FirstRanker.com
Firstranker's choice
www.FirstRanker.com www.FirstRanker.com

Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 08

M.Tech. (ME)(2017 Batch) (Sem.–2)

ADVANCED METAL CUTTING

Subject Code : MTME-209

M.Code : 74985

Time : 3 Hrs. Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT question.
2. Each question carries TWENTY marks.

1. a) Discuss the tool signatures of a single point cutting tool in ORS and NRS systems. Illustrate all the SPCT elements with different views in both the systems.

   b) Explain the relationship between various forces in orthogonal cutting.

2. a) Prove that according to Ernst Merchant theory, the relation between rake angle (α), shear angle (β) and friction angle (γ) is given by :

$$\beta = \pi/4 - \gamma/2 + \alpha/2$$

   b) Define and explain the significance of chip reduction coefficient. Describe the effect of cutting speed, depth of cut, feed and rake angle on chip reduction coefficient.

3. a) In an orthogonal turning operation, Cutting speed = 80m/min; cutting force = 20 kg; feed force = 8 kg; back rake angle = 15°; feed = 0.2mm/rev; chip thickness = 0.4 mm. Determine : shear angle, work done in shear and shear strain.

   b) Explain the construction and working of four component strain gauge type drill dynamometer.

4. a) Why tool wear is important in metal cutting? Explain the different types of tool wear encountered in machining operations.

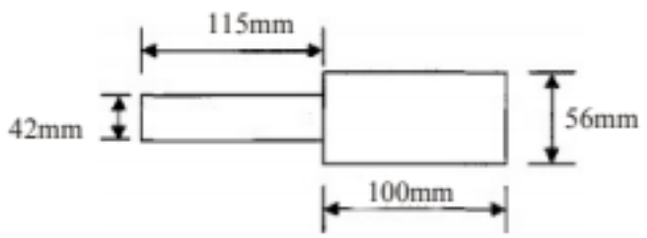
   b) What do you understand by built up edge phenomenon in machining? Discuss the effect of cutting variables on built-up edge (BUE) and built-up layer (BUL).

5. a) Define machinability. Explain the effect of alloying elements on machinability. How does metallurgy of work material affect machinability?

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

FirstRanker.com
Firstranker's choice
www.FirstRanker.com www.FirstRanker.com

b) Find the time required to turn a 60 mm diameter rod to the dimensions shown in the figure. Take cutting speed as 20 m/min, feed as 1.2 mm/rev. All cuts are 3 mm deep. Also give the production rate for 6 hour tool life.



6. a) The following data were recorded while turning a work piece on a lathe: V=25m/min; f = 0.3 mm/rev.; d = 2.0 mm; tool life, T = 100 min. The following tool life equation is given for this operation $VT^{0.12}\ f^{0.7}\ d^{0.3} = C$. If V, f, d are all increased by 25% each & collectively. What will be their effect on tool life?

b) Describe the criterion for selection of cutting tool, process parameters for machining of composites.

7. a) Discuss the factors affecting the surface quality of the machined surface.

b) A 200mm long and 60mm diameter bar is to be turned on a lathe with a feed rate of 0.15mm/rev. The operating cost is Rs 0.50 per minute and the tool cost is Rs. 10 per edge. The tool changing time is about 2 minutes. Assume the weight of work piece as 0.14 kg. The following two work piece materials have been used:

Material	Cost/kg	Tool life equation
X	Rs. 100	$Vt^{0.10} = 67$
Y	Rs. 120	$Vt^{0.16} = 90$

Calculate the tool life values and optimum cutting velocities for minimum cost with no consideration for material cost, and maximum production rate criterion for both work piece materials. State which material should be chosen for total minimum cost.

8. a) Write short note on any one of the following :

(i) ISO recommendation for assessment of machined surface

(ii) Techniques for tools wear measurement.

b) Calculate the machining time required for the slab milling operation for the following data: Diameter of milling cutter = 100 mm, cutter speed = 500 rpm, width of cutter = 100 mm, depth of cut = 5 mm, table feed =100 mm/min, length of work piece = 50 cm, width of work piece = 80 mm & Number of teeth in cutter = 8.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

FirstRanker.com
Firstranker's choice
www.FirstRanker.com