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

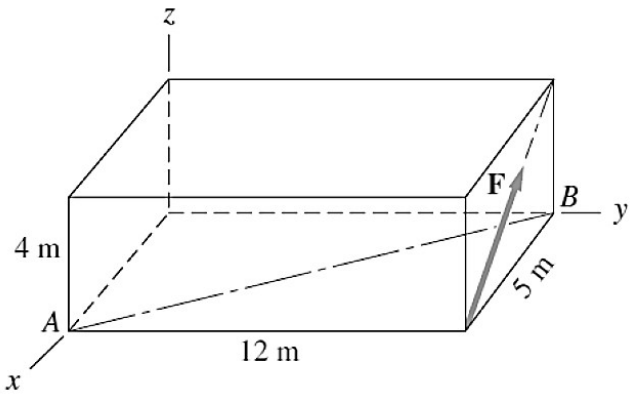
CLASS: B. TECH. **SEMESTER : I**
BRANCH: **SESSION : MO/2025**

SUBJECT: ME24101 BASICS OF MECHANICAL ENGINEERING

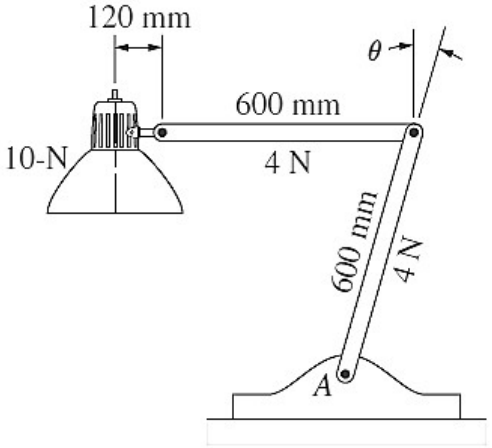
TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1	The moment of the force **F** about the *x*-axis is 1080 N.m. Determine the moment of **F** about the axis *AB*.	[5]	CO1, CO2	Apply

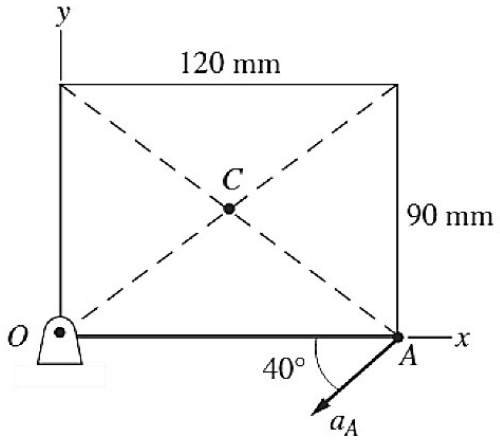


Q.2	The table lamp consists of two uniform arms, each weighing 4 N, and a 10-N bulb fixture. If θ =16°, calculate the couple that must be supplied by the friction in joint *A*.	[5]	CO2, CO3	Evaluate

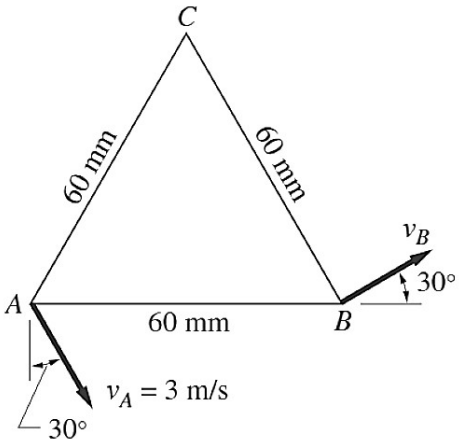


PTO

Q.3 The rectangular plate rotates in the *xy*-plane about the corner *O*. At the instant shown, the acceleration of corner *A* is a_A = 60 m/s^2 in the direction indicated. Determine the total acceleration of the mid-point *C* of the plate at this instant. [5] CO1, CO3 Apply



Q.4 For the triangular plate undergoing plane motion, v_A and the direction of v_B are known. Calculate the angular speed of the plate and the speeds of corners *B* and *C*. [5] CO1, CO3 Evaluate



Q.5 A table of 1 m length, 0.75 m height and 25 kg mass is to be pulled on a rough surface (μ = 0.3) as shown in Figure. Determine (i) the horizontal force required to just pull it to the right, and (ii) the normal reactions at the left and right legs. [5] CO2, CO3 Apply