UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2021

Course: Manufacturing Technology   **Semester: V**
Program: B.Tech Mechatronics   **Duration: 3 hours**
Course Code: MEPD 3010P   **Max. Marks: 100**
Instruction:

	SECTION A		
Q-1	Name the process based on the given statements a) Wax pattern is used for high accuracy of the product b) Granular flux is used with the invisible arc c) Cutting velocity is gain by reciprocation of the tool while the feed is given to table d) High speed multipoint cutter is used to cut in the peripheral direction.	4	CO1
Q-2	Name the type of cutting tool used in the lathe machine. Give the name of various angles provided to this cutting tool	4	CO1
Q-3	Describe the part of gating system used to compensate the liquid shrinkage in the casting process. Enlist the other functions of the same.	4	CO1
Q-4	Explain the effect of polarity in the welding of process.	4	CO2
Q-5	Differentiate between limit, fit and tolerances.	4	CO2
	SECTION B		
Q-6	Describe the die casting process. Explain its advantage and disadvantages.	10	CO2
Q-7	a) Compare constant current and constant voltage characteristics of welding power source b) The arc length and voltage characteristics of the DC power source is given by the equation V =30+5L. The static volt-ampere characteristics is approximated by straight line. V_{OC}= 80 Volt and I_{SC} 600 Amp. Find optimum arc length and the power required under this condition.	10	CO3
Q-8	a) Describe the types of wear in metal cutting operation. b) Compare orthogonal and oblique cutting processes.	10	CO4
Q-9	Two metallic sheets each of which 2mm thickness are welded by in lab joint configuration by resistance spot welding at a welding current of 10 KA and welding time of 20 milliseconds. A spherical fusion zone extending up to full thickness of each sheet is formed. The effective resistance is 80 micro ohms, density 7500 kg/m3, latent heat 200 KJ/kg, Cp is 850 J/Kg K, melting temperature 1900K, ambient temperature 293K. Find the melting efficiency. **OR** A low carbon steel plate is to welded by MMAW using a linear VI characteristics DC power source. The following data are available. O_{CV}= 60 Volts Isc= 120 Amp, arc length 5 mm. travel speed of the welding is 15 cm/ sec. efficiency of heat input is equals to 85%. Voltage	10	CO3

	is given as V = 20+5L. Calculate the heat input into workpiece. If the area of nuggets is 40 mm2 and units energy for melting is 50 J/mm^3 calculate the length of weld that can be formed in 30 seconds.		
	SECTION C		
Q-10	In an orthogonal cutting operation the following data is given Cutting force:- 1400N rake angle = 12^0 Thrust force:- 700N feed:- 0.8 mm/rev thickness of the chip:- 3.2mm Cutting velocity:- 18 m/min depth of cut:- 2mm Calculate the following based on the merchant's theory a. Friction force and normal to friction force and friction angle b. Shear strength and normal stress on the shear plane c. Shear plane velocity and chip velocity d. Power consumed in friction, shear deformation and total power consumption e. Specific energy for cutting	**20**	**CO4**
Q-11	a) Compare different types of flames in gas welding process. b) Tolerances for a hole and shaft assembly having a nominal size of 50 mm are as follows: hole dimensions $50^{+0.02}_{+0.00}$ mm and shaft dimensions $50^{+0.05}_{+0.08}$ mm. answer the following i) Draw the tolerance diagram. ii) Find upper and lower dimension of the hole and the shaft iii)Type of fit iv)Maximum interference/ clearance v) Hole and shaft tolerance. **OR** a) Derive the expression for shear plane angle using orthogonal cutting model. The end of the pipe is orthogonally cut with the tool of -12^0 rake angle. The chip thickness measured was 0.5 mm whereas the feed was 0.2 mm/ rev. determine the shear plane angle. b) Compare TIG and MIG welding process.	**10+10**	**CO2**