BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID-SEMESTER EXAMINATION MO/2023)

CLASS: BTECH **SEMESTER : V**
BRANCH: PIE **SESSION : MO/2024**

SUBJECT: PE329 MACHINING SCIENCE AND MACHINE TOOLS

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)	Define shear plane and shear angle in orthogonal metal cutting	[1]	CO1	1
Q.1(b)	During orthogonal turning of mild steel at 210 m/min with a tool of rake angle 12^0, the width of cut and the uncut thickness are 1.8 mm and 0.2 mm respectively. If the average value of the coefficient friction between the chip and the tool is 0.55 and the shear strength of the material is 390N/mm^2, Estimate the shear angle, the cutting force and the thrust force, using Merchant's theory. Also calculate the shear angle (without using Merchant's theory), if the chip thickness is 0.5 mm.	[4]	CO1	4
Q.2(a)	With the help of Merchant's circle diagram, derive an expression of shear force in terms of cutting force and thrust force.	[2]	CO1	3
Q.2(b)	Analyze why rake angle of a cutting tool is important. Explain the requirement of negative rake angle in a cutting tool.	[3]	CO1	4
Q.3(a)	Differentiate between flank and crater wear of a cutting tool.	[2]	CO2	4
Q.3(b)	The workpart in a turning operation is 88 mm in diameter and 400 mm long. A feed of 0.25 mm/rev is used in the operation. Assume that the entire workpiece is turned in one pass. If cutting speed = 210 m/min, the tool must be changed every 3 workparts; but if cutting speed = 150 m/min, the tool can be used to produce 20 pieces between tool changes. Determine the values of C and n for Taylor's tool life equation.	[3]	CO2	3
Q.4(a)	Differentiate between steady rest and follower rest.	[2]	CO2	4
Q.4(b)	Explain with a neat diagram how you hold a workpiece between centres.	[3]	CO2	1
Q.5(a)	How do you specify a shaper machine?	[2]	CO3	1
Q.5(b)	Draw a block diagram of a shaper machine and label the major components.	[3]	CO3	3

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