VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD

B.E. (Civil Engg. : CBCS) IV-Semester Main Examinations, January-2021

Strength of Materials-II

Time: 2 hours
Max. Marks: 60

Note: Answer any NINE questions from Part-A and any THREE from Part-B

Part-A (9× 2 = 18 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	State formulas for moment-area method	2	2	1	1
2.	Calculate the deflection of cantilever beam of length L subjected to uniformly distributed load w/meter over its entire span.	2	3	1	2
3.	What do you mean by propped cantilever beam? What is the use of propping the beam?	2	2	2	1
4.	Write the advantages and disadvantages of fixed beams	2	1	2	2
5.	Write the three moment equation and explain the terms	2	1	3	2
6.	What is shear center and state its significance	2	1	3	2
7.	Explain the difference between the behavior of closed coiled and open coiled springs	2	2	4	1
8.	Write the assumptions made in deriving the torsion equation	2	1	4	2
9.	State Castigliano's first theorem	2	2	5	2
10.	Define the terms buckling load and slenderness ratio	2	2	5	1
11.	Explain the double integration method to find the deflection of beams	2	1	1	1
12.	Explain the Claperon's theorem of three moments	2	1	2	1

Part-B (3 × 14 = 42 Marks)

13. a)	A beam is 10 m long and is simply supported at the ends. It carries concentrated loads of 125 kN and 75 kN at distances of 2 m and 5 m respectively from left end. Calculate the deflection under each load. Take I = 16 x 10⁸ mm⁴ and E = 2.1 x 10⁵ N/ mm².	8	3	1	2
b)	A cantilever beam of length 3 m carries a uniformly distributed load of intensity beam10 kN/m over entire span. Find the slope and deflection. Take E = 100 GPa and I = 9 x 10⁸ mm⁴.	6	4	1	2
14. a)	A propped cantilever of length 6 m carries a uniformly distributed load 3.5 kN/m for a distance 3 m from fixed end. Determine the reactions at the supports and draw shear force and bending moment diagram	7	2	2	1
b)	A fixed beam of span 5 m carries a point load of 50 kN at 2 m from the left end in addition to a uniformly distributed load of 15 kN/m over the entire span. Determine the fixed end moments and draw SFD and BMD	7	3	2	2

15.	a)	A continuous beam 10 m long is supported at the ends and another support at 4 m from right end. It carries a udl of 20 kN/m over the entire length. Draw the shear force and bending moment diagram	8	2	3	2
	b)	Determine the position of shear centre for the T-Section as shown in Fig.1	6	3	3	2

Fig.1

16.	a)	A steel shaft is 6 m long and 200 mm in diameter. If the shear stress in the steel shaft shall not exceed 15 N/ mm^2, find the power transmitted by the shaft at 250 rpm. Take C = 8.5 x 10^4 N/ mm^2	7	3	4	2
	b)	A closed coiled helical spring is made of rod diameter 15 mm has 12 complete turns and mean diameter of 120 mm. It is subjected to an axial pull of 800 N. Find the maximum stresses in the spring and also find the deflection. Take C = 80 GPa	7	3	4	2
17.	a)	A vertical round steel rod 2 m long is securely held at its upper end. A weight can slide freely on the rod and its fall is arrested by a stop provided at the lower end of the rod. When the weight falls from a height of 2.5 cm above the stop, the maximum stress reached in the rod is 145 N/mm^2. Determine the stress in the rod if the load had been applied gradually and also maximum stress if the load had fallen from a height of 4.5 cm. Take E = 2 x 10^5 N/mm^2	7	4	5	2
	b)	Calculate the safe compressive load on a hallow cast iron column with one end hinged and other end fixed of 20 cm external diameter and 15 cm internal diameter and 8 m in length. Use Euler's formula with factor of safety 3 and E = 100 GPa	7	3	5	2
18.	a)	A simply supported beam of span 7 m subjected to two point loads of 20 kN and 40 kN acting at a distance of 2 m and 4 m from left support. Neglecting the weight of the beam, find the slope and deflection under the loads. Take E = 200 GPa and I = 12 x 10^8 mm^4	8	3	1	2
	b)	A fixed beam of span 4 m carries a udl of 12 kN/m over the left half of its length and a clockwise couple of 30 kNm at 1 m from right support. Draw shear force and bending moment diagram	6	3	2	2

Contd...3

19.		Answer any *two* of the following:				
	a)	A two span continuous beam ABC of length 6 m. Span AB of length 2 m carries a udl of 25 kN/m, span BC of length 4 m carries udl of 10 kN/m. Find the support moment at B and support reactions	7	2	3	2
	b)	A hallow shaft whose internal diameter is 0.6 times the external diameter is to replace a solid shaft of the same material, to transmit the same power at the same speed. Find the ratio of diameter of solid shaft to external diameter of hallow shaft	7	3	4	2
	c)	A column of length 5 m with internal diameter 180 mm and thickness 10 mm carries a load at an eccentricity of 20 mm. Find the value of the load carried by the column by using Secant formula, if permissible stress is not to exceed 150 MPa. Both the ends of the column are hinged. E = 200 GPa	7	3	5	2

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

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	56
2	Knowledge on application and analysis (Level-3 & 4)	44
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	0

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