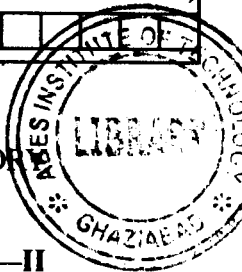


(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2103

Roll No.

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**B.Tech.****(SEM. V) ODD SEMESTER THEORY****EXAMINATION 2010-11****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 is the essential criterion for a cutting tool to give maximum production with minimum maintenance and trouble ?
  - (b) Discuss the importance of shear angle from the standpoint of metal cutting performance. What factors affect its value ?
  - (c) What is machinability ? Explain the factor that affects the machinability of a material.
  - (d) How does the cutting process parameter affects the cutting tool wear in a single point tool ?
  - (e) Derive the Merchant's shear angle relationship  $2\phi + \beta - \alpha = \pi/2$ , where  $\phi$  is the shear angle,  $\beta$  is the friction angle and  $\alpha$  is the rake angle.
2. Attempt any **two** parts of the following :— **(2×10=20)**
  - (a) List the different types of lathes available giving salient features of each. What are the uses of lead screw, tail stock, feed rod, half nut and compound slide in lathe ?

- (b) Classify the different types of milling machines. Explain what are the following operations : boring, reaming, tapping, counter boring, sinking and countersinking.
- (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 important factors which need to be considered for specifying a grinding wheel ? Explain with suitable examples.
- (b) Show that the maximum chip thickness  $t_m$  in surface grinding, using grinding wheel of diameter  $D$ , is given by

$$t_m = \sqrt{\frac{6f}{\pi N D r_g C}} \sqrt{\frac{d}{D}}$$

where  $f$  = feed,  $N$  = No. of abrasive grains per unit area of grinding wheel surface,  $b$  = width,  $d$  = depth of cut.

- (c) The cutting and thrust components of the machining during orthogonal machining of an alloy with a rake angle of  $8^\circ$  are found to be 400 N and 225 N, respectively :
- (i) Estimate the coefficient of friction between the tool and the chip.
- (ii) If the rake angle is reduced to  $0^\circ$ , keeping all other parameters the same and if the coefficient of friction also remains unchanged, estimate the new values of  $F_c$  and  $F_t$  using Lee and Shaffer's solution.

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

- (a) Define resistance welding and the various principle processes. What are the main factors to be considered in resistance welding ? Explain the process and equipment used in this process.
- (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) Explain the inert-gas metal arc welding. How does it differ from other arc welding processes ? Discuss its advantages and disadvantages and applications.

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

- (a) What is the principle of working of electro-chemical machining (ECM) ? Compare ECM with EDM. What are the advantages, disadvantages and applications of ECM ?
- (b) Explain the EDM process in brief. What are the advantages and disadvantages of electrical discharge machining (EDM) process ? When will you go use reverse polarity in the EDM process and what are its advantages and disadvantages ? Also explain the term wear ratio.
- (c) Describe the oxy-acetylene welding equipments. Discuss the appearance and properties of neutral flame, reducing flame and oxidizing flame. Why neutral flame is extensively used in oxy-acetylene welding ?