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

CLASS: BTECH **SEMESTER : V/ADD**
BRANCH: PIE **SESSION : MO/2025**

SUBJECT: PE329 MACHINING SCIENCE AND MACHINE TOOLS

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)	In orthogonal metal cutting, what is shear plane? Discuss how the shear plane angle may be manipulated for reducing the cutting forces.	4	1	3
Q.1(b)	Low carbon steel having a tensile strength of 300 MPa and a shear strength of 220 MPa is cut in a turning operation with a cutting speed of 3.0 m/s. The feed is 0.20 mm/rev and the depth of cut is 3.0 mm. The rake angle of the tool is 5^0. The resulting chip thickness ratio is 0.45. Using Merchant's theory as an approximation of turning, determine (a) the shear plane angle, (b) shear force, (c) cutting force and feed force.	6	1	5
Q.2(a)	What are the different types of chips formed during metal cutting? Also, state the conditions under which they form?	5	2	2
Q.2(b)	Explain any five operations that can be carried out on a lathe machine.	5	2	2
Q.3(a)	If the ratio of return to cutting speed is 3:2 on a shaper and the return speed is 61m/min, how much time is required for 260mm cut? What is the cutting speed? Calculate machining time if feed is 1 mm/cycle and the breadth of the work is 100 mm.	5	3	5
Q.3(b)	With a neat figure of twist drill, explain the twist drill nomenclature.	5	3	2
Q.4(a)	Determine the time required to face mill a workpiece 400 mm long and 250 mm wide with a face mill of 100 mm diameter having 8 teeth. The depth of cut is 3 mm and the feed per tooth is 0.07 mm, cutting speed used is 75 m/min.	6	4	5
Q.4(b)	Explain why a grinding wheel is self-sharpening in nature.	4	4	4
Q.5(a)	Explain the need for use of non-conventional machining processes.	4	5	2
Q.5(b)	Explain with a neat diagram the USM process. When will you use this process?	6	5	2

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