

(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 4089**

Roll No.

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### B.Tech.

(SEM. V) ODD SEMESTER THEORY EXAMINATION

2010-11

### MANUFACTURING PROCESSES – III

Time : 3 Hours

Total Marks : 100

**Note :** Attempt all questions.

1. Answer any **four** of the following : (5×4=20)
  - (a) What are the requisite properties of a cutting tool material? Discuss any one advance cutting tool material in detail.
  - (b) Either cemented carbide or ceramic (oxide) may be used as tool material while machining medium carbon steel. The Taylor tool life equations are :
    - (i) For carbide  $vt^{0.5} = 800$
    - (ii) For oxide  $vt^{1.5} = 8000$ ,
 calculate the breakeven speed above which oxide will give better tool life.
  - (c) What is '*machinability*'? How is machinability index of any metal evaluated?

- (d) With the help of suitable sketch explain specification of a single point cutting tool in American System (ASA).
- (e) A straight turning tool has back rake angle  $\alpha_b$  of  $8^\circ$  and side cutting angle  $\gamma_s$  of  $30^\circ$ . What value of side rake angle  $\alpha_s$  should be taken to achieve orthogonal cutting condition?

2. Answer any **two** of the following : (10×2=20)

- (a) Explain any **two** of the following :
- Built-up edge
  - Oblique cutting, and
  - Discontinuous chips.
- (b) Stating assumptions derive the expression of Merchant's shear angle relationship.
- (c) Show that in orthogonal cutting the shear strain  $\gamma$  can be evaluated from  $\gamma = \frac{1 - 2r \sin\alpha + r^2}{r \cos\alpha}$ , where  $\alpha$  is rake angle and  $r$  is chip thickness ratio.

Answer any **two** of the following : (10×2=20)

- (a) Differentiate between capstan and turret lathes. Which work holding device is used on capstan or turret lathe? Explain them giving suitable diagram.
- (b) with a label schematic diagram describe constructional feature of any **one** of the following :
- Horizontal milling machine, and
  - Radial drilling machine.

- (c) What for reamer is used ? Sketch a reamer and explain functions of its different parts. Also, give the materials of which reamers are made.

4. Answer any **two** of the following : (10×2=20)

- (a) How are shapers classified ? Giving suitable sketch describe quick return mechanism used in shapers.
- (b) Explain any **two** of the following related to grinding process :
- (i) Grinding ratio
  - (ii) 'Grade' of a grinding wheel
  - (iii) 'Structure' of a grinding wheel
  - (iv) 'Dressing' of a grinding wheel.
- (c) Explain broaching process. With a labelled diagram explain functions of each part of an internal broach. Also, give the tooth shape.

5. Answer any **two** of the following : (10×2=20)

- (a) During orthogonal turning of steel with a single point turning tool of 15° orthogonal rake and 75° principal cutting edge angles at a feed rate of 0.2 mm/rev. and depth of cut of 2 mm a chip thickness of 0.36 mm has been observed. If dynamic shear strength of work piece material is 400 N/mm<sup>2</sup>. assuming Merchant's shear angle relationship estimate the cutting force and thrust force components.

- (b) Show that mean undeformed chip thickness  $t'$  in plain milling can be expressed as  $t' = \frac{v}{nN} \sqrt{\left(\frac{d}{D}\right)}$ , where  $v$  is the table speed,  $n$  is number of teeth on the milling cutter,  $N$  is rpm of cutter,  $D$  is diameter of the cutter and  $d$  is depth of cut.
- (c) Discuss the wear mechanism of a grinding wheel. What is wheel loading and glazing? What considerations are made at the time of wheel selection to minimize these?