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December 2023 (REEXAM)

SY (SEMESTER - I)

COURSE NAME: Manufacturing Process   Branch: Mechanical COURSECODE: MEUA21202
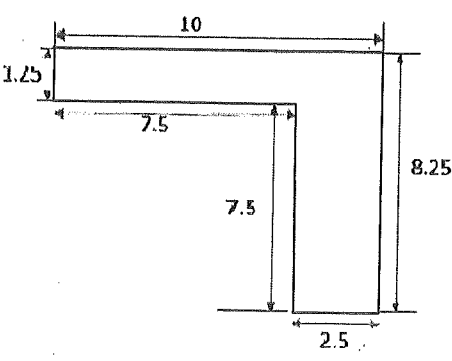(PATTERN 2020)

Time: [2 Hrs]   [Max. Marks: 60]

(*) Instructions to candidates:
1) **Figures to the right indicate full marks.**
2) **Use of scientific calculator is allowed**
3) **Use suitable data wherever required**
4) **All questions are compulsory. Solve any two sub questions each from each Question 1 ,2, 3,4,5,and 6 respectively**

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) A casting made of cast iron weighs 4.2 kg, the riser and gating systems add another 2.1 kg to the total metal poured during the operation. The melting temperature of this grade of cast iron =1180°C, the density =7.6 g/cm³, specific heat of the solid and molten metal = 0.46 J/g °C, and the heat of fusion =126 J/g. Compute the volume of the casting, unit energy required for melting and pouring, and total energy required to heat the metal to pouring temperature of 1300°C from a starting room temperature of 25°C.	[5]	1	3
	b) A steel rectangular plate casting with dimensions 7.5 cm x 12.5 cm x 2.0 cm has solidified in 1.8 minutes.The cylinder for the riser will have diameter-to-height ratio=1.0. Calculate the dimensions of the riser so that its solidification time = 2.2 minutes.	[5]	1	3
	c) A cube shaped casting with certain alloy and type of sand mold solidifies in 160 sec. The cube was 45 mm on a side. If the same alloy and mold type were used for cylindrical casting whose diameter = 40 mm and length = 80 mm, calculate the total solidification time.	[5]	1	3
Q2	a) Wire is drawn through as draw die with entrance angle =15°. Starting diameter = 2.5 mm and final diameter = 2.0 mm. The coefficient of friction at work-die interface = 0.07. The strength coefficient of metal is 205 MPa and strain hardening exponent, n = 0.20. Compute the draw stress and draw force in this operation.	[5]	2	3
	b) Choose the suitable bulk deformation process used in	[5]	2	3

	manufacturing of commercial aluminum doors and windows frames.			
	c) A 300 mm wide strip, 25 mm thick is fed through two high rolling mills, each of radius=250 mm. The work thickness is to be reduced to 22 mm in one pass at roll speed of 50 rev/min. Strength coefficient =275 MPa, n=0.15 and coefficient friction is assumed to be 0.12. Calculate the roll force if the friction is sufficient to accomplish rolling operation.	[5]	2	3
Q3.	a) Explain the Shielded Metal Arc Welding process with applications.	[5]	3	2
	b) Describe the Gas Metal Arc Welding process with its merits and demerits.	[5]	3	2
	c) Explain the Oxyacetylene fusion welding process with its application.	[5]	3	2
Q.4	a) Describe the Injection molding process for thermoplastic materials with its application.	[5]	4	2
	b) Explain the Vacuum thermoforming process with its application.	[5]	4	2
	c) Explain the extrusion blow molding process used in manufacturing of double layer bottles with its advantages.	[5]	4	2
Q.5	a)A drawing operation is used to form a cylindrical cup of low-carbon steel with inside diameter = 75 mm and height = 50 mm. The starting blank size = 138 mm stock thickness= 2.4 mm. If the operation is feasible, calculate the drawing force for given tensile strength of 300 MPa.	[5]	5	3
	b) Calculate the center of pressure of the following irregular shaped blank. (All dimensions are in centimeters) 10 1.25 7.5 8.25 7.5 2.5	[5]	5	3
	c) A compound die is used to blank and punch a large washerof 6061ST aluminum alloy sheet stock of	[5]	5	3

	3.2 mm thick. The outside diameter of the washer is 25.0 mm, and the inside diameter is 12.0 mm. Compute the punch and die sizes for the blanking operation, and the punching operation.				
Q.6)	a)A cylindrical workpiece of 200 mm length is turned from diameter of 60 mm to 50 mm, with depth of cut =1.25 mm, feed = 0.5 mm/rev and cutting speed = 40 m/min. Calculate the machining time required to complete the turning operation.	[5]	6	3
	b) A steel piece 100 mm long is to be taper turned for length of 40 mm from its one end. Diameter of the work piece s 20 mm and smaller end of the tapered part ends in a point. Compute the angle through which the compound rest has to be swiveled in order to turn the required taper.	[5]	6	3
	c) To cut 7 mm pitch thread on lathe having lead screw of 4 TPI. Calculate the gear train and sketch it. Gear set is from 20 to 120 in steps of 5 and 127 teeth wheel.	[5]	6	3

Note: - BT Level- 1-Remember, 2-Understand, 3- Apply. 4-Analyze, 5-Evaluate, 6-Create