

**GANPAT UNIVERSITY****B. Tech. Semester: VII Mechanical/ Mechatronics Engineering****Regular Examination Nov – Dec 2015****2ME703 - PRODUCTION TECHNOLOGY****Time: 3 Hours****Total Marks: 70**

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

**Section - I**

- Que. – 1**
- (a) Define various angles of single point cutting tool. **4**
  - (b) What is machinability index? Discuss the various factors influencing machinability of metals. **4**
  - (c) Explain crater wear and flank wear in detail with suitable sketch. **4**

**OR**

- Que. – 1**
- (a) In Orthogonal turning of a low carbon steel bar of diameter 150 mm with uncoated carbide tool, the cutting velocity is 90 m/min. The feed is 0.24 mm/rev and the depth of cut is 2 mm. The chip thickness obtained is 0.48 mm. If the orthogonal rake angle is zero and the principal cutting edge angle is  $90^\circ$ , find the shear angle in degree. **4**
  - (b) Explain tool signature. What are the importance of positive and negative rake angles? **4**
  - (c) Discuss the types of chip produced during machining along with the factors responsible for it. **4**
- Que. – 2**
- (a) Why a build-up edge on a tool is undesirable? Why are chip breakers used? **5**
  - (b) In an orthogonal cutting operations the following data has been observed during turning mild steel of 60 mm diameter on lathe: **6**  
 Cutting speed = 24 m/min., tool rake angle =  $32^\circ$ , feed rate = 0.12 mm/rev., tangential/ cutting force = 3000 N, feed force = 1200 N, length of continuous chip in one revolution = 96 mm. Determine
    - (i) Coefficient of friction
    - (ii) Shear plane angle
    - (iii) Velocity of chip along tool face
    - (iv) Chip thickness

**OR**

- Que. – 2**
- (a) During orthogonal cutting a bar of 90 mm diameter is reduced to 87.5 mm. If the mean length of the cut chip is 88.2 mm and rake angle is  $15^\circ$ , calculate cutting ratio, shear angle and shear strain. **5**
  - (b) State assumptions made in Merchant Circle Analysis. Derive the forces on the chip by Merchant Circle Analysis. **6**
- Que. – 3 Attempt All.** **12**
- (a) Derive the expression for Ernst-Merchant 1<sup>st</sup> Angle relationship.



- (b) During straight turning of a 24 mm diameter steel bar at 300 rpm with an HSS tool, a tool life of 9 min. was obtained. When the same bar was turned at 250 rpm, the tool life increased to 48.5 min. What will be the tool life at a speed of 280 rpm?
- (c) Briefly explain the formation of chip in metal cutting with suitable sketch.

#### Section – II

- Que. – 4 (a) Describe with neat sketch any three types of clamping device with their features and application. 4
- (b) Explain the working principle of EDM with schematic diagram. Explain the components of EDM in detail. What is the purpose of dielectric medium in EDM? 4
- (c) Explain briefly the methods of reducing cutting forces. Differentiate between a “Drop through” and “Inverted” blanking die. 4

#### OR

- Que. – 4 (a) A hole of 60 mm diameter is to be produced in steel plate 2.5 mm thick. The ultimate shear strength of the plate material is  $450 \text{ N/mm}^2$ . If the punching force is to be reduced to half of the force using a punch without shear, estimate the amount of shear on the punch. Take percentage penetration as 40 %. 4
- (b) Explain the principle of metal shearing in press working. Describe different types of dies in detail. 4
- (c) Differentiate the following: a) EBM and LBM b) AJM and WJM 4

- Que. – 5 (a) Define the following with neat sketch. 6
- (i) Blanking (ii) Punching (iii) Notching  
(iv) Lancing (v) Nibbling (vi) Perforating
- (b) Explain the process AJM in detail with suitable diagram. List the applications and limitations of AJM. 5

#### OR

- Que. – 5 (a) Define “Center of pressure” in press tool design. 6
- Estimate the blanking force to cut a blank 25 mm wide and 30 mm long from a 1.5 mm thick metal strip, if the ultimate shear stress of the material is  $450 \text{ N/mm}^2$ . Also determine the work done if the percentage penetration is 25 % of material thickness.
- (b) Name and explain briefly various methods used for cutting internal and external threads. 5

- Que. – 6 Attempt All 12
- (a) Sketch the schematic diagram and explain the process principle of electro chemical machining.
- (b) Define jig and fixture. What are the advantages of jigs and fixtures?
- (c) Write a short note on “Economics of machining”.
- (d) Explain “3-2-1 principle” of locating a work piece.

END OF PAPER