

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2025)

CLASS: BTECH
BRANCH: PIE

SEMESTER : VI
SESSION : SP/2025

SUBJECT: PE334 MACHINE TOOL DESIGN

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
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		CO	BL
Q.1	Define machine tools and explain their classification based on the degree of automation, weight, and degree of specialization. Provide examples for each category.	[5] 1	2
Q.2	Draw and explain the K23 kinematic structure of a thread milling machine, and describe the function of each component in the system.	[5] 1	3
Q.3	Find the speed layout (steps) arranged in logarithmic progression for the following conditions: $N_1 = 30$ rpm; $N_z = 375$ rpm and speed steps $Z = 12$. Assume $V_c = 20$ m/min	[5] 2	3
Q.4	Construct possible 2x3x2 cross-type ray diagrams for the given conditions: $N_1 = 30$ rpm, $z = 12$, $\phi = 1.41$, and motor rpm = 1440. From the constructed diagrams, analyze and select the optimum one that best satisfies the conditions.	[5] 2	4
Q.5	Derive the mathematical expressions to analyze how a material with greater unit strength and unit rigidity becomes more advantageous in terms of the weight of material required for use under tensile loading conditions.	[5] 3	4

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