BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO/2024)

CLASS: BTECH **SEMESTER : V**
BRANCH: PIE **SESSION : MO/2024**

SUBJECT: PE319 MATERIAL DEFORMATION PROCESSES

TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)		Demonstrate the stages of annealing after cold working explaining the effect on mechanical properties with the help of a neat diagram [2]	CO1	BL2
Q.1(b)	I.	Explain the sequential steps involved in impression die forging with the help of neat sketches. [2+1]	CO1	BL2
	II.	Identify the need of flash and flash gutter in closed die forging.		BL2
Q.2(a)	I.	Cite examples of parts manufactured by deep drawing process. [1+2]	CO1	BL1
	II.	Explain the state of stress in deep drawing with the help of a neat diagram.		BL3
Q.2(b)	I.	Differentiate between ausforming and isoforming with the help of CCT diagrams. [2+1]	CO1	BL2
	II.	Demonstrate the main principle of explosive forming with the help of a diagram.		BL2
Q.3(a)		Derive the relationship between true strain and engineering strain. [2]	CO2	BL2
Q.3(b)		The state of stress in N/mm^2 at a point is given by [3]	CO2	BL3

$$\begin{bmatrix} 10 & 4 & 0 \\ 4 & 12 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

Solve for the principal stresses.

Q.4(a)		State the assumptions of Levy Mises equations. [2]	CO2	BL1
Q.4(b)	I.	Starting from the strain as a function of displacement equations, derive the compatibility equations. [2+1]	CO2	BL3
	II.	Discuss the physical significance of compatibility equations.		
Q.5(a)		Define hydrostatic and deviatoric stress explaining their significance. [2]	CO2	BL3
Q.5(b)		In a tension test of steel, a specimen of circular cross section with original diameter 9 mm is used. The loads applied were 22 kN and 28 kN which reduces its diameter to 8.6 mm and 8.3 mm, respectively. Determine [3]	CO2	BL3
	A.	true stress and true strain for given loads		
	B.	strain hardening exponent and strength coefficient		

::::::25/09/2024::::::M