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

PAPER ID : 4077   Roll No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

B.Tech.

(SEM. V) ODD SEMESTER EXAMINATION 2010-11

MANUFACTURING SCIENCE–II

Time : 3 Hours   *Total Marks : 100*

Note : Attempt **all** questions. Each question carries equal marks.

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

   (a) A tool shape with 10° back rack and 30° side cutting edge angle has to be used under orthogonal cutting condition. The tangential component of cutting force is 400 N and the normal component of cutting force (i.e. thrust component) is 200 N. The cutting velocity is 100 m/min. Calculate :

       (i) the required side rake angle so that cutting is orthogonal,   3

       (ii) the kinetic coefficient of friction and   4

       (iii) energy consumed in friction per unit volume of material removal, if the chip reduction coefficient is 2.5.   3

   (b) (i) If Taylor's tool life exponent n = 0.4 and constant C =250, what will be the percentage increase in tool life when cutting speed is reduced to one-third (i.e. 1/3).   5

       (ii) What is meant by Machinability ? Explain the methods of representing it.   5

   (c) Explain Merchant's force circle diagram and derive the following Merchant's shear angle relationship :

$2\phi + \beta - \alpha = \pi/2$

where ϕ is the shear angle, β is the friction angle and α is the rake angle. 10

2. (a) Differentiate any **two** of the following : (5×2=10)
   (i) Turret lathe and Capstan lathe
   (ii) Compound and Differential indexing
   (iii) Single point and Multipoint cutting tool
   (iv) Horizontal and Vertical milling machine.

   (b) Answer any **two** of the following : (5×2=10)
   (i) Explain the different types of holes and the processes used for making holes.
   (ii) Explain 'Dressing' and 'Truing' of grinding wheel.
   (iii) Give the significance of dimensional tolerance control during various machining processes.

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

   (a) Discuss various factors considered in selection of a grinding wheel.

   (b) Show that the chip length l_s in horizontal surface grinding, using grinding wheel of diameter D is given by

   $$l_s = \left[1 + \frac{v}{V}\right]\sqrt{Dd}$$

   Where V is the wheel speed, v is the work speed and d is the wheel depth of cut.

   (c) Define flaw, roughness and waviness to characterize surfaces. Show surface profile for a rough, lapped and finished object.

4. Answer any **four** of the following :   (5×4=20)

   (a) What is HAZ ? How it affects the quality of weld ?

   (b) Give reasons for failure of weld joints. How we can enhance the life of weld joints ?

   (c) What is the difference between Submerged arc and Electroslag welding ?

   (d) What is Projection welding ? Discuss its advantages and disadvantages.

   (e) Discuss the advantages and disadvantages of A.C. and D.C. supplies for Metal arc welding.

   (f) What is 'arc blow' ? Discuss its causes and precaution for A.C. welding.

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

   (a) What is Electron beam machining (EBM) ? Explain its working principle and application in the field.

   (b) What is Electro-Discharge machining (EDM) ? Derive the expression for material removal rate in EDM.

   (c) What is Ultrasonic machining ? Explain its working principle and application in the field.