Hall Ticket Number:

Code No. : 13547 S

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (Mech. Engg.) III-Semester Supplementary Examinations, August-2022

Mechanics of Materials

Time: **3 hours** Max. Marks: **60**

*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Draw the stress-strain behavior of steel, mention the varies points on the graph	2	1,2	1	1
2.	Write the relation between the elastic constants	2	1,2	1	1
3.	A cantilever beam span 6m subjected to point load 60kN at the centre, find the Shear force and Bending moment at fixed support	2	1,2	2	1
4.	Mention the relation between intensity of loading with SF and BM.	2	1,2	2	1
5.	A rectangular beam 120mm X 200mm, if the permissible flexural stress is 230MPa, calculate the moment of resistance of the section.	2	1,2	3	2
6.	Draw the shear stress distribution for a symmetrical I- section along the depth	2	3,4	3	2
7.	Write the governing equation for the determination of deflections as per Macaulay's approach.	2	1,2	4	1
8.	State the Euler's equation for load carrying capacity of long column	2	1,2	4	1
9.	Differentiate between the closed coil and opened coiled helical spring	2	1,2	5	1
10.	Draw the shear stress distribution along the depth of the shaft subjected to tensional Moment	2	3,4	5	2
	Part-B (5 × 8 = 40 Marks)				
11. a)	Derive the expression for deformation due to self-weight of a prismatic bar	4	1,2	1	1

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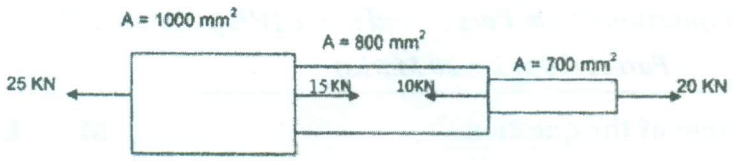
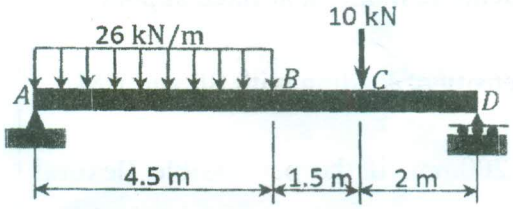
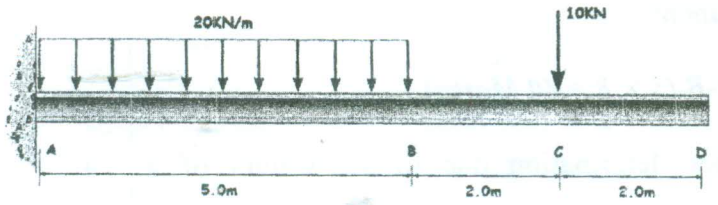
b)	Find the total deformation of the bars shown in fig 1. Take E is 2 x10^5MPa. Length of each bars is 2m.  Fig 1	4	3,4	1	2
12. a)	Define the Shear Force and Bending Moment, and relation between them .	4	1,2	2	1
b)	Draw the SFD and BEM for the beam shown in fig 2.  Fig 2	4	3,4	2	3
13. a)	Derive the expression for the flexural strength of the beam from the fundamentals	4	1,2	3	1
b)	Draw the shear stress distribution for a rectangular section 120mmX200mm, subjected to shear force 45kN, also find the magnitude of shear stress at 75mm from the centrioidal axis.	4	1,2	3	2
14. a)	By using the double integration method evaluate the deflection of a simply supported beam subjected to UDL at the centre also show that slope at the both the supports are same.	4	1,2	4	2
b)	Find the slope and defection at the free end of the cantilever beam shown in fig 3  Fig 3	4	3,4	4	3

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15. a)	Derive the torsion equation	4	1,2	5	1
b)	A shaft of 72 mm diameter supported on bearings 640mm apart transmits 32 KW of power at 400 rpm. The shaft carries a flywheel carrying 5KN midway of the shaft. Find the principal stresses and the maximum shear stress at the ends of a vertical and horizontal diameter in a plane close to the flywheel.	4	1,2	5	3
16. a)	A 12 mm dia steel rod passes centrally through a copper tube 48 mm external and 36 mm internal diameter and 2.5 m long. The tube is closed at each end by 24mm thick steel plates which are secured by nuts. The nuts are tightened until the copper tube is reduced in length by 0.508 mm. The whole assembly is then raised in temp by 60°C. Calculate the stress in copper and steel before and after the rise of temperature assuming that the thickness of the plates remains unchanged. $E_s = 2.1 \times 10^6$ N/mm^2, $E_c = 1.05 \times 10^5$ N/mm^2, $\alpha_s = 1.2 \times 10^{-5}$/°C, $\alpha_c = 1.75 \times 10^{-5}$/° C.	4	1,2	1	3
b)	The modulus of rigidity for a material is 0.51×10^5N/mm^2.A 10 mm diameter rod of the material was subjected to an axial pull of 10 kN and the change in diameter was observed to be 3×10^{-3}mm. Calculate Poisson's ratio and the modulus of elasticity.	4	1,2	2	2
17.	Answer any ***two*** of the following:				
a)	Find an expression for the elongation of a prismatic bar due to its own weight, when the bar is fixed at its upper end and hanging freely at the other end.	4	1,2	1	1
b)	State and explain Hooke's law	4	1,2	1	1
c)	Define the compound stresses and write the uses of the Mohr's circle.	4	1,2	2	2

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1 & 2	60%
ii)	Blooms Taxonomy Level – 3 & 4	40%

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