3E1213

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B.Tech. III Sem. (Main) Examination, April/May - 2022
Civil Engineering
3CE3-04 Engineering Mechanics

Time : 2 Hours   Maximum Marks : 70
Instructions to Candidates:

Attempt **all ten** questions from **Part A**. All **five** questions from **Part B** and **three** questions out of **Five** questions from **Part C**.

Schematic diagrams must be shown wherever necessary. Any data missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(As Mentioned in form No. 205)

PART - A
(word limit 25)   (10×2=20)

1. Write down the expression of stiffness for spring.
2. Write the names of different types of friction.
3. State the Lami's theorem.
4. Write the conditions for equilibrium of a body.
5. What is the difference between close coiled helical springs and open coiled helical springs.
6. State the principle of virtual work.
7. What do you mean by complementary shear stress.
8. What is the value of poisson's ratio for mild steel.
9. What are the units of work done.
10. What are the various characteristics of a force?

PART - B
(word limit 100)   (5×4=20)

1. A load with as mass 5 kg was lifted up by a pulley to the height of 0.8 m for pile work. (Use, $g = 9.81$ ms^{-2}). What is Potential Energy the load.
2. Explain Stress - Strain Curve of mild steel in tension showing its all principal points.

3. Two forces of 100 N and 150 N are acting simultaneously at a point. What is the resultant of these two forces, if the angle between them is 45°?

4. State and explain Newton's laws of mechanics.

5. Explain the method of sections and method of joints for plane truss.

PART - C

(Any three)   (3×10=30)

1. Four forces of magnitude P, 2P, $3\sqrt{3}P$, and 4P are acting at a point O. The angles made by these forces with x - axis are 0º, 60º, 150º, and 300º respectively. Find the magnitude and direction of the resultant force.

2. Bring out the differences among perfect, deficient and redundant trusses.

3. Find the moment of inertia of a rectangular section 60 mm wide and 40 mm deep about its centre of gravity. https://www.rtuonline.com

4. A trolley of mass 200 kg moves on a level track for a distance of 500 metres. If the resistance of the track is 100 N, find the work done in moving the trolley.

5. A circular rod of diameter 16 mm and 500 mm long is subjected to a tensile force 40kN. The modulus of elasticity for steel is 200 kN/mm². Find

   i. Stresses.

   ii. Strain.

   iii. Elongation of the rod due to applied load.