CBCS SCHEME

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BME402

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2024
Machining Science and Metrology

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	With a neat sketch, explain the nomenclature of single point cutting tool.	07	L2	CO1
	b.	Explain briefly mechanics of chip formation process.	06	L1	CO1
	c.	The following data refer to an orthogonal cutting process. Chip thickness 0.62 mm, feed 0.2 mm, rake angle 15°. Calculate chip reduction coefficient and shear angle.	07	L3	CO1
		OR			
Q.2	a.	With a neat sketch, explain the main parts of a lathe.	07	L2	CO1
	b.	Briefly explain the major differences between capstan and turret lathe.	06	L1	CO1
	c.	Explain any five operations performed on a lathe.	07	L2	CO1
		Module – 2			
Q.3	a.	Explain with a neat sketch, up milling and down milling methods.	07	L2	CO2
	b.	Briefly explain the broad classification of milling machines.	06	L1	CO2
	c.	By applying the knowledge of indexing, discuss the different types of indexing that are in practice.	07	L2	CO2
		OR			
Q.4	a.	With a neat sketch, explain the radial drilling machine.	07	L2	CO2
	b.	Apply the knowledge of mechanism, explain the quick return mechanism that are used in shaping machine.	06	L3	CO2
	c.	With a neat sketch, explain the centerless grinding machine.	07	L2	CO3
		Module – 3			
Q.5	a.	With neat sketches, analyze the different heat zones that are present during metal cutting process.	07	L2	CO3
	b.	Explain the factors that affect the heat generation in metal cutting process.	06	L2	CO3
	c.	Briefly explain the different wear mechanisms of cutting tools.	07	L2	CO3
		OR			
Q.6	a.	Briefly explain the different cutting tool materials that are used in practice.	07	L2	CO3
	b.	Analyze the life of tool which is used for rough turning which give a tool life of 1 hrs at a cutting speed of 30 m/min. What will be the life of the tool when it is used at the same cutting speed for finish turning? Take n = 0.125 for rough cut and n = 0.1 for finish cut.	06	L4	CO3
	c.	Briefly discuss the different types of cutting fluids.	07	L2	CO3
		Module – 4			
Q.7	a.	Briefly discuss the major objective of metrology.	07	L2	CO4
	b.	Briefly discuss the following standards of measurement: (i) Line standard (ii) End standard (iii) Wave length standard	06	L2	CO4
	c.	Three 100 mm end bars are measured on a level comparator by first wringing them together and comparing with a 300 mm bar. The 300 mm bar has a known error of +40 μm and the three bars together measures 64 μm less than the 300 mm bar. Bar A is 18 μm longer than bar B and 23 μm longer then bar C. Determine the actual length of each bar.	07	L3	CO4
		OR			

Q.8	a.	Briefly explain Inter changeability and selective assembly.	06	L2	CO4
	b.	Define fit. Explain the different types of fits designed for different applications.	06	L2	CO4
	c.	Determine the tolerances on the hole and shaft for a precision running fit designated by 50 H_7g_6. Given: (i) 50 mm lies between 30-50 mm (ii) i(microcs) = 0.45 $(D)^{1/3}$ + 0.001 D (iii) Fundamental deviation for 'H' hole = 0 (iv) Fundamental deviation for 'g' shaft = –2.5 $D^{0.34}$ (v) IT7 = 16i (vi) IT6 = 10i State the actual maximum and minimum sizes of the hole and shaft and maximum and minimum clearances.	08	L3	CO4
Module – 5					
Q.9	a.	Briefly explain with neat sketch, plug and ring gauges.	07	L2	CO5
	b.	With a neat sketch, explain the sigma comparator.	07	L2	CO5
	c.	With a neat sketch, explain the principle of sine bar.	06	L2	CO5
OR					
Q.10	a.	Discuss the different materials used for the construction of gauges.	07	L2	CO5
	b.	With a neat sketch, explain the Zeiss Ultra Optimeter.	07	L2	CO5
	c.	With a neat sketch, explain the Verneir Bevel Protractor.	06	L2	CO5

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