

GANPAT UNIVERSITY
M. TECH SEM- I(AMT)REGULAR EXAMINATION NOV-DEC 2015
3ME103 ANALYSIS OF METAL FORMING AND MACHINING PROCESSES

MAX. TIME: 3 HRS

MAX. MARKS: 60

- Instructions:** (1) This Question paper has two sections. Attempt each section in separate answer book.
 (2) Figures on right indicate marks.
 (3) Be precise and to the point in answering the descriptive questions.
 (4) Assume suitable data if necessary.

Section: I

- Q.1 Answer the following:** [10]
- [A] What is flow stress? Discuss the ideal flow curve for different materials. Also explain the effect of strain rate in metal forming. (5)
- [B] What is the difference between conventional and true stress-strain. Derive an expression for relationship between them. Discuss the need of true stress- strain in metal forming analysis. (5)

OR

- Q.1 Answer the following:** [10]
- [A] What is the effect of temperature in metal forming process? Explain how mechanical properties vary with temperature in carbon steel. (5)
- [B] Derive an expression for the pressure distribution in rolling strip in plain strain condition. (5)

- Q.2 Answer the following:** [10]
- [A] A 100 mm diameter forging billet is decreased in height from 300 to 100 mm (5)
- (a) Determine the average axial strain and true strain in the direction of compression
- (b) What is the final diameter of the forging?
- (c) What is the transverse plastic strain?
- [B] Explain the state of stress acting in wire drawing process. Also derive an expression for draw stress for wire drawing. (5)

OR

- Q.2 Answer the following:** [10]
- [A] A strip 150 mm wide and 400 mm length and 10 mm thick is compressed in plane strain such that the dimension 400 mm remains same. The yield strength of material in uniaxial compression is equal to 200 N/mm^2 . Determine the average and maximum die pressure if the coefficient of friction on the interface between die and material is 0.10. (5)
- [B] What would be the total strain experienced by a block compressed in five successive passes each having 15% reduction in area. (5)

- Q.3 Answer the following: (Any Two) [10]
- [A] Discuss the super plasticity of metal and alloys in detail. (5)
- [B] Explain the effect of the following factors on the rolling load. (5)
- (a) The coefficient of friction
- (b) Forward and backward tension
- (c) Reduction
- (d) Diameter of rolls
- [C] What do you mean by High Energy Rate Forming? Explain Explosive Forming with neat sketch. (5)

Section: II

- Q.4 Answer the following: [10]
- [A] Define electro discharge machining process? Explain the process parameters effect on surface finish in detail. (5)
- [B] Explain why different abrasives produce different material removal rate. Also give reasons for inaccuracies in Abrasive Jet Machining process. (5)

OR

- Q.4 Answer the following: [10]
- [A] Explain laser beam machining process with neat sketch and characterize the process by its merits and demerits. (5)
- [B] With suitable example enlist the necessities that contribute to the development of non-conventional machining process and classify them. (5)

- Q.5 Answer the following: [10]
- [A] Discuss the various phases of material removal mechanism in electrochemical grinding with neat sketch. (5)
- [B] Why ductile material erode less than brittle material in Ultrasonic Machining process? Also derive an expression for MRR in machining of ductile materials by Ultrasonic Machining. (5)

OR

- Q.5 Answer the following: [10]
- [A] Schematically explain cryogenic machining process. (5)
- [B] What is meant by machinability? Explain the method of representing the machinability. (5)

- Q.6 Answer the following: (Any Two) [10]
- [A] Draw the schematic diagram and discuss the role of subsystems used in water jet machining. (5)
- [B] How do you define tool life? Explain the parameters that control the tool life of a single point cutting tool in detail. (5)
- [C] What are the types of pulse generators used in EDM process? Discuss the merits and demerits of each one. (5)

End of Paper