

R.N.G.PATEL INSTITUTE OF TECHNOLOGY-RNGPIT
(An Autonomous Institute U/s UGC Act 1956)

B.Tech. SEMESTER-III, SEMESTER END EXAMINATION – WINTER 2025

SUBJECT CODE: 1CV301

DATE: 16-12-2025

SUBJECT NAME: MECHANICS OF SOLIDS

TIME: 11:00 AM to 01:30 PM

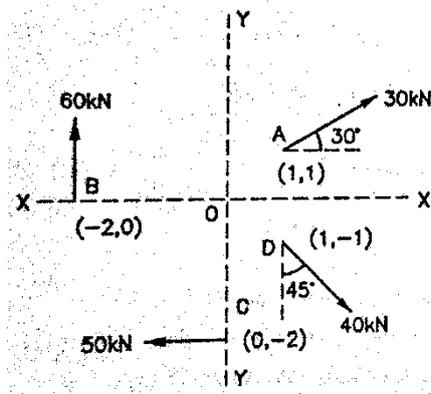
TOTAL MARKS: 70

Instructions

1. It is **compulsory** for students to write **Enrolment No. /Seat No.** on the question paper.
2. Write answers of **Section A** and **Section B** in **separate answer books**.
3. Attempt all questions from both **Section A** and **Section B**.
4. Each section carries **35 marks**, with a total of **70 marks** for the examination.
5. The figures to the right of each question indicate full marks, make suitable assumptions with justification.
6. BL - Cognitive Level (As per Revised Bloom's Taxonomy) (R-Remember, U-Understanding, A –Application, N –Analyze, E – Evaluate, C -Create), CO - Course Outcomes.

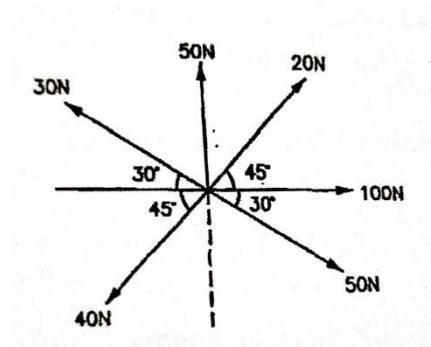
SECTION A

		Marks	BL	CO
Q.1	(a) Define the following terms: (i) Space (ii) Time (iii) Particle.	03	R	1
	(b) Describe the Law of Parallelogram of Forces and derive the expression for resultant.	04	A	1
Q.2	(a) Explain in detail system of forces.	03	U	2
	(b) Find magnitude & direction of resultant force for the system shown in figure below.	04	A	2
(c)	Find magnitude, direction and position of resultant force w.r.t. point O as shown in figure below.	07	A	2

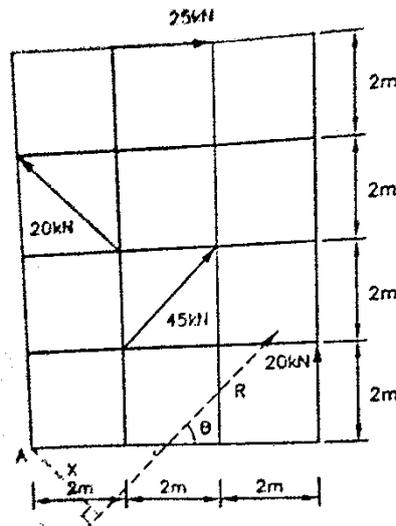


OR

- Q.2 (a) Differentiate : Moment & Couple 03 U 2
- (b) Find magnitude & direction of resultant force for the system shown in figure below. 04 A 2

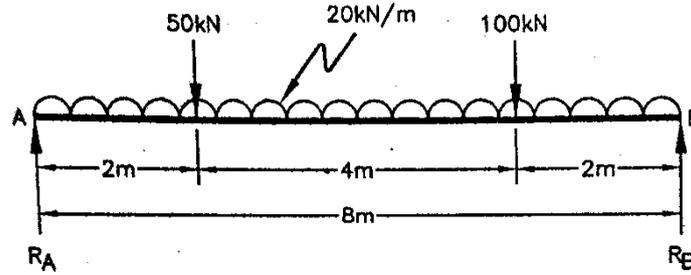


- (c) Find magnitude, direction and position of resultant force w.r.t. point A as shown in figure below. 07 A 2

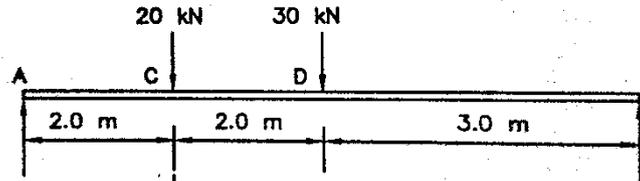


- Q.3 (a) Explain the relationship between load, shear force, and bending moment with a neat diagram. 03 U 3

- (b) Find the support reactions for the beam shown in figure below. 04 A 3



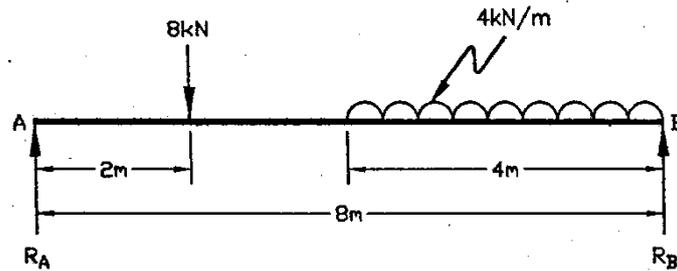
- (c) Draw S.F. and B.M. diagram for the beam shown in figure below. 07 E 3



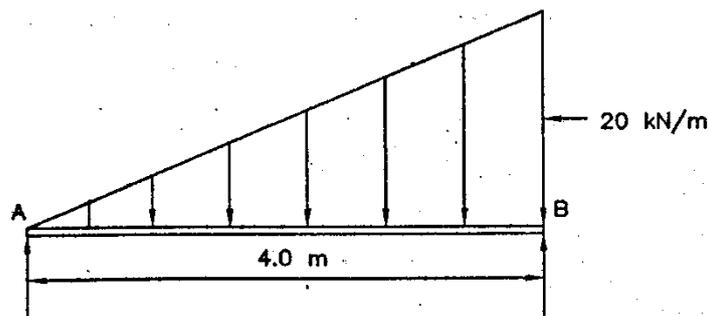
OR

- Q.3 (a) Define types of beams, supports, and loads with suitable sketches. 03 U 3

- (b) Find the reaction at support for the beam shown in figure below. 04 A 3

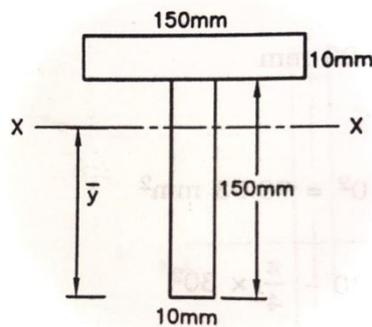


- (c) Draw S.F. and B.M. diagram for the beam loaded as shown in figure below. 07 E 3



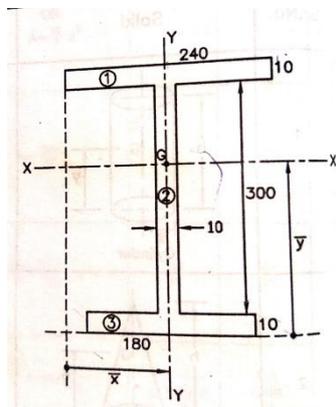
SECTION B

		Marks	BL	CO
Q.4	(a) Define following terms: 1. Pure bending 2. Neutral axis 3. Moment of resistance.	03	R	4
	(b) State the assumptions made in the theory of simple bending.	04	U	4
Q.5	(a) Define: Moment of Inertia.	03	R	5
	(b) Explain Centroid and Center of gravity.	04	U	5
	(c) Determine moment of resistance of a section of a beam shown in figure below if allowable bending stress is 230 MPa	07	A	5



OR

Q.5	(a) Define: Parallel axis theorem.	03	R	5
	(b) State and explain Pappus- Guldinus theorems.	04	U	5
	(c) Find center of gravity of I-section as shown in following figure	07	A	5



Q.6	(a) Define: Hook's law	03	R	6
	(b) Write equations for principal stresses and location of principal planes.	04	U	6

- (c) The principal stresses at a point are 80 N/mm^2 and 40 N/mm^2 both being tensile. Find the normal, tangential, and resultant across a plane through the point inclined at 50° to the plane having the 80 N/mm^2 stress. **07 A 6**

OR

- Q.6** (a) Define: Young's modulus **03 R 6**
- (b) Define principal plane and principal stress. **04 U 6**
- (c) A hollow steel column of external diameter 250 mm has to support and axial compressive load of 2000 kN. If the ultimate stress for the steel column is 480 N/mm^2 , find the internal diameter of the column. Take factor of safety as 4. **07 A 6**
