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C09-EE-406

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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.

2.3 3. Define torsion and write the torsion equation.

2.9 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.

3.13 5. Compare SI and CI engines.

6. What is the function of a boiler?

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

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7.9 8. What is draft tube? State its functions.

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

9.8 10. Name the different types of lubricant.

PART—B

10×5=50

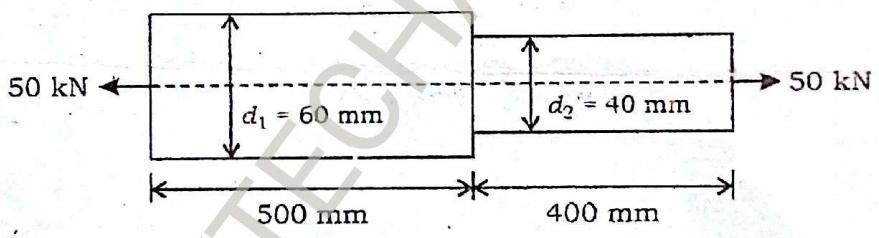
Instructions : (1) Answer *any* **five** questions.

(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. An axial load of 50 kN is acting on a bar consisting of two lengths as shown in the figure below. If $E = 2 \times 10^5$ N/mm^2, determine *(a)* stress in each section and *(b)* total elongation of the bar.

1.36



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.

1.35

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;

2.13 *(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.

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

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

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

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

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

8.5 (b) What are the advantages of centrifugal pumps?

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