END-SEMESTER EXAMINATION WINTER 2022-2023

Time : 3.00 hrs, Subject: Manufacturing Processes (MEI102) Full marks - 48

Part – I

Q.1(a)	Classify different bulk deformation process and represent them with the help of appropriate sketches.	2
(b)	With the help of sketch discuss different classes of forging processes.	2
(c)	State and discuss the hollow section extrusion process with an appropriate diagram.	2
Q.2(a)	A tensile test specimen has a starting gage length = 50 mm and a cross-sectional area = 200 mm². During the test, the specimen yields under a load of 32,000 N (this is the 0.2% offset) at a gage length of 50.2 mm. The maximum load of 65,000 N is reached at a gage length of 57.7 mm just before necking begins. Final fracture occurs at a gage length of 63.5 mm. Determine (a) yield strength, (b) modulus of elasticity, (c) tensile strength, (d) engineering strain at maximum load, and (e) percent elongation.	2
(b)	With the help of sketches illustrate the different pipe and tube manufacturing processes.	2
(c)	Differentiate between hot and cold working process in a tabular format.	2

Part -II

Q.1	What influences contribute to the Kerf's size, and how do they impact the cutting process?	2
Q.2	In arc welding, current, voltage, and electrode speed were 140 A, 22V, and 15 cm/min, respectively. Find out the heat input per unit length.	2
Q.3	If the current is increased 4 times and duration is reduced by half (other parameters remain unchanged) the order of change in the heat generated in a welding process is?	2
Q.4	With a neat sketch, explain two welding defects due to electrode travel speed.	2
Q.5	Estimate the time required to fabricate a circular hollow cylinder prototype using Stereolithography, with an outside diameter of 110 mm, an inside diameter of 100 mm, and a height of 100 mm. The layer thickness of the cylinder is 0.8 mm, and the diameter of the laser beam is 0.2 mm. The beam is moved across the surface of the photopolymer at a velocity of 350 mm/s. Additionally, 10 s are lost each layer to lower the height of the platform that holds the part.	3
Q.6	What are the amplitude and frequency ranges used in ultrasonic welding?	1

Part – III

Q.1	(a) Neatly draw the geometry of a single point cutting tool projected on the three mutually perpendicular planes as per the American Standards Association (ASA) system.	3
	(b) In this diagram, identify and write the **names** (not symbols) of all angles, which are needed for the nomenclature of the single point cutting tool as per ASA.	3
	(c) Also, suitably label all other important parts of the single point cutting tool in this diagram.	2
Q.2	(a) Determine the shear angle during an orthogonal machining operation, where the uncut thickness is 0.2 mm, the chip thickness is 0.5 mm, and the cutting tool has 10^{o} rake angle.	2
	(b) A cutting tool of rake angle 10 degree is machining mild steel at a cutting speed of 200 m/min. The uncut thickness is 0.2 mm, and the width of cut is 2 mm. Shear stress of the work material is 400 N/mm^2. Coefficient of friction between the chip and the tool is 0.5. Determine the shear angle.	2

Part – IV

Q.3	A cast iron block of 150 mm length and 90 mm width is to be machined using a shaping machine operating at 45 strokes/minute. The depth of cut and the feed rate are 2 mm and 0.5 mm/stroke, respectively. The stroke length and the quick return ratio of the machine is 200 mm and 3, respectively. Determine (a) the time needed to machine the complete workpiece, (b) the volume of metal removed during this time, (c) velocity of the cutting stroke **in m/s**, (d) velocity of the return stroke **in m/s.**	**1+1+1 +1**
Q.4	(a) What is the function of the lips in a twist drill?	1
	(b) Name different types of grinding operations.	3
	(c) Neatly draw labelled diagrams of (i) Live riser, (ii) Dead riser.	2
	(d) With the help of a neat and properly labelled diagram, mathematically prove that air aspiration occurs in case of a cylindrical sprue.	2