

Seat No. _____

GANPAT UNIVERSITY
B.Tech Semester - VII Mechatronics Engineering / Mechanical
Regular Examination: - November/December 2012
ME 703 / MC 701 - Production Technology

[Time: 3 Hour]

[Total Marks: 70]

Instructions:

- (1) Attempt all questions.
- (2) Assume suitable data if necessary.
- (3) Figures to the right indicate full marks

SECTION - I

- 1 (a) Schematically explain laser beam machining process and characterize the process with their merits and area of applications. 4
- (b) Briefly explain any five types of jigs widely use in drilling operations. 4
- (c) Briefly explain rolling of external screw threads by circular dies with plunge (radial) feed and inherent radial feed. 4

OR

- 1 (a) Draw schematic diagram and explain the significance of different subsystems used in abrasive jet machining process. 4
- (b) With definition of jigs and fixtures explain all design considerations with suitable sketch. 4
- (c) Explain any five kind of locators use to locate blanks in fixture with the help of neat sketch. 4
- 2 (a) Draw the schematic diagram of electrical discharge machining and list out different components with their key role in process of material removal. 4
- (b) Explain any five kind of clamping devices use to clamp blanks in fixture with the help of neat sketch. 4
- (c) Explain internal thread cutting by hand operated tools under production of screw threads by machining. 3

OR

- 2 (a) Draw schematic diagram and list out the effect of process parameter of electrochemical grinding process. 4
- (b) Elaborate general clamping methods of common use for clamping blanks in fixture with suitable sketch. 4
- (c) Explain external thread cutting by hand operated tools under production of screw threads by machining. 3
- 3 Answer the following: (Any Three) 12
- (a) With neat sketch explain all phases of material removal mechanism during electrochemical grinding process.
- (b) Sketch the schematic diagram and explain the process principle of electrochemical machining.
- (c) Draw the schematic diagram and explain working of water jet machining process.
- (d) Explain the working principle of ultrasonic machining process.

SECTION - II

- 4 (a) Draw the three view of a single point cutting tool having tool signature (-5), 5, 8, 8, 10, 15, 2 in ASA system. 4

- (b) "Throwaway carbide inserts have brought revolution in metal cutting industries" - justify the statement. 4
- (c) What is machinability of metals? Discuss the various factors influencing machinability of metals. 4

OR

- 4 (a) Differentiate the Orthogonal cutting and Oblique cutting with neat sketch. 4
- (b) Discuss the various types of tool wear and failures. 4
- (c) Discuss the following cutting tool material with respect to compositions, Manufacturing process, merits, demerits and application. 4

(i) HSS

(ii) Cemented carbide

- 5 (a) Using tool life equation, derive the expression for optimum cutting speed for minimum total cost. 5
- (b) In an orthogonal turning operation on a lathe the following data were obtained: 6
- | | |
|------------------------------|---------------------------|
| Cutting force = 700N. | Feed force = 200N |
| Back rake angle = 10° | Feed rate = 0.127 mm/rev, |
| Chip thickness = 0.2 mm, | Cutting speed = 60 m/min, |
| Work piece diameter = 120 mm | Depth of cut = 0.4 mm, |
- Determine: (i) Chip thickness ratio (ii) Shear angle (iii) Coefficient of friction angle (iv) Shear stress (v) Shear strain (vi) Strain energy and (vii) Chip flow velocity.

OR

- 5 (a) What is chip thickness ratio? With usual notion, derive the expression showing relationship between shear plane, chip thickness ratio and rake angle. 4
- (b) Draw the merchant circle diagram showing all forces acting during the machining. State the assumption made in it. 3
- (c) An automatic lathe is to be used machine brass components 75 mm long × 50 mm diameter using a depth of cut of 1.25. Select the speed that minimizes the machining cost and calculate the corresponding tool life. Also estimate the cutting speed for minimum time of production. 4

Assume that Labour + overhead rate

Rs. 5.00 per hour

Reconditioning cost of tool edge

Rs 0.25 per edge

Loading and unloading time of work piece

15 sec

Tool changing time

5 min,

Feed

0.2 mm/rev

Tool life relation

$VT^{0.25} = 300$.

- 6 Answer the following: (Any Three) 12

- (a) Discuss various means to reduce the punch load.
- (b) Calculate the maximum punch force necessary to blank a steel washer 44 mm outside diameter, 22.22 mm inside diameter and 2.0 mm thick, if $\tau_s = 400\text{N/mm}^2$. Estimate the work done if percentage is 25%. Find the punch and die dimensions.
- (c) Discuss the types of chip produced during machining along with the factors responsible for it.
- (d) Draw the geometry of a twist drill and discuss the important elements and angle with their functions.

END OF PAPER