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ME 103

B.TECH. II[nd] SEMESTER EXAMINATION, 2024-25

Bachelor of Technology

(IT & ECE)

Fundamentals of Mechanical Engineering and Mechatronics

Time : 3 Hours] [Maximum Marks : 75

Note: There are **three** sections (A, B and C) and Candidate has to attempt question from all sections. Marks are Indicated against each section .

Section-A

1. **Attempt all part of the following:** **5×3=15**

(a) Define specific weight or weight density. What is the difference between kinematic viscosity and dynamic viscosity?

(b) What is the physical significance of Factor of safety? Enlist the difference between determinate and indeterminate beam.

(c) Which is better efficient two stroke or four stroke engine and why?

(d) Define Mechatronics and write the main applications of mechatronics?

(e) Define the Hook's Law; Poisson's Ratio and Modulus of elasticity.

Section-B

Note : Attempt All Questions : **4×5=20**

2. (a) Explain briefly about stress-strain diagram for mild steel and brittle materials.

OR

(b) Derive the relationship between the elastic constant E, G and .

3. (a) Define Fluid? Explain all the fluid properties in brief.

OR

(b) State the Two-dimension continuity Equations for the incompressible flow. Write the application of Bernoulli's Theorem.

4. (a) State the differences between 2 stroke and 4 stroke engine? Write the applications of SI & CI engines.

OR

(b) Define COP of Heat pump and Refrigerator. What is the difference between Refrigeration and Air conditioning? Calculate the COP of a refrigerator if it extracts 1200 Joule of heat from the cold reservoir and release 1800 Joule of heat to the hot reservoir in each cycle?

5. (a) Write short note on advantage and disadvantage of mechatronics in details and also discuss the industrial application of Mechatronics.

OR

(b) Write short note on evolution of Mechatronics and scope of Mechatronics in details.

Section-C

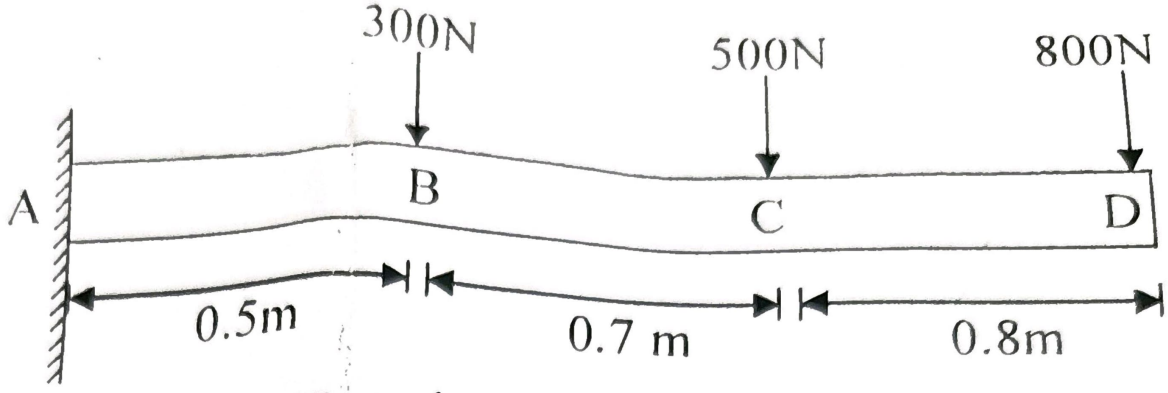
Note : Attempt Any Two Question : **2×20=40**

6. State the Bernoulli's theorem and Write the expression of Bernoulli's Equation with assumption?

A Water is flowing through a pipe of 5cm diameter under a pressure of 29.43 N/cm^2 (Gauge) and with the mean velocity of 2m/sec. Find the total head or total energy per unit weight of water at a cross-section, which is 5m above the datum line.

7. What is the concept of shear force and bending moment? Define the point of contra-flexure in a beam. A cantilever beam of length 2m carrying the point load as shown in figure below:

Draw the shear force diagram and Bending moment diagram?



8. Explain the sensors and transducer in brief and also explain the type of sensors and transducer and their characteristics? Also discus about Auxotonic and bionics?

Autotonic

9. Define air conditioning? What is the standard comfort temperature range for human list any 5 applications of air conditioning state difference between refrigeration and air conditioning?

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