Name: **Enrolment No:**	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: B.Tech. Mechatronics **Semester: V**
Course: Manufacturing Technology **Time: 03 hrs.**
Course code: MHEG 357 **Max. Marks: 100**
No. of pages: 2 **Instructions:**

SECTION A

S. No.		Marks	CO
Q1.	Discuss the classification of manufacturing processes.	**4**	**CO1**
Q2.	Explain the purpose of CO_2 moulding. Write the chemical equation and use of various materials used in it.	**4**	**CO2**
Q3.	Differentiate between Pressurised and Non-pressurised gating system.	**4**	**CO2**
Q4.	Calculate the indexing required while cutting a gear with 36 teeth? The counts available on the indexing plate are 21, 23, 27, 29, 31, and 33. Use simple indexing.	**4**	**CO3**
Q5.	Differentiate between DCEP and DCEN in welding with applications.	**4**	**CO2**

SECTION B

Q6.	Low carbon steel having a tensile strength of 300 MPa and a shear strength of 220 MPa is cut in a turning operation with a cutting speed of 3.0 m/s. The feed is 0.20 mm/rev and the depth of cut is 3.0 mm. The rake angle of the tool is 5˚ in the direction of chip flow. The resulting chip ratio is 0.45. Using the orthogonal model as an approximation of turning, determine (a) The shear plane angle, (b) Shear force, (c) Cutting force and feed force. **Or** In an orthogonal machining operation: Uncut thickness = 0.5 mm, Cutting speed = 20 m/min, Rake angle = 15° Width of cut = 5 mm, Chip thickness = 0.7 mm Thrust force = 200 N, Cutting force = 1200 N Assume Merchant's theory. Calculate the following 1) The coefficient of friction at the tool-chip interface. 2) The percentage of total energy dissipated due to friction at the tool-chip interface.	**10**	**CO3**

	3) The values of shear angle and shear strain. 4) Shear strength of work material.		
Q7.	A drilling operation is to be performed with a 12.7-mm diameter twist drill in a steel work part. The hole is a blind hole at a depth of 60 mm and the point angle is 118˚. The cutting speed is 25 m/min and the feed is 0.30 mm/rev. Determine (a) The cutting time to complete the drilling operation, and (b) Metal removal rate during the operation, after the drill bit reaches full diameter.	**10**	**CO3**
Q8.	Explain the 3-2-1 principle of locating pins.	**10**	**CO2**
Q9.	Design a GO and NO GO plug gauge for 25 H_8/f_9 fit. The basic size falls in diameter range of 18-30 mm. The fundamental deviation for 'f' shaft is **$-5.5\ D^{0.41}$.** The values of standard tolerances for grades of IT 9 and IT 8 are 40i and 25i respectively. Assume suitable wear allowance. Sketch the gauges with values.	**10**	**CO3**
	SECTION-C		
Q10.	a) During a steady state gas metal arc welding with direct current electrode positive, the welding current, voltage, and welding speed are 150A, 30V, 6m/ min. A metallic wire electrode of diameter 1.2 mm is being fed at a constant rate of 12m/min. The density, specific heat and melting temp of the wire electrode are 7000 kg/m^3, 500J/Kg, 1530°C. Assuming ambient temp to be 30°C and neglect latent heat of melting. Further consider that 2/3rd of the total electrical power is available for melting. Calculate the melting efficiency of the wire electrode? b) Compare the solidification time of 2 optimum side risers. One is cylinder and other is a square parallelepiped. Both have same material and same volume.	**10** **10**	**CO4**
Q11.	a) Explain the following welding procedures 1. Submerged arc welding 2. Gas Tungsten Arc welding b) Explain in detail the investment casting process with neat diagram along with its applications. **Or** a) Explain in detail resistance welding and its types with their advantages-disadvantages and applications. b) Explain in detail the shell moulding process with neat diagram along with its applications.	**10** **10** **10** **10**	**CO2**