GANPAT UNIVERSITY

B.Tech. Sem. VII (Mechanical / Mechatronics) Regular Examination

November – 2011

ME703/MC701 – Production Technology

Max. Time: 3 Hrs. **Max. Marks: 70**

Instructions:

(1) Attempt all question.
(2) Figure to right indicates full marks.
(3) Assume additional data if required.
(4) Draw neat sketch whenever required.
(5) Answer each section in separate book.

SECTION – I

Q- 1 12

(a) Discuss the types of chip produced during machining along with the factors responsible for it.

(b) Discuss the sources of heat generated and ways and means of heat decapitation during machining.

(c) Discuss the orthogonal and oblique method of machining.

OR

Q-1 (a) What is tool signature? Discuss the effect of rack angle, relief angle, side cutting edge angle and nose radius on machining process. 12

(b) Discuss the following cutting tool materials with respect to composion, merits, demerits and field applications.

(i) High carbon steel
(ii) Cemented carbide
(iii) CBN

(c) Give broad classification of cutting tools giving example in each case.

Q – 2 11

(a) What is chip thickness ratio? With usual notation, derive the expression showing relationship between shear plane angle, chip thickness ratio and rack angle.

(b) Draw the neat sketch of merchant circle diagram showing all forces. .

(c) In orthogonal turning of a hollow tube, the following observations have been obtained :

(i) Cutting velocity = 20m/min
(ii) Back rake angle = 8°
(iii) Feed rate = 0.2 mm/rev.
(iv) Cutting force = 2000 N.
(v) Feed force = 300 N.
(vi) Outside diameter of tube = 50 m.m.
(vii) Inside diameter of tube = 48 m.m.
(viii) Length of chip per revolution = 80 m.m.

Determine :

(i) Coefficient of friction between chip-tool interface.
(ii) Shear plane angle.
(iii) Chip flow velocity.
(iv) Mean shear stress of material

OR

P.T.O.

Q – 2 11

(a) Explain :
  (i) Machinability index of metals.
  (ii) Economic cutting speed.

(b) Using Taylor's tool-life equation $VT^n = C$, derive the following expression for optimum cutting speed. $V_0 = C\,[C_m/C_t.n/1\text{-}n]^n$

(c) A M.S. rod of 60 m.m. diameter is to be machined at 30m/min cutting speed with carbide tool has tool life of 2 hrs. If cutting speed increases by 30 % the tool life drops by 20 %,. What will be the life of same tool if diameter of rod is increased by 50 % keeping r.p.m. constant?

Q – 3 Answer any three of the following. 12

(a) Draw the geometry of a twist drill and discuss the important elements and angle with their functions.

(b) Discuss the advantages, disadvantages and field applications of brazed tools v/s throwaway carbide inserts.

(c) Discuss the crater and frank wear of cutting tool.

(e) List the different type of gear boxes used in machine tool and discuss any one of them.

SECTION – II

Q – 4 12

(a) What do you understand by zigs and fixtures? Discuss the advantages of using its in mass production.

(b) List the various clamping devices and explain the working of pneumatics and hydraulic operated clamping devices.

(c) Discuss the 3-2-1 principle of location.

OR

Q-4 (a) With the help of sketch discuss the important elements of press tool design. 12

(b) Calculate the maximum punch force necessary to blank a steel washer 44mm outside diameter, 22.22mm inside diameter and 2.0 mm thick, if $\tau s = 400 N/mm^2$. Estimate the work done if percentage penetration is 25%. Find also punch and die dimensions.

(c) Differentiate between centre of pressure and centre of gravity.

Q – 5 11

(a) With the help of diagram explain the working principle of E.D.M. process. List the important process parameter and discuss their effects on material removal rate.

(b) Distinguish between conventional and unconventional machining processes. With suitable example, justify the requirements and development of unconventional machining process.

(c) Draw the schematic diagram of an abrasive jet machining and explain the mechanism of metal removal.

OR

(a) List the various methods of manufacturing gears. Discuss any one of them in detail with sketch. 11

(b) Discuss the different methods for gear finishing.

Q – 6 Write short notes on any three of the following. 12

(a) Ultrasonic machining

(b) Types of locators

(c) CNC machine tools

(d) Laser beam machining

End of Paper