Hall Ticket Number:													

Code No.: 16501

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD B.E. (Mech. Engg.: CBCS) VI-Semester Main & Backlog Examinations, May-2019

Machine Tools and Metal Cutting

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Q.No	. Stem of the question	M	L	CO	PO
	$Part-A (10 \times 2 = 20 Marks)$				
1.	Contrast automatic and semi-automatic lathes.	2	2	1	1
2.	How is the tool-work relationship in turning different from facing?	2	1	1	1
3.	Estimate the Index crank movement to cut a gear of 35 teeth.	2	3	2	2
4.	How does the process of shaping differ from slotting?	2	1	2	1
5.	Why is aluminum oxide used more frequently than silicon carbide as an abrasive?	2	5	3	1
6.	Choose a proper locating element to hold cylindrical work.	2	1	3	1
7.	Justify the use of USM for cutting holes on Glass.	2	5	4	1
8.	Why doesn't the cutting force F_c increase with increased speed V ?	2	6	4	1
9.	List out the important properties of a cutting fluid.	2	1	5	1
10.	How do you estimate Machinability Index?	2	1	5	1
	Part-B $(5 \times 10 = 50 \text{ Marks})$				
11.	a) What are the differences between automatic lathe and capstan lathe? Give an example component suited for capstan lathe with dimensions.	6	1	1	1
1	b) Find the machining time to turn a workpiece of diameter 50 mm to 39 mm on a DC motor operated lathe. The permitted depth of cut in rough machining is 2 mm. The length of the work is 500 mm and the feed is 0.1 mm/rev, permitted cutting speed is 30 m/min.	4	3	1	2
12.	a) Differentiate between a shaper and planer.	6	2	2	1
	b) Estimate the Machining time to cut a single layer on a Planer. The length of the work is 1000 mm and permitted feed is 2 mm/stroke. The time taken for cutting is 20 seconds while the cutting and return time are in 3:2 ratio. The work width is 51 mm.	4	3	2	2
13.	a) What are the factors to be considered for designing a jig or a fixture? Explain with the help of sketches wherever necessary.	6	2	3	
	b) Interpret the Marking system used to identify a Grinding wheel, how do you select one.	4	1	3	
14.	 a) Compare the performance of HSS tools and Carbide tools. Explain the significance of Chip Breakers. 	6	2	4	
	b) The cutting and thrust components of the machining force during orthogonal machining of aluminium with a rake angle of 10° are found to be 312 N and 185 N respectively. Estimate the co-efficient of friction between the tool and chip. If the rake angle is reduced to 0°, keeping all other parameters constant, and if the coefficient of friction also remains unchanged, estimate the new values of cutting and thrust force components using Merchant's first solution.		3	4	

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15.	a)	Explain sources of heat generation and heat distribution in machining operation with a neat sketch. Also explain the necessity of controlling heat in metal	6	2	5	1
		cutting.				
	b)	A single point cutting tool is ground to ASA angle sequence of 7^{0} - 11^{0} - 5^{0} - 5^{0} - 15^{0} - 30^{0} - 0.5 mm. Find the angle sequence according to ORS.	4	2	5	1
16.	a)	Discuss about the problems faced in drilling operation with their causes and possible remedies.	5	2	1	1
	b)	With neat sketch, explain the working of open and cross belt drive in a Planer.	5	1	2	1
17.	Ar	aswer any <i>two</i> of the following:				
	a)	Explain Electron beam machining and Electro chemical machining.	5	2	3	1
	b)	Explain how the principle of thermocouple is used in measuring Chip-Tool contact temperature. Also mention its limitations.	5	2	4	1
	c)	List out four major mechanism of tool wear and explain each one of them with the help of neat sketches.	5	1	5	1

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	82
2	Knowledge on application and analysis (Level-3 & 4)	12
3	*Critical thinking and ability to design (Level-5 & 6)	6
	(*wherever applicable)	

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