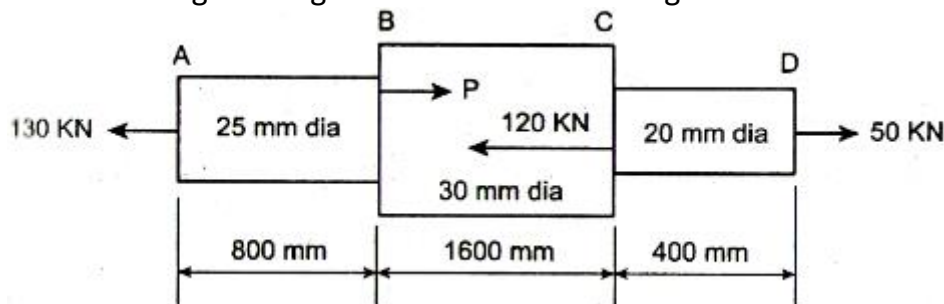


THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025****Fourth Semester****Mechanical Engineering****CE3491 - Strength of Materials****Regulations - 2021****Duration : 3 Hrs****Maximum : 100 Marks****PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)**

Q.No	Questions	BLT	CO	Marks
1.	State Hooke's law.	L1	1	2
2.	Define principal planes and principal stresses.	L1	1	2
3.	State the different types of supports.	L1	2	2
4.	What is mean by positive or sagging BM?	L2	2	2
5.	What is meant by polar moment of inertia?	L1	3	2
6.	Distinguish between closed coil helical spring and open coil helical spring.	L2	3	2
7.	Define deflection of a beam.	L1	4	2
8.	What is a conjugate beam?	L2	4	2
9.	Differentiate between thin cylinder and thick cylinder.	L1	5	2
10.	Mention two applications of pressure vessels.	L2	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No	Questions	BLT	CO	Marks
11. a	Find the value of P and the change in length of each component and the total change in length of the bar shown in figure-1.	L3	1	16

**figure-1****Or**

- | | | | | |
|---|---|----|---|----|
| b | A Mild steel rod of 20 mm diameter and 300 mm long is enclosed centrally inside a hollow copper tube of external diameter 30 mm and internal diameter 25 mm. The ends of the rod and tube are brazed together, and the composite bar is subjected to an axial pull of 40 kN. If E for steel and copper is 200 GN/m ² and 100 GN/m ² respectively, find the stresses developed in the rod and the tube also find the extension of the rod. | L4 | 1 | 16 |
|---|---|----|---|----|

12. a A simply supported beam of span 10m carries a concentrated load of 10 kN at 2m from the left support and a uniformly distributed load of 4kN/m over the entire length. Sketch the shear force and bending moment diagram for the beam. L4 2 16

Or

- b A cantilever of 2m length carries a point load of 20 kN at 0.8 m from the fixed end and another point of 5 kN at the free end. In addition, a u.d.l. of 15 kN/m is spread over the entire length of the cantilever. Draw the S.F.D, and B.M.D. L4 2 16

13. a A solid circular shaft transmits 75Kw at 200 rpm. Find the shaft diameter if the twist in the shaft is not to exceed 1° in 2m length of the shaft and the shearing stress is limited to 50N/mm^2 . Take $G = 100\text{KN/m}^2$ L3 3 16

Or

- b A close coil helical spring of round steel wire 10mm in diameter has a mean radius of 120mm. The spring has 10 complete turns and is subjected to an axial load of 200N. Determine
i) deflection of the spring.
ii) maximum shear stress in the wire and.
iii) stiffness of the spring. $G=80\text{KN/mm}^2$ L3 3 16

14. a A beam AB of length 8m is simply supported at its ends and carries two point loads of 50 kN at a distance of 2m and 5m respectively from left support A. Determine the deflection under each load, maximum deflection occurs. Take $E= 2 \times 10^5 \text{ N/mm}^2$ and $I=85 \times 10^6 \text{ mm}^4$. L4 4 16

Or

- b Using double integration method, determine the deflection under the loads of the beam shown in figure-2. L4 4 16

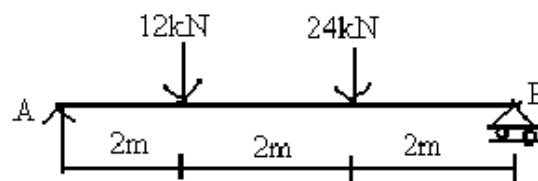


figure-2

15. a A steel cylinder shell 3m long which is closed at its ends, had an internal diameter of 1.5m and a wall thick ness of 20mm. calculate the circumferential and longitudinal stress induced and also the change in dimensions of the shell if it is subjected to an internal pressure of 1.0 N/mm^2 . Assume the modulus of elasticity and poisson's ratio for steel as 200 KN/mm^2 and 0.3 respectively. L4 5 16

Or

- b The normal stresses in two mutually perpendicular direction are 110N/mm^2 and 47N/mm^2 both tensile. The complementary shear stresses in these directions are of intensity 63N/mm^2 . Find the L4 5 16

principal stresses and its planes.