

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)**

**CLASS: BE
BRANCH: PRODUCTION**

**SEMESTER: VI
SESSION : SP/2020**

SUBJECT : PE6003 MATERIAL DEFORMATION PROCESSES

TIME: 1.5 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 30.
 2. Candidates may attempt for all 30 marks.
 3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. The missing data, if any, may be assumed suitably.
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- Q1 (a) Differentiate between direct and indirect extrusion. [2]
(b) What do you understand by hot working processes? List its advantages. [3]
- Q2 (a) Explain the concept of strain hardening. What effect does it have on yield strength of a material? [2]
(b) Write the expression of flow stress in case of strain hardening and prove that the strain hardening index 'n' is equal to strain value at UTS [3]
- Q3 (a) For a specimen undergoing metal working process $\epsilon_x=0.05$ and $\epsilon_y=0.15$. Find the value ϵ_z . [2]
(b) What do you understand by principal stresses? Give their expression on a 2D plane. Show that the sum of principal stress is constant. [3]
- Q4 In a plane stress system $\sigma_x = 750$ MPa, $\sigma_y = 150$ MPa, $\sigma_z = 0$ & $\tau_{xy} = 150$ MPa. Determine principal stresses. If the above stress system just causes yielding, what is the uniaxial yield stress Y of material according to Tresca yield criterion. [5]
- Q5 (a) How does the strain rate effect the flow strength of material? Give its expression also [2]
(b) Explain Baushinger effect. [3]
- Q6 Give the statement, expression and applicability for the following: [5]
a. Maximum Shear Stress Theory
b. Maximum Distortion Energy Theory

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