Printed Pages—3 **EME503**

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

PAPER ID : 2103 | Roll No. | | | | | | | | | | |

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 ϕ is the shear angle, β is the friction angle and α 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° 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°, 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 ?