

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

PAPER ID : 2103 Roll No.

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B.Tech.**(SEM. V) ODD SEMESTER THEORY****EXAMINATION 2013-14****MANUFACTURING SCIENCE—II***Time : 3 Hours**Total Marks : 100***Note :—** Attempt **all** questions. All questions carry equal marks.**1. Attempt any four parts of the following : (4×5=20)**

- (a) What are the various types of chips ? Under what conditions is each formed ?
- (b) Explain the Merchant's force circle diagram and derive the 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. State the assumptions made in the developments of such a diagram.
- (c) What are cutting fluids ? Discuss some of the cutting fluids used during machining.
- (d) When the rake angle is zero during orthogonal cutting,

show that
$$\frac{\tau_s}{U_c} = \frac{(1 - \mu r)r}{1 + r^2}$$

Where symbols have their usual meanings.

- (e) Draw the tool geometry of a single point cutting tool and show the different angles.

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

- (a) What is the difference between Capstan and Turret lathe ?
What are the standard and special tools used on these machines ? How are these tools different to engine lathe tools ?
- (b) Discuss the various criteria used for optimizing the cutting conditions. A cylindrical bar is to be turned. The maximum allowable feed is 0.2 mm/revolution and at this feed rate Taylor's tool life equation for a tool-work combination is found to be $VT^{0.25} = 75$. The labor cost involved in each regrinding of the tool is Rs. 5.00. On the average, it takes about 2 minutes to change the tool. Find the cutting speed that will lead to maximum production rate. Derive the formula used.
- (c) What are the main differences between a shaper and a planer ? Discuss the different drive mechanisms used in shaper with the help of suitable diagram.

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

- (a) What are the various factors to be considered in the selection of a grinding wheel ? Discuss each in detail.
- (b) (i) Why surface finish is important for many applications ? Illustrate your answer.
(ii) Explain the Lapping process. State its uses, limitations and advantages.
- (c) Explain the factors which affect the surface finish in plain milling operations.

A steel block of 20 mm width is being milled using a straight slab milling cutter with 20 teeth, 50 mm diameter, and 10° radial rake. The feed velocity of the table is 15 mm/min and the cutter rotates at 60 rpm. If a depth of cut of 1 mm is used, what will be the power consumption? Assume shear-strength (k) of steel is 250 N/mm² and tool-chip interface friction $\mu = 0.3$.

4. Attempt any **two** parts of the following : **(2×10=20)**
- (a) Explain with neat sketch the working and applications of the following :
 - (i) Coated and uncoated electrode welding
 - (ii) Atomic hydrogen welding.
 - (b) (i) Describe the submerged arc welding process with the help of a suitable diagram. What are the advantages and applications of this process ?
 - (ii) Compare electro-slag welding process with that of submerged arc welding from standpoint of heat liberated, joint preparation and welding position.
 - (c) Describe the oxy-acetylene welding equipments. Draw the different types of flames used in gas welding. How would you identify these flames? What are the specific uses of each of these flames?
5. Attempt any **two** parts of the following : **(2×10=20)**
- (a) What are the main parameters to be considered while selecting a particular unconventional machining process and why?

- (b) (i) How metal removal in EDM is achieved ? Discuss any one spark generator used in EDM.
- (ii) Draw a neat sketch of the Electrode feeding mechanism used in EDM.
- (c) (i) What are the applications of ultrasonic machining ? Why can very hard material be better cut by the ultrasonic process than soft ones ?
- (ii) Compare ECM with EDM. Why isn't ECM as widely used as EDM ?