

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

Term-End Examination

June, 2011

BME-008 : MACHINING TECHNOLOGY

Time : 3 hours

Maximum Marks : 70

Note : *Answer any five questions. All questions carry equal marks. Use of calculator is permitted.*

1. (a) With the help of suitable flow chart, give a brief classification of metal-removal processes. 5
- (b) In orthogonal machining processes derive the equation 6

$$\tan \phi = \left(\frac{r_c \cos \alpha}{1 - r_c \sin \alpha} \right)$$

Where ϕ = angle of shear

α = rake angle

r_c = chip thickness ratio

- (c) Differentiate between orthogonal and oblique cutting in metal removal process. 3

2. (a) Write the significance of temperature measurement of the cutting tool in machining. 4
- (b) Show that for orthogonal machining with zero degree rake angle tool, the rate of heat generation in metal machining (PSDZ) can be expressed as 6

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

Where F_c = cutting ratio
 v_c = cutting speed
 μ = coefficient of friction
 r_c = chip thickness ratio
 J = mechanical equivalent of heat.

- (c) When the cutting tool can be regarded to have failed? Give atleast four conditions. 4
3. (a) Describe the term machinability with suitable graph, show the relationship between tool life and cutting speed. Briefly discuss Taylor's tool life equation. 2+3+3
- (b) Explain the following term of grinding wheel. 2x3
- (i) Grit size
- (ii) Grades
- (iii) Structure

4. (a) How grinding wheels are specified ? 3
- (b) With the help of suitable sketch describe through feed grinding and plunge grinding of centreless grinding operation. 6
- (c) A cylindrical shaft having diameter equal to 80 mm and length equal to 600 mm is to be ground. The shaft speed (N_s) is given as 100 rpm the grinding wheel diameter is 400 mm width is 30 mm and downfeed adjustment per cycle is 0.1 mm. Take grinding allowance as 0.2 mm and grinding wheel speed as 1400 rpm calculate; 5
- (i) Peripheral speed of the shaft and grinding wheel in m/s.
- (ii) Total time (t_t) required for grinding the shaft
5. (a) What do you understand by Magnetic Abrasive finishing ? Explain the working principle of Magnetic Abrasive Finishing with the help of suitable sketches. 4+3
- (b) What steps are followed while performing chemical machining ? Explain chemical machining with the help of schematic diagram of chemical machining setup. 4+3

6. (a) Define the term 'tribology' explain it. 3
- (b) Describe the mechanism of material removal of lapping operation. Give its process capabilities and applications. 6
- (c) Explain burnishing operation with suitable sketch. Give its applications. 5
7. (a) Compare LASER beam machining with electron beam machining in terms of process capabilities and cost effectiveness. 4
- (b) With the help of suitable sketch describe Abrasive Jet Machining. 6
- (c) Explain the solid LASER. 4
8. (a) With the help of schematic diagram describe Electric discharge machining. What is the purpose of Flushing ? 5+2
- (b) Derive an expression to calculate metal removal rate in ECM. 7
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