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

CLASS: B.TECH **SEMESTER: VI**
BRANCH: PIE **SESSION: SP/2024**

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**

			CO	BL
Q.1(a)	What distinguishes a machine from a machine tool, and how do their functions differ in the context of manufacturing processes?	[2]	1	2
Q.1(b)	Describe with a neat sketch the operational principles behind feed boxes equipped with a gear cone and sliding key in machine tools.	[3]	1	2
Q.2(a)	Explain the role of the direction control valve in a hydraulic transmission system.	[2]	1	2
Q.2(b)	Illustrate the C-13 lathe kinematic structure for taper thread cutting, emphasizing component functions.	[3]	1	2
Q.3	Find the speed layout (steps) arranged in logarithmic progression for the following conditions. N_1 = 30 rpm; N_Z = 64 rpm and speed steps Z = 6. Assume Vc = 20 m/min.	[5]	2	3
Q.4	Design a 6-speed gearbox for transmitting 10 HP with speeds ranging from 120 rpm, with φ = 1.41. Select the optimum ray diagram and calculate the shaft sizes. Standard spindle speeds for φ = 1.41 are 11.2, 16, 22.4, 31.5, 45, 63, 125, 180, 250, 355, 500, 710, and 1000 rpm.	[5]	2	3
Q.5(a)	Classify machine tool structures based on their functions.	[2]	3	2
Q.5(b)	Evaluate the statement “The greater the unit rigidity of the material, the better the material”, considering structural integrity and performance.	[3]	3	5

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