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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, APRIL – 2021

APPLIED MECHANICS AND STRENGTH OF MATERIALS

[Maximum Marks: 75] [Time: 2.15 Hours]

PART-A

(Answer ***any three*** questions in one or two sentences. Each question carries 2 marks)

I

1. State Hookes Law.
2. Define radius of gyration.
3. List the types of welded joints.
4. Define polar modulus.
5. Define Crippling load. (3×2=6)

PART-B

(Answer ***any four*** of the following questions. Each question carries *6* marks)

II

1. Draw the stress – strain diagram for mild steel and mark the significant points.
2. A steel wire is used to lift a load of 5kN. Ultimate stress for the steel is found to be 360N/mm^2. Find the minimum diameter required for the wire using a factor of safety of 5.
3. State and prove the perpendicular axis theorem.
4. Derive the expression for the moment of inertia of a circular section.
5. What are the different modes in which riveted joint may fail? How the strength of a riveted joint is determined?
6. Define hoop stress and longitudinal stress acting upon a thin shell. Write the relations to determine each of them.
7. Explain the different types of end conditions of columns. (4×6=24)

PART-C

(Answer ***any of the three units*** from the following. Each full question carries 15 marks)

UNIT-I

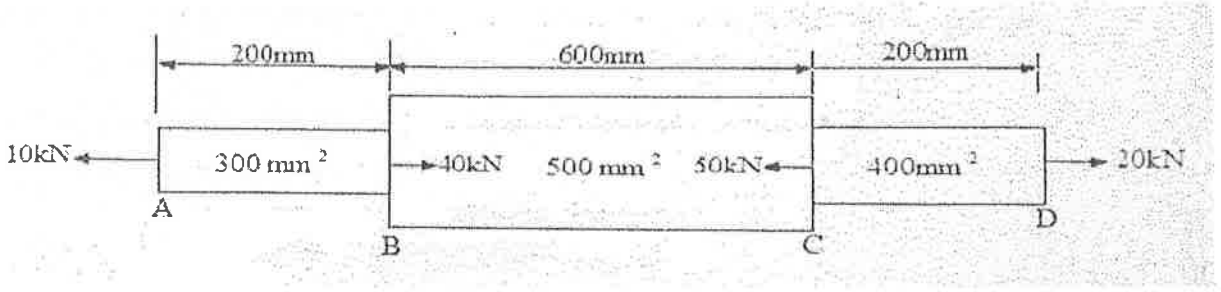
III (a) Explain the terms lateral strain, longitudinal strain and poisons ratio. (6)

(b) In an experiment a bar of 30 mm diameter is subjected to a pull of 60kN. The measured extension on gauge length of 200 mm is 0.09 mm and the change in diameter is 0.0039 mm. Calculate the poisons ratio and the values of three moduli. (9)

OR

IV (a) Differentiate between young's modulus and modulus of rigidity. (5)

(b) A member ABCD is subjected to point load as shown in fig. Determine the total changes in length of the member. Take E=2x105N/mm^2. (10)



UNIT – II

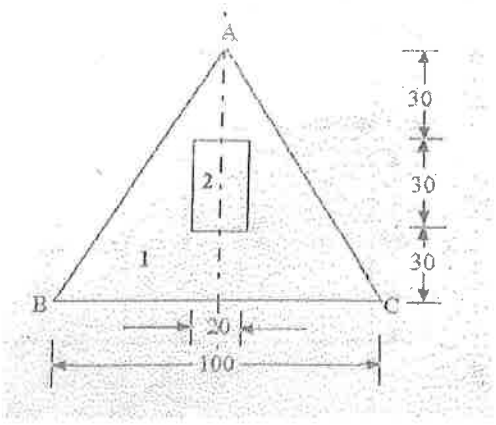
V (a) Define (i) Angle of friction (ii) Angle of repose. (5)

(b) A body of weight 500N is pulled up an inclined plane, by a force of 350N. The inclination of the plane is 30^o to the horizontal and the force is applied parallel to the plane. Determine the coefficient of friction. (10)

OR

VI (a) State and prove the parallel axis theorem. (5)

(b) A rectangular hole is made in a triangular section as shown in fig. Determine the moment of inertia of the section about XX axis passing through its CG and the base BC. (10)



UNIT – III

VII (a) Explain caulking and fullering operations. (6)

(b) A double riveted, double cover, butt joint is made in 20mm thick plates with 25mm diameter rivets and 100mm pitch. Take permissible stresses in shearing as 80MPa, in bearing as 160MPa, and in tearing as 100MPa respectively. Find the pull per pitch length of the joint and efficiency of the joint. (9)

OR

VIII (a) Define (i) Strength of the shaft (ii) Torsional rigidity. (5)

(b) Find the maximum shear stress induced in a solid circular shaft of diameter 160mm when the shaft transmits 150kW power at 180rpm. (10)

UNIT – IV

IX (a) What are the assumptions made in the Euler's theory? (5)

(b) The external and internal diameter of a hollow cast iron columns are 50mm and 40mm respectively. If the length of the column is 3m and both of its ends are fixed, determine the crippling load using Rankin's formula. Take the values of σ =550N/mm^2 and α=(1/1600) in Rankin's formula. (10)

OR

X (a) Distinguish between bending spring and torsion spring. (5)

(b) A close-coiled helical spring of round steel wire 10mm in diameter having 10 complete turns with a mean diameter of 120mm is subjected to an axial load of 200N. Determine

(i) The deflection of the spring.

(ii) Maximum shear stress in the wire.

(iii) Stiffness of the spring G=8x104N/mm^2 (10)
