Hall Ticket Number:

Code No. : 14145

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (Civil Engg.) IV-Semester Main & Backlog Examinations, July-2022

Strength of Materials-II

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.	**State** the two theorems of Mohr.	2	1	1	1
2.	**Explain** what is meant by elastic load in the case of a conjugate beam.	2	2	1	1
3.	**Explain** what you mean by propped cantilever beam? What is the use of propping the beam?	2	1	2	1
4.	**State** the expression for the maximum deflection of a fixed beam subjected to a point load at the mid-span.	2	2	2	1
5.	**State** the Clapeyron's theorem of three moments in a case of continuous beam with different value of I for each span.	2	1	3	1
6.	**Define** shear center and **state** its significance	2	1	3	1
7.	**Define** torsional rigidity and state its units.	2	1	4	1
8.	**State** the expression for the deformation of a close coiled helical spring subjected to an axial load?	2	1	4	1
9.	**Define** proof resilience and **state** its units.	2	1	5	1
10.	**Define** slenderness ratio and **explain** its significance.	2	1	5	1
	Part-B (5 × 8 = 40 Marks)				
11. a)	**Compute** the slope and deflection at the free end of a cantilever beam of span L and subjected to a point load of W at the free end. Adopt EI as constant.	4	2	1	2
b)	A simply supported beam of span 5m is subjected to a point load of 60kN at a distance of 3m from the left end. **Compute** the slope and deflection at salient points. Adopt EI as constant.	4	3	1	2
12. a)	A propped cantilever beam of span L is subjected to a point load of W at mid-span. **Draw** the SFD and BMD for the beam. Adopt EI as constant.	4	2	2	2
b)	A fixed beam of span 4m is subjected to a uniformly distributed load of 25kN/m over the entire span. **Compute** the fixed end moments and maximum deflection.	4	3	2	2

Contd... 2

13. a)	**State** and **derive** the Clapeyron's theorem of three moments.	4	2	3	1
b)	A two-span continuous beam ABC has spans AB and BC of lengths 3m and 4m respectively. There is a hinge at support A and rollers at supports B and C respectively. Span AB is subjected to a uniformly distributed load of 20kN/m run and span BC is subjected to a point load of 75kN at the midspan. **Analyze** the beam and draw SFD and BMD. Adopt EI as constant.	4	3	3	2
14. a)	A steel shaft is 250 mm in diameter. If the shear stress in the steel shaft shall not exceed 15N/mm^2, **compute** the power transmitted by the shaft at 250 rpm.	4	2	4	2
b)	A closed coiled helical spring is made of wire of diameter 12 mm has 18 complete turns and mean diameter of 160 mm. It is subjected to an axial pull of 800 N. **Find** the maximum stresses in the spring and find the deflection. Take C = 0.8×10^5 N/ mm^2.	4	3	4	2
15. a)	A weight of 15kN falls by 40mm on a collar rigidly attached to a vertical bar 4m long and 1000 mm^2 in section. Find the instantaneous expansion of the bar. Adopt $E = 2\times10^5\ N/mm^2$	4	2	5	2
b)	**Derive** an expression for the Euler's buckling load of a column with both ends fixed.	4	3	5	1
16. a)	A simply supported beam of span L is subjected to a uniformly distributed load of **w** over the entire span. **Compute** the end slopes and maximum deflection. EI is constant.	4	3	1	1
b)	A fixed beam of span 5m is subjected to a point load of 75kN at a distance of 3m from the left end. **Compute** the fixed end moments, deflection under the load and maximum deflection. Adopt EI as constant.	4	3	2	2
17.	Answer any ***two*** of the following:				
a)	A two-span continuous beam ABC has spans AB and BC of lengths 4m and 5m respectively. Support A is fixed and supports B and C have rollers. Spans AB and BC are subjected to a uniformly distributed load of 20kN/m run. **Analyze** the beam and draw SFD and BMD. Adopt EI as constant.	4	3	3	2
b)	Derive the governing equation for the torsion of circular shafts $\frac{T}{J}=\frac{f_s}{R}=\frac{C\theta}{L}$	4	3	4	2
c)	**Compute** the crushing load for a column of T section with flange dimensions 250mm×20mm and web dimensions 30mm×150mm. The column is 5 meters long with both ends fixed. Use Rankine's formula, taking $\sigma_c = 550\ N/mm^2$ and $\alpha=\frac{1}{1600}$.	4	3	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%