

Code No: R31036 m R10

Set No. 1

III B.Tech I Semester Supplementary Examinations, May/June - 2015 METAL CUTTING & MACHINE TOOLS

(Mechanical Engineering)

Time: 3 hours Max. Marks: 75

Answer any FIVE Questions All Questions carry equal marks

		All Questions carry equal marks *****	
1	a)	During an orthogonal cutting a chip length of 160mm was obtained from an uncut chip length of 350 mm. The cutting tool has 22^0 rake angles and a depth of cut is 0.8mm. Determine the shear plane angle and chip thickness.	[7]
	b)	Explain constructional features of feed gear box with neat sketch.	[8]
2	a)	Sketch and explain a method used for taper turning of long jobs.	[8]
	b)	What are the difference between a face plate and a drive plate? Explain when you use them.	[7]
3	a)	A shaper is operated at 130 cutting strokes per minute and is used to machine a work piece of 300mm in length and 122mm in width. Use a feed of 0.7mm per stroke and a depth of cut of 5mm. Calculate the total machining time for machining the component. The forward stroke is completed in 220°. Calculate the percentage of time when the tool is not contacting the work piece.	[8]
	b)	Discuss the mechanisms involved in a shaper and a planning machine?	[7]
4	a)	Explain with a neat sketch the feed mechanism used on drilling machines.	[10]
	b)	Describe the specifications of horizontal boring machines.	[5]
5	a)	How can sawing be done on milling machine?	[5]
	b)	Describe any one indexing method with its merits and demerits.	[10]
6	a)	Bring out the differences between Lapping and Honing.	[7]
	b)	Sketch and explain the tool and cutter grinding machine.	[8]
7	a)	Explain briefly the important features of following: i) Turning Fixtures ii) Indexing fixtures.	[8]
	b)	What is meant by 3-2-1 principle? Explain.	[7]
8	a)	Discuss various features of CNC meeting.	[8]
	b)	Explain the principle of operation of CNC with neat sketch.	[7]



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Set No. 2

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Time: 3 hours

Answer any FIVE Questions All Questions carry equal marks

1		The orthogonal cutting of steel is done with 10^0 rake tool with a depth of cut 2mm and feed rate of 0.20 mm/rev. The cutting speed is 200 m/min. The chip thickness ratio is 0.31. The vertical cutting force is 1200 N and the horizontal cutting force is 650 N. Calculate from the merchant's theory, the various works done in metal cutting and shear stress.	[15]
2	a)	Explain the principal features of automatic lathes.	[8]
	b)	List out various tool holding devices used in Lathe. Explain any two.	[7]
3	a)	How to specify the planner?	[8]
	b)	How the stroke length and position are adjusted? Explain briefly with a neat sketch.	[7]
4	a)	Describe the working of an upright drilling machine with a neat sketch.	[8]
	b)	What is deep-hole drilling? Explain the problems associated with it.	[7]
5	a)	Sketch and explain the differential method of indexing.	[8]
	b)	Discuss different types of milling cutters used in milling machine.	[7]
6	a)	Explain the operations performed by a broaching machine.	[8]
	b)	What are the advantages and disadvantages of centre less grinding?	[7]
7	a)	What are the principles of clamping? Explain various types of clamps.	[8]
	b)	Describe briefly Principle of Location.	[7]
8	a)	What is meant by CNC? Explain.	[8]
	b)	Describe in detail the advantages of CNC over NC.	[7]



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Set No. 3

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(Mechanical Engineering)

Time: 3 hours Max. Marks: 75

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1	a)	In an orthogonal cutting experiment with a tool of rake angle α = 7^{0} , the chip thickness was found to be 2.5mm when the uncut chip thickness was set to 1mm. Find (i) the shear angle and	[8]
		(ii) the friction angle assuming that Merchant's formula holds good.	
	b)	Write short notes on crater wear and flank wear.	[7]
2	a)	What are the advantages of using collet chuck?	[8]
	b)	Explain in detail the single-spindle automatic lathe and compare it with multi-spindle automatic lathe.	[7]
3	a)	Sketch and explain the working of Slotting machine.	[8]
	b)	Describe the principle of a hydraulic drive quick return mechanism.	[7]
4	a)	Differentiate between multi-spindle and gang drilling machines.	[8]
	b)	Explain with neat sketches any five machining operations performed on vertical boring machines.	[7]
5	a)	Explain the following milling operations: i) Straddle milling ii) Gang milling	[8]
	b)	Sketch and describe a vertical milling machine.	[7]
6	a)	Write short notes on finishing operations that are used in grinding.	[8]
	b)	Describe the working principle of surface grinders.	[7]
7	a)	Discuss the following jigs with a neat sketch. i) Template Jig ii) Leaf Jig	[8]
	b)	Write a short note on work holding devices.	[7]
8	a)	What are the advantages and disadvantages of CNC machines over NC machines?	[8]
	b)	Explain the coordinate system used for vertical CNC milling machines.	[7]



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Set No. 4

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(Mechanical Engineering)

Time: 3 hours Max. Marks: 75

Answer any FIVE Questions All Questions carry equal marks ****

1	a)	How is metal removed in metal cutting? Explain the process with neat sketch?	[7]
	b)	A cutting tool at 35m/min gave a life of one hour twenty minutes, when operating on roughening cuts. What will be the probable life when engaged on light finishing cuts? Take n=0.125 for rough cut n=0.1 for finishing cut.	[8]
2	a)	How is the size of a lathe specified?	[5]
	b)	A taper pin of length 80 mm has a taper length of 48mm. the larger diameter of taper is 83mm and the smaller diameter is 73mm. Determine (i) taper in mm/meter and in degrees (ii) the angle to which the compound rest should be set up (iii) the tail stock setting over.	[10]
3	a)	Describe the automatic feed of the shaper table with a suitable sketch.	[7]
	b)	Explain briefly shaper driving mechanisms.	[8]
4	a)	Explain the working principle of Jig boring machine with a neat sketch.	[8]
	b)	How does a radial drilling machine work?	[7]
5	a)	Describe the construction of milling cutters.	[8]
	b)	What are the differences between face milling and end milling? Explain their applications.	[7]
6	a)	What are the various abrasive machining operations you are familiar with? Explain	[8]
	b)	their application and imitations. Name the various types of abrasive bonds and explain them in detail.	[7]
7	a)	What are the differences between jigs and fixtures?	[8]
	b)	Sketch a typical drill jig and explain its features.	[7]
8		Discuss the applications of CNC machine.	[15]