BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: B. ARCH **SEMESTER : II**
BRANCH: ARCHITECTURE **SESSION : SP/2025**

SUBJECT: AR153 STATICS AND STRENGTH OF MATERIALS

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Explain free body diagram of a force system with the help of a suitable example.	[5]	1	2
Q.1(b)	The 30 N force P is applied perpendicular to the portion BC of the bent bar as shown in Figure 1. Determine the moments of P about point B and A.	[5]	1	3

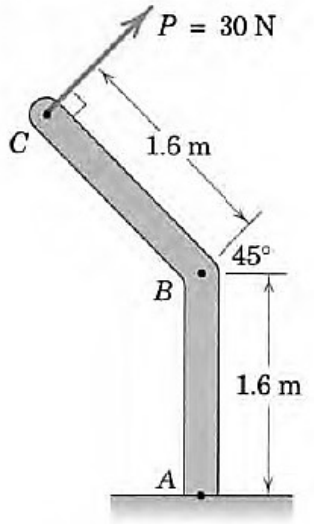

Figure 1

Q.2(a)	Explain Method of Sections used to analyze a truss problem.	[5]	2	2
Q.2(b)	Determine the forces in members GH, CG, and CD for the truss loaded and supported as shown in Figure 2. Use method of sections. Both the supports used at joints E and F are hinged support.	[5]	2	3

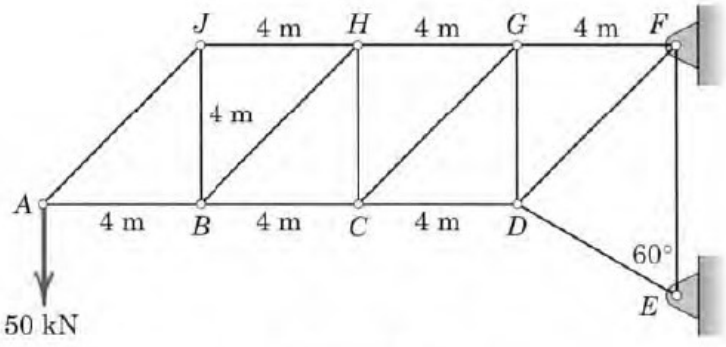

Figure 2

PTO

Q.3(a)	Explain parallel axis theorem of moment of inertia with the help of a suitable example.	[5]	3	2
Q.3(b)	Determine the moment of inertia of the shaded area shown in Figure 3 about y- axis.	[5]	3	3

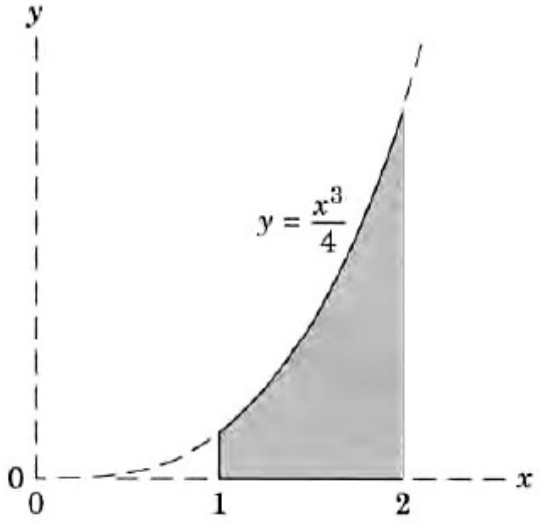

Figure 3

Q.4(a)	Explain allowable stresses and factor of safety for ductile and brittle materials.	[5]	4	2
Q.4(b)	A steel bar of length 2.5 m with a square cross section of 100 mm on each side is subjected to an axial tensile force of 1300 kN as shown in Figure 4. Assume modulus of elasticity of the steel, E = 200 GPa and Poisson's ratio, v = 0.3. Determine the increase in volume of the bar.	[5]	4	2

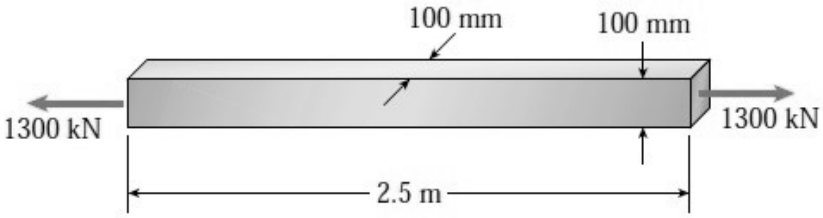

Figure 4

Q.5(a)	Explain with example: Statically determinate and indeterminate beams.	[5]	5	2
Q.5(b)	Draw the shear-force and bending-moment diagrams for a cantilever beam AB carrying a uniform load of intensity *q* over one-half of its length as shown in Figure 5.	[5]	5	4

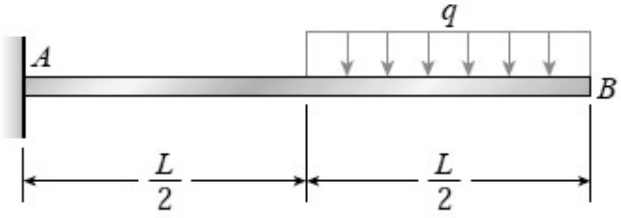

Figure 5

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