UPES

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

Course: Manufacturing processes
Program: B.Tech Mechanical
Course Code: MEPD 3011
Instruction:

Semester: V
Duration: 3 hours
Max. Marks: 100

	SECTION A		
Q-1	Enlist the functions of Riser and pattern in the casting process	**4**	**CO1**
Q-2	Differentiate between single point and multipoint cutting tool	**4**	**CO1**
Q-3	Explain the effect of polarity on the geometry of weld bead in the welding process	**4**	**CO3**
Q-4	Rolling of a 40 mm slab is performed using 1000 mm diameter rolls. Coefficient of friction between the roll and slab is 0.2. find the value of maximum draft and bite angle in the process.	**4**	**CO2**
Q-5	Compare advance manufacturing processes with conventional manufacturing	**4**	**CO3**
	SECTION B		
Q-6	Explain the effect of density of core sand in casting process. In a sand casting of a hollow part of aluminium a cylindrical core of diameter 150 mm and height 200 mm is used. The density of core material and the lead is 1800 kg/cm^3 and 2700 kg/cm^3 is used. Find the net force that tends to lift the core.	**10**	**CO2**
Q-7	Describe the steps involved in the powder metallurgy process with the help of neat sketch **OR** Describe the working principle, advantages and disadvantages of any one additive manufacturing processes.	**10**	**CO1**
Q-8	Explain the working principle of electro chemical machining. Derive the expression for MRR in electro chemical machining process **OR** Explain the working principle of electro discharge machining. Derive the expression for pulse on and pulse off time in case of R-C relaxation generator in EDM.	**10**	**CO3**
Q-9	Create energy balance equation in the arc welding process for the nugget of definite cross sectional area and weld length.	**10**	**CO4**
	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	**20**	**CO2**

	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 **OR** A plate of thickness 120mm and width 250mm is to be rolled for reducing its thickness to 40mm. following are the data given for the process. Roll radius = 400mm coefficient of friction= 0.2 roller speed = 50 RPM Assume that material follows the power law in which value of strength coefficient is 500MPa and strain hardening exponent is n=0.3. find i. Number rolling passes required. **(5)** **ii.** Torque and power required for one pass of rolling. Take value of a= 0.5 and average flow stresses as a value of average rolling pressure. **(8+7)**		
Q-11	Analyze the open die forging of rectangular slab between two flat dies to find the force required in the process, considering both sticking and sliding friction condition	20	CO3