24261

B. Tech. 5th Semester (Mechanical Engg.)
Examination, December–2012

MANUFACTURING TECHNOLOGY–II

Paper– ME-309-F

Time allowed : 3 hours]   *[Maximum marks : 100*

Note :   *Attempt five questions in all, selecting at least one question from each section.* **Question No. 1 is compulsory.** *All questions carry equal marks.*

1.   (i)   What are the conditions that would allow a continuous chip to be formed in metal cutting ?

     (ii)   Why are synthetic diamonds preferred to natural diamonds as cutting tools ?

     (iii)   Show diagrammatically the variation of flank wear of cutting tool with time.

     (iv)   From the machining performance viewpoint which type of chip is preferred ?

     (v)   What are the locations where heat is produced in an orthogonal cutting tool ? Show there approximate percentages.

     (vi)   Explain the advantages and limitations of Ultrasonic machining.

     (vii)   Discuss the importance of shear angle from the standpoint of metal cutting performance. What factors influence its value ?

     (viii)   How do the cutting process parameters affect the cutting tool wear in single point tools ?

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(ix) Explain why the tool shape in Electric Discharge Machining should be complementary to the final form.

(x) Explain the application of the GRAPHITE as electrode material in EDM. 2×10

Section–A

2. (a) What is meant by built-up-edge (BUE) ? With a neat sketch explain the formation of a BUE. Explain the conditions which promote the growth of BUE along with its consequences.

(b) An orthogonal cutting of steel is done with 10° rake tool, with a depth of cut 2mm and feed rate of 0.20 mm/rev. The cutting speed is 200m /min. The chip thickness ratio is 0.31. The vertical cutting force is 1200N and the horizontal force is 650N. Calculate from the Merchant's theory, the various work done in metal cutting and shear stress.

10+10

3. (a) Which are the suitable tool failure criteria that are generally practiced in industries ? Explain your answers with examples.

(b) What are the various methods available for measuring cutting tool temperature ? Explain their applications and disadvantages.

(c) A single point cutting tool has a zero rake angle and a 2° clearance angle. By what percentage would

the life of the tool between regrinds be increased if a clearance angle of 8° was provided ? State any assumptions made.   6+6+8

Section–B

4. (a) Briefly explain the various process parameters that affect the material removal rate and surface quality in ECM.

   (b) What are the important parameters that control the material removal rate in EDM ? Briefly explain about any two factors.   10+10

5. (a) What is the function of abrasive slurry in USM ? Explain how the abrasive selection is made.

   (b) Calculate the material removal rate and the electrode feed rate in the electrochemical machining of an iron surface that is 25mm × 25mm in cross-section using NaCl in water as electrolyte. The gap between the tool and the workpiece is 0.25 mm. The supply voltage is 12 V DC. The specific resistance of the electrolyte is 3Ω cm.   8+12

Section–C

6. (a) Explain the advantages and limitations of Numerical Control of machine tools.

(b) How is cutter compensation given in the case of a machining center ? Explain it with the help of an example how it is operational. Specify any of the limitations in using this facility. 8+12

7. (a) Explain the concept of location. What do you understand by the 3-2-1 principle of location ?

(b) What are the principles to be considered while placing the locators in different planes of a part ?

(c) Explain briefly about the errors caused by the clamping forces used in holding the workpieces.

8+6+6

Section–D

8. (a) What do mean by Group Technology (GT) in the manufacturing philosophy ? Enlist the benefits of group technology.

(b) Explain the concept of Part families in the light of Group technology. 10+10

9. (a) How classification and coding of parts is done in Group Technology (GT) layouts ? Also give some benefits of using GT principles in production plants.

(b) Write a short note on composite part concept used in Group technology. 10+10