Total No. of Questions: [10] **SEAT NO. :**

[Total No. of Pages: 02]

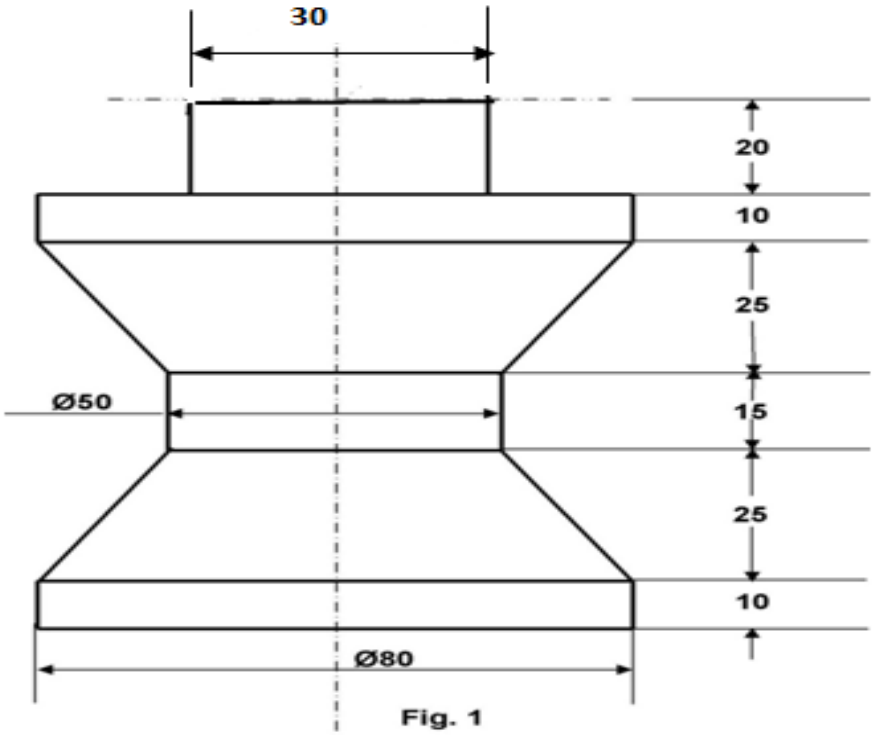
TE PRODUCTION (2015 & 2012 COURSE), NOV. / DEC. 2017
SUBJECT – CUTTING TOOL ENGINEERING (311085)

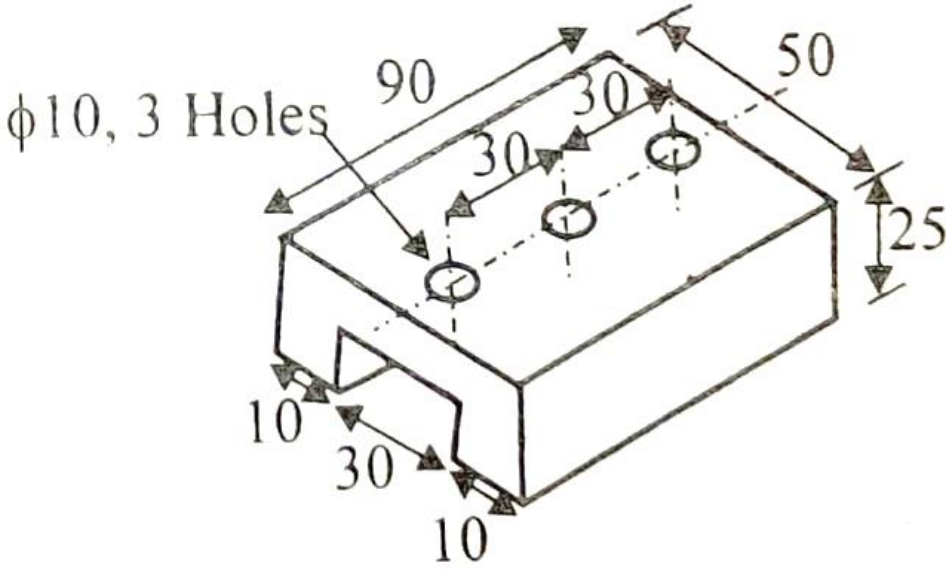
Time: 3 Hours **Max. Marks: 70**

INSTRUCTIONS TO THE CANDIDATES:

1) Answer Q1 **or** Q2, Q3 **or** Q4, Q5 **or** Q6, Q.7 **or** Q.8, Q. 9 **or** Q.10
2) Neat diagrams must be drawn wherever necessary
3) Figures to the right in black indicates full marks
4) Use drawing sheet for Q.9 and Q. 10
5) Assume suitable data if necessary

		Unit-I	
Q. 1		In orthogonal cutting of a mild steel bar of 100 mm diameter, the cutting force was observed to be 90 kg and feed force is 25 kg, chip thickness is 0.25 mm and uncut chip thickness is 0.12 mm. The orthogonal cut was taken at 50 m/min. If the back rake angle of the cutting tool was 6^0, calculate 1) Chip thickness ratio 2) Shear angle 3) Shear strain 4) Coefficient of friction.	**8**
		OR	
Q. 2		Explain with neat sketch Merchants force circle diagram; also explain the different quantities involved and relation between them.	**8**
		Unit-II & III	
Q. 3	a)	Explain with neat sketch different sources of heat generation in metal cutting? Explain the different factors affecting the temperature in machining.	**6**
	b)	A tool cutting at 24 m/min gave a life of 50 minutes between regrinds when operating on rough cuts with medium carbon steel. What will be its probable life when engaged on light finishing cuts? Assume n=0.125 for rough cutting and n = 0.1 for finishing cuts. The tool life and cutting speed relationship is $VT^n=C$.	**6**
		OR	
Q. 4	a)	What are the functions of cutting fluid? List the different properties required for cutting fluid.	**4**
	b)	The Taylor tool life equation was obtained experimentally as $VT^{0.15}$ = 700. A batch of 500 components, each 80 mm in diameter and 200 mm in length, is to be turned using a feed of 0.2 mm/rev. If the tool cost per cutting edge is Rs. 40, time for tool change is 2 minutes and operating cost is Rs. 4 / min, calculate (i) Optimum cutting speed for minimum cost (ii) Tool life for minimum cost (iii) Optimum cutting speed for maximum production rate (iv) Tool life for maximum production rate.	**8**
		Unit-IV	
Q. 5	a)	Calculate the cross section (Rectangular) of a straight shank single point turning tool made of HSS. Data given are, allowable bending stress of HSS = 250 MPa, Young's modulus of HSS = 2 x 10^5 MPa, Main cutting force = 1100 N, Permissible deflection of tool tip = 0.08 mm, L = 1.5 x H	**6**

		and H = 1.6 x B. Also check the tool for rigidity	
	b)	Determine the tool setting height for the circular form tool design by graphical method for the job as shown in fig. 1. Assume rake angle=10^0, relief angle = 8^0 and chip disposal thickness = 5 mm.  Fig. 1	**10**
		OR	
Q. 6	a)	Explain the different steps for design of plain milling cutter.	**8**
	b)	Explain the different steps for design of pull broach.	**8**
		Unit-V	
Q. 7	a)	What do you mean by Jigs and Fixtures? What are the different elements of Jigs and Fixtures? Explain the different materials used in Jigs and Fixtures.	**8**
	b)	First cost of fixture is Rs. 5000 and one run is made per year, saving in labor cost per unit is Rs. 4, burden applied on labor saved is 40 %, annual allowance for depreciation is 10 %, and annual allowance for maintenance and repairs is 50 %. Bank rate of interest per annum is 8 % and annual rate of taxes is 12 %, yearly cost of setup is Rs. 600, find (i) Number of pieces manufactured per year (ii) Number of years to amortize the investment out of earnings.	**8**
		OR	
Q. 8	a)	Explain the different methods of locating the work	**8**
	b)	Explain with neat sketch following principle of location a) Fool proofing principle b) Principle of duplicate locators	**8**
		Unit-VI	
Q. 9		Design a drilling jig for drilling the thee holes of ϕ 10 mm for the component as shown in fig. 2. Draw minimum two views of your design, show the component in position, name all important elements in drawing, write a part list of your design and draw detail view for locating, clamping and bushing.	**18**
		OR	

Q. 10		Design a milling fixture for machining the top 90 x 50 mm surface as shown in fig. 2. Draw minimum two views of your design, show the component in position, name all important elements in drawing, write a part list of your design and draw detail view for locating and clamping.  Fig. 2	**18**