functions.

9. What are the difference between single-stage and multistage centrifugal pumps?

10. Name the different types of lubricant.

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. An axial load of 50 kN is acting on a bar consisting of two lengths as shown in the figure below. If E 2 10^5 N/mm^2, determine *(a)* stress in each section and *(b)* total elongation of the bar.
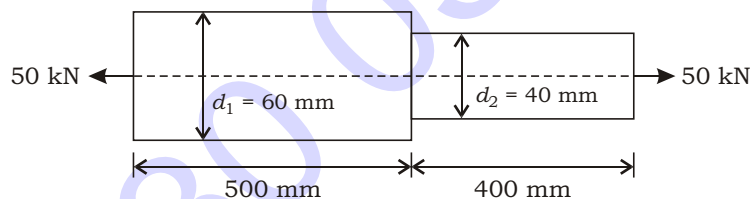
12. *(a)* Define the term 'Poisson's ratio'.

(b) The allowable stress for a hollow steel column which carries an axial load of 2000 kN is 125 N/mm^2. If the external diameter of the column is 300 mm, determine the internal diameter.

13. A solid steel shaft 200 mm diameter transmits power at 250 r.p.m. If the maximum shear stress induced in it is 35 N/mm^2, calculate—

(a) the power transmitted in kW;

(b) the angle of twist per metre length of shaft,

when G = 80 kN/mm^2;

(c) the value of shear stress at a radial distance of 30 mm from the centre.

14. Describe the working principle of 4-stroke diesel engine with a neat sketch.

15. Draw a neat sketch of fire tube boiler and describe its working.

16. Draw a neat sketch of open-cycle gas turbine and explain its working principles.

17. Explain the working of Kaplan turbine with a neat sketch.

18. *(a)* Write a short note on the thrust bearing.

   (b) What are the advantages of centrifugal pump?

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