BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2024)

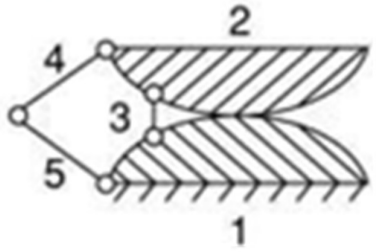
CLASS: B TECH **SEMESTER : IV/ADD**
BRANCH: MECHANICAL/PIE **SESSION : SP/2024**

SUBJECT: ME207 KINEMATICS & DYNAMICS OF MACHINES

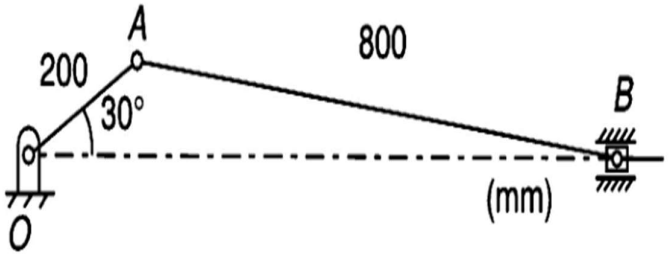
TIME: 02 Hours **FULL MARKS: 25**

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**

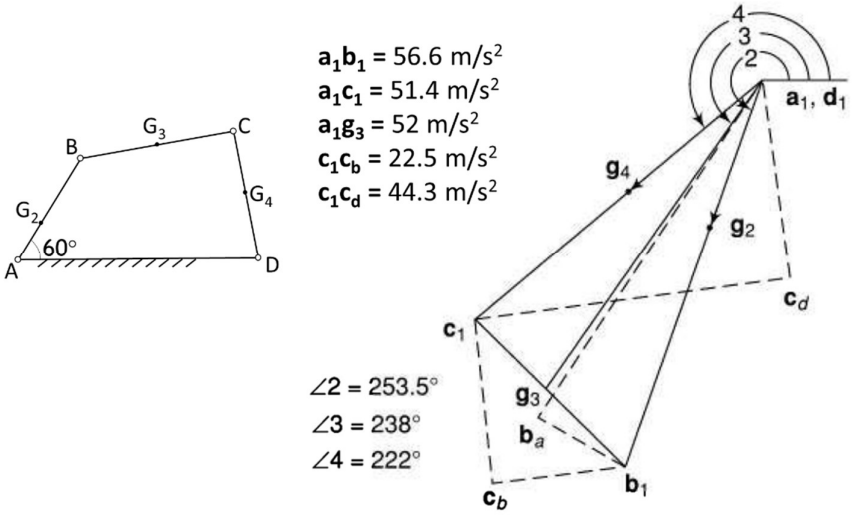
			CO	BL
Q.1(a)	Which inversion is obtained by fixing the slider in a slider-crank mechanism? Draw a schematic diagram.	[2]	1	Understand
Q.1(b)	Calculate the number of degrees of freedom for the linkage shown in Figure.	[3]	1	Apply



Q.2	In a slider-crank mechanism, the lengths of the crank and the connecting rod are 200 mm and 800 mm respectively. Find the velocity of the slider and the angular velocity of the connecting rod at the instant when the crank has turned 30° from the inner dead centre, rotating anticlockwise at 40 rad/s.	[5]	1	Analyze



Q.3	Derive an expression for the acceleration of slider in a slider-crank mechanism.	[5]	2	Apply
Q.4	The dimensions of a four-link mechanism are AB = 500 mm, BC = 660 mm, CD = 560 mm and AD = 1000 mm. The link AB has an angular velocity of 10.5 rad/s counter-clockwise and an angular retardation of 26 rad/s^2 at the instant when it makes an angle of 60° with AD, the fixed link. The mass of the links BC and CD is 4.2 kg/m length. The link AB has a mass of 3.54 kg, the centre of which lies at 200 mm from A and a moment of inertia of 88500 kg.mm^2. Find the inertia forces and inertia couples acting on each link. The acceleration diagram is shown in Figure.	[5]	2	Evaluate



Q.5 A circular disc mounted on a shaft carries three attached masses of 4 kg, 3 kg and 2.5 kg at radial distances of 75 mm, 85 mm and 50 mm and at the angular positions of 45°, 135° and 240° respectively The angular positions are measured counter-clockwise from the reference line along the x-axis. Determine the amount of the countermass at a radial distance of 75 mm required for the static balance. [5] 2 Evaluate

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