

Printed Pages—3

TME504

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

PAPER ID : 4077

Roll No.

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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 rake 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 :
- the required side rake angle so that cutting is orthogonal, 3
 - the kinetic coefficient of friction and 4
 - 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 :

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

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 milled 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.