01622

BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING) (BTMEVI)

Term-End Examination

December, 2011

BME-008 : MACHINING TECHNOLOGY

Time : 3 hours   Maximum Marks : 70

Note : Answer any five questions. Use of scientific calculator is permited.

1. Differentiate between 'orthogonal' and 'oblique'   14 cutting. Draw merchant's force circle diagram showing different forces acting on tool, chip and work system. State all assumptions made in deducing the Merchant's equation. Further, from the diagram, derive the expressions for :
   (a) shearing force on the share plane.
   (b) Friction force on the tool face.

2. (a) Show that for orthogonal machining with   7+7 zero degree rake angle tool, the rate of heat generation in metal machining can be expressed as

$$\frac{F_c V_c (1 - \mu r_c)}{J}$$

   Where F_c = cutting force

V_c = cutting speed

μ = coefficient of friction

r_c = chip thickness ratio, and

J = mechanical equivalent of heat

(b) Differentiate clearly between 'crater wear' and 'flank wear' on a cutting tool. What are different causes of tool wear ? Briefly explain each of them. What is 18 : 4 : 1 HSS cutting tool ?

3. (a) What do you understand by M - series and 7+7 T-series of HSS ? Describe the significant characteristic of high speed steels (HSS).

(b) Describe the various methods of making grinding wheels.

4. (a) Briefly describe the process of Ion Beam 7+7 Machining (IBM) with the aid of neat diagram.

(b) Explain the process of metal spraying with the help of a neat diagram.

5. (a) In a tabular form, write the merits and 7+7 limitations of honing, lapping and super finishing.

(b) Compare the mechanism of hoving with that of burnishing and shot peening.

6. (a) What is the difference between chemical **7+7**
machining and Electrochemical
machining ? Explain.

(b) What is the importance of gap between the
electrode and the work piece in ECM ?
Explain.

7. (a) Make a comparison between LASER beam **7+7**
and EBM processes on the basis of their
application and limitations.

(b) With the help of a neat sketch describe
principle and working of Abrasive Jet
Machining (AJM). Discuss the advantages,
limitations and applications.

8. During orthogonal cutting operation with **14**
15° rake angle tool, following observations are
made :

Tool chip contact length, $l = 0.85$ mm,
$l_1 = 0.40$ mm,

$\sigma_{max} = 2500$ kg/cm^2, $\tau_{max} = 800$ kg/cm^2

Calculate the average value of the coefficient of
friction, and the resultant force for a 8 mm wide
cut.