Register Number:……..

KUMARAGURU
college of technology
character is life

B.E DEGREE EXAMINATIONS: DEC 2022

(Regulation 2018)

Third Semester

CIVIL ENGINEERING

U18CEI3201: SOLID MECHANICS

COURSE OUTCOMES

CO1: Apply the fundamental concepts of stress and strain in the analysis of various structural Components and machines.
CO2: Analyze the beams to determine shear forces, bending moments.
CO3: Determine the bending, shear stresses and deflection produced in a beam.
CO4: Analyze and design shafts and springs used in vehicles and structures.
CO5: Find out the design forces in truss members.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions: -
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	Define Factor of safety	CO1	[K_1]
2.	Outline Young's Modulus	CO1	[K_1]
3.	What is the maximum bending moment for a simply supported beam subjected to uniformly distributed load and where it occurs?	CO2	[K_1]
4.	What do you mean by point of contraflexure?	CO2	[K_1]
5.	Sketch the shear stress variation for symmetrical I section	CO3	[K_2]
6.	What are the methods for finding out the slope and deflection at a section?	CO3	[K_1]
7.	Define torsional rigidity	CO4	[K_1]
8.	Classify the helical springs	CO4	[K_2]
9.	Write the basic equilibrium equation used to analyse a frame member	CO5	[K_1]
10.	How will you determine the stability and determinacy in trusses	CO5	[K_2]

Answer any FIVE Questions: -
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a)	Draw stress - strain curve for a mild steel rod subjected to tension and explain about the salient points on it.	8	CO1	[K_3]

	b)	A reinforced short concrete column 250 mm x 250 mm in section is reinforced with 8 steel bars. The total area of steel bars is 2500 mm^2. The column carries a load of 390 kN. If the modulus of elasticity of steel is 15 times that of concrete. Find the stresses in concrete and steel.	8	CO1	[K_3]
12.		A cantilever of length 4 m carries a UDL of 3 kN/m run over the whole length and two-point loads of 4 kN and 2.5 kN are place 1 m and 2 m respectively from the fixed end. Draw the shear force and BM diagrams.	16	CO2	[K_3]
13.		A beam of rectangular cross section 50 mm wide and 150 mm deep is used. As cantilever 6 m long and subjected to a uniformly distributed load of 2 kN/m over the entire length. Determine the bending stress at 50 mm from the top fibre, at the mid span of the beam. Also, Calculate the maximum bending stress.	16	CO3	[K_3]
14.		A beam AB of length 8 m is simply supported at its ends and carries two-point loads of 50 kN and 40 kN at 2 m and 5 m respectively from left support A. Determine, deflection under each load and maximum deflection point in which it occurs. Take $E=2\times10^5$ N/mm^2 and $I=85\times10^6$ mm^4. Use Macaulay's method	16	CO3	[K_3]

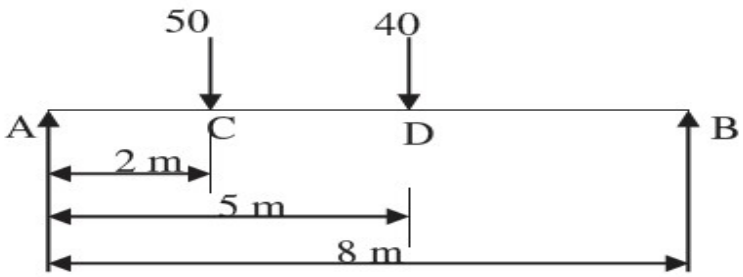

Figure.1

15	a)	A solid circular shaft transmits 75 kW power at 200 rpm. Calculate the shaft diameter, if the twist in the shaft is not to exceed 1^0 in 2 m length of shaft and shear stress is limited to 50 N/mm^2. Take modulus of rigidity C= $1x10^5$ N/mm^2	8	CO4	[K_3]
	b)	A closed coiled helical spring is to carry a load of 500 N, its mean coil diameter is to be 10 times that of the wire diameter. Calculate the diameter if the maximum shear stress in the material of the spring is to be 80 MN/m^2.	8	CO4	[K_3]

16. A pin jointed waren truss of 4.0 m span is freely supported at the ends and it carries loads of 2000 kg and 4000 kg at the upper joint, as shown in figure.2. Calculate the forces in all the members, using method of joints

16 CO5 [K_3]

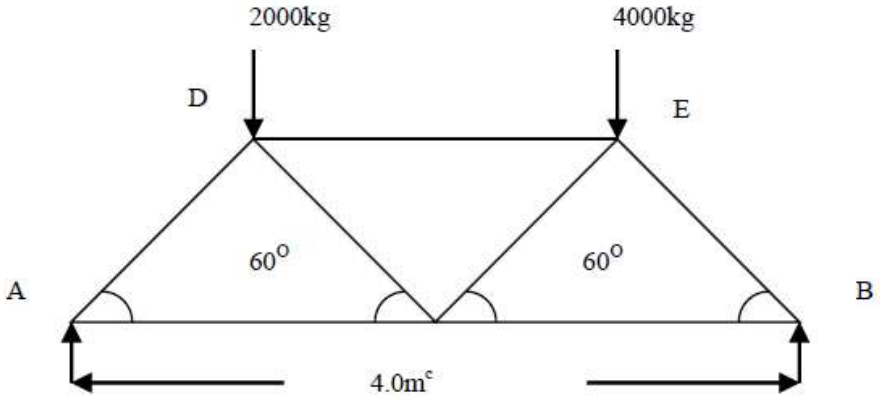

Figure.2

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