BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2025)

CLASS: BTECH. **SEMESTER : VI**
BRANCH: MECH/PIE **SESSION : SP/2025**

SUBJECT: PE337 MANUFACTURING SCIENCE

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)	Explain the two different types of slag trap systems with the help of neat diagrams.	[2]	CO1	BL2
Q.1(b)	Illustrate with suitable schematic diagrams, the design mistakes to avoid while pouring basin design.	[3]	CO1	BL3
Q.2(a)	Differentiate between pressurized and unpressurized gating systems.	[2]	CO1	BL4
Q.2(b)	In a top gating system design, a sprue of 180 mm in length has a diameter of 20 mm at its top end. The liquid metal in the pouring basin is maintained up to 60 mm height. Evaluate the diameter of the sprue at its lower end to avoid aspiration.	[3]	CO1	BL4
Q.3(a)	A cup is to be drawn in a deep drawing operation. The height of the cup is 75 mm and its inside diameter = 100 mm. The sheet metal thickness = 2 mm. If the blank diameter = 225 mm, determine: (a) drawing ratio, (b) reduction, and (c) thickness-to-diameter ratio. (d) Does the operation seem feasible?	[2]	CO2	BL3 BL5
Q.3(b)	A plate of copper with an initial size of 25 mm x 60 mm x 220 mm is homogeneously press-forged between flat dies to final dimensions of 15 mm x 100 mm x 220 mm. The mean flow stress in plain strain condition 104 N/mm^2. Evaluate the types of friction acting (sticking, sliding or intermediate sticking and sliding) at the die-job interface, when the coefficient of friction is (a) 0.1; (b) 0.3; and (c) 0.5.	[3]	CO2	BL5
Q.4(a)	Explain the sequential steps in impression die-forging with the help of neat diagrams.	[2]	CO2	BL2
Q.4(b)	Discuss the different lubrication regimes with the help of neat diagrams.	[3]	CO2	BL2
Q.5(a)	Define angle of bite and derive a relationship between maximum possible draft, roll radius and coefficient of friction for an unaided rolling pass.	[2]	CO2	BL1 BL3
Q.5(b)	A compound die will be used to blank and punch a large washer out of a brass sheet stock 3.0 mm thick. The outside diameter of the washer = 92 mm and the inside diameter = 50 mm. The clearance allowance is assumed to be 7% of the sheet thickness. Estimate: (a) the punch and die sizes for the blanking operation, (b) the punch and die sizes for the punching operation, and (c) the minimum load to perform the blanking and punching operation if the brass sheet metal has a tensile strength = 360 MPa. Assume that blanking and punching occur simultaneously.	[3]	CO2	BL4

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