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

PAPER ID : 4089 Roll No. | | | | | | | | | | |

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 α_b of 8° and side cutting angle γ_s of 30°. What value of side rake angle α_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 :

(i) Built–up edge

(ii) Oblique cutting, and

(iii) Discontinuous chips.

(b) Stating assumptions derive the expression of Merchant's shear angle relationship.

(c) Show that in orthogonal cutting the shear strain γ can be evaluated from $\gamma = \dfrac{1 - 2r\sin\alpha + r^2}{r\cos\alpha}$, where α is rake angel and r is chip thickness ratio.

3. 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 :

(i) Horizontal milling machine, and

(ii) 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 10° 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^2, 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 ?