Hall Ticket Number:

Code No. : 14165 N/O

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

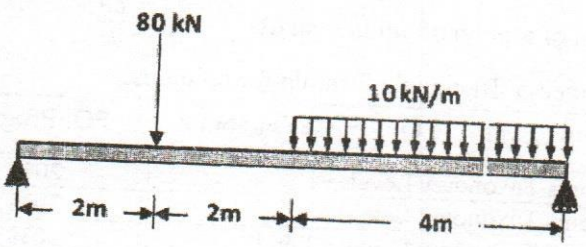
B.E. (Civil Engg.) IV-Semester Main & Backlog Examinations, July-2023

Strength of Materials-II

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

*Note: Answer **ALL** questions in **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.	A cantilever beam of span 3 metres is subjected to a uniformly distributed load of 25kN/metre run over the entire span. **Compute** deflection at the free end.	2	2	1	1
2.	A simply supported beam of span 4m is subjected to a uniformly distributed load of 12kN/metre run over the entire span. **Compute** maximum deflection. EI is constant.	2	2	1	1
3.	A propped cantilever beam of span 3 metres is subjected to a point load of 20kN at a distance of 2m from the propped end. **Compute** prop reaction.	2	2	1	1
4.	**State** the fixed end moments of a fixed beam of span L subjected to a point load of W at the midspan.	2	1	1	1
5.	**State** Clayperon's theorem of three moments when spans have unequal flexural rigidity.	2	1	1	1
6.	**State** the significance of shear centre.	2	1	2	1
7.	**Explain** what is meant by strength of a shaft.	2	2	4	1
8.	A close coiled helical spring of mean radius 200mm and of wire diameter 16mm has 20 turns. **Compute** its deflection when subjected to an axial load of 100N. Adopt $C=0.8\times10^5 N/mm^2$.	2	2	4	1
9.	**Define** and explain modulus of resilience.	2	1	4	1
10.	**State** the Rankine's formula for columns.	2	1	5	1
	Part-B (5 × 8 = 40 Marks)				
11. a)	**Derive** the expressions for the slope and deflection at the free end of a cantilever beam of span *L* subjected to a point load *P* at the free end. *EI* is constant.	4	3	1	1
b)	**Analyze** the simply supported beam shown in the figure and compute slopes and deflections at typical points. *EI* is constant. 	4	4	1	2

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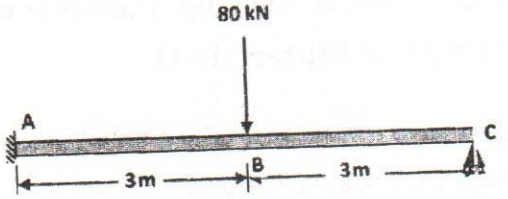
12. a)	**Analyse** the propped cantilever beam shown in the figure and compute slopes and deflections at typical points. *EI* is constant.  	4	4	1	2
b)	A fixed beam of span L is subjected to a uniformly distributed load of w per metre run. **Draw** the shear force and bending moment diagrams for the beam.	4	4	1	2
13. a)	**Derive** the Clayperon's theorem of three moments for the analysis of continuous beams.	4	3	1	1
b)	A two-span continuous beam ABC is supported by hinge at A and rollers at B and C. The span AB of length 4m is subjected to a uniformly distributed load of 25 kN/m over the entire span while the span BC of length 5m is subjected to a point load of 60kN acting at a distance of 1m from C. **Draw** the SFD and BMD for the beam.	4	4	1	2
14. a)	**Compute** the diameter of a solid shaft which will transmit 500 kW at 120 rpm. The maximum shear stress should not exceed 30 N/mm^2 and twist shall not be more than 1^0 in a shaft length of 2 m. Take modulus of rigidity C=0.8×10^{5}N/mm2.	4	2	4	1
b)	A closely coiled helical spring of 120 mm mean diameter is made up of 10 mm diameter wire and has 16 turns. Spring carries an axial load of 150N. If modulus of rigidity is C=0.8×10^5 N/mm^2. **Compute** the deflection of the spring.	4	2	4	1
15. a)	A prismatic bar of length L and cross-sectional area A is attached to a collar at its lower end. A weight of P falls on the collar suddenly through a height of h. The Young's modulus of the material of the bar is E. **Derive** an expression for the strain energy stored in the bar.	4	3	4	2
b)	**Derive** the formula for Euler's buckling load of a column with both ends fixed.	4	3	5	2
16. a)	**Derive** the expressions for the end slopes and midspan deflection of a simply supported beam of span L subjected to a point load P at the midspan. EI is constant.	4	3	1	2
b)	**Draw** the bending moment diagram for a fixed beam of span 4 metres subjected to a point load of 25kN at a distance of 2 metres from the left end.	4	4	1	2
17.	Answer any ***two*** of the following:				
a)	A continuous beam has a fixed support at A and roller supports at B and C. Length of span AB is 4 metres and is subjected to a point load of 50kN at midspan while length of span BC is 3 metres and is subjected to a uniformly distributed load of 12kN per metre run. **Draw** the bending moment diagram for the beam.	4	4	1	2
b)	**Derive** the governing equation of torsion of circular shafts $\frac{T}{J} = \frac{f_S}{R} = \frac{C\theta}{L}$	4	4	3	2
c)	**State** and **explain** the importance of Rankine's formula for columns.	4	1	5	2

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

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	30%
iii)	Blooms Taxonomy Level – 3 & 4	50%

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