

GANPAT UNIVERSITY

B. Tech. Semester: VII Mechanical/ Mechatronics Engineering

Regular Examination November – December 2014

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) Explain briefly with neat sketch the following: 4
Orthogonal cutting and Oblique cutting
- (b) Enlist and explain any six cutting tool materials briefly. What are the importance of positive and negative rake angles? 4
- (c) Explain briefly the following types of chips: 4
Continuous chip, Discontinuous chip and Build up chip

OR

- Que. – 1 (a) What is Build up edge? Why a Build up edge on a tool is undesirable? 4
- (b) Discuss the various types of tool wear and failures. 4
- (c) List and explain various types of single point cutting tools. 4

- Que. – 2 (a) A Carbide tool with a mild steel work-piece was found to give life of 2 hours while cutting at 48 m/min. If Taylor's exponent $n=0.27$, determine 5
(i) The tool life if the same tool is used at a speed of 20 percent higher than the previous one.

(ii) The value of cutting speed if the tool is required to have tool life of 3 hours.

- (b) What is chip thickness ratio? With usual notion, derive the expression showing relationship between shear plane, chip thickness ratio and rake angle. 6

OR

- Que. – 2 (a) In an orthogonal cutting operations the following data has been observed: 5
Chip length obtained = 96 mm
Uncut chip length = 240 mm
Rake angle used = 20°
Depth of cut = 0.6 mm
Horizontal and vertical components of cutting force = 2400 N and 240 N respectively.

Determine the value of shear plane angle, chip thickness, frictional angle, and resultant cutting force.

- (b) Using tool life equation, derive the expression for optimum cutting speed for minimum total cost. 6

- Que. – 3 Attempt All. 12

- (a) Discuss briefly 'Friction in metal cutting'.

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- (b) During orthogonal machining with a cutting tool having a 12° rake angle, the chip thickness is measured to be 0.44 mm, the uncut chip thickness being 0.18 mm. Determine Shear plane angle and shear strain.
- (c) Discuss briefly the following:
Side cutting angle, Side relief angle, Back rake angle, nose radius
- (d) What is machinability index? What is the function of chip breakers?

Section – II

- Que. – 4** (a) Enumerate various types of clamps. Explain in detail with neat sketch any three clamping devices. 4
- (b) Classification of method for gear manufacturing. Explain any three methods in details. 4
- (c) Describe briefly with a neat diagram the working principle of Laser Beam Machining (LBM)? What are its advantages, limitations and applications? 4

OR

- Que. – 4** (a) What do you understand by 'Degree of freedom'? List the main components or elements of jigs and fixtures. 4
- (b) Explain the factor affecting the Torque and Axial thrust in drilling machining operation. 4
- (c) What is Chemical Machining? State its advantages and limitations. 4

- Que. – 5** (a) Differentiate the following: a) ECG and ECM b) AJM and PAM 6
- (b) Explain the working principle of Electro-Chemical machining process. 3
- (c) Why LBM cannot be used for machining Al and Ag? 2

OR

- Que. – 5** (a) Give the comparison of gear hobbing and gear shaping. Explain with neat sketch the thread rolling method of making threads. 6
- (b) Explain briefly the following methods of gear finishing. 5
1. Gear shaving
 2. Gear burnishing
 3. Gear grinding
 4. Gear lapping
 5. Gear honing

Que. – 6 Attempt All 12

- (a) Explain Six-pin method (3-2-1 method).
- (b) How are jigs and fixtures classified? Write the principles of Jigs and Fixtures design.
- (c) Describe briefly with a neat diagram the working principle of Ultra Sonic Machining (USM)? Give also its advantages, limitations and applications.
- (d) Sketch the schematic diagram and explain the process principle of Electron Beam machining.

END OF PAPER