Name: **Enrolment No:**	UPES UNIVERSITY OF TOMORROW

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Supplementary Examination, December 2023

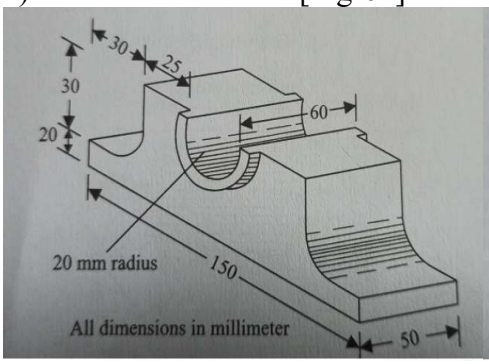
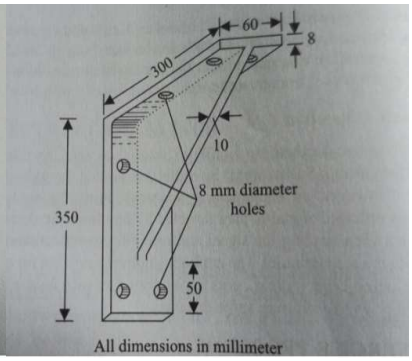
Course: Aircraft Manufacturing Technology **Semester: V**
Program: B. Tech Aerospace **Time : 03 hrs.**
Course Code: ASEG 3025P **Max. Marks: 100**

Instructions: Make use of sketches/plots to elaborate your answer. Brief and to-the-point, answers are expected. Assume suitable data if needed.

SECTION A
(5Qx4M=20Marks)

Q. No.		Marks	CO
1	**I.** The process of making hollow castings of non-circular shape and desired thickness by permanent mould without the use of cores is known as (a) Die casting (b) Slush casting (c) Pressed casting (d) Centrifugal casting **II.** Which one of the following is the correct statement? In a centrifugal casting method (a) No core is used (b) Core may be made of any metal (c) Core is made of sand (d) Core is made of ferrous metal **III.** Turbine blade can be made through centrifugal casting [True/ False] **IV.** Interference fit joints are provided for: (a) Assembling bush bearing in housing (b) Mounting heavy duty gears on shafts (c) Mounting pulley on shafts (d) Assembly of flywheels on shafts	**4**	**CO1**
2	State the merits of a casting process. And sheet metal operation.	**4**	**CO1**
3	Define the general method of the fabrication process in the aircraft components.	**4**	**CO1**
4	Discuss the material removal process in metal cutting operation.	**4**	**C03**
5	List down the application of following welding process. 1) TIG	**4**	**CO2**

	2) Arc welding 3) Gas Welding 4) Submerged arc welding		
	SECTION B **(4Qx10M= 40 Marks)**		
6	Discuss the following casting process and their application with neat sketch. a) Continuous casting [03] b) Centrifugal casting [03] c) Investment casting [03] d) Draw the placement of riser with end wall condition [01]	**10**	**CO2**
7	Discuss the effect of following tool geometry on machining process. a) Positive Back rake angle b) Negative Back rake angle c) Side rake angle d) Cutting edge angle e) Nose radius **OR** Discuss the economics of machining operations and calculate optimum cutting velocity and tool life based on maximum production and maximum profit criteria	**10**	**CO2**
8	Discuss the following cutting tool material based on the property posses by the cutting tool. 1. High speed steel tool 2. Carbides 3. Ceramics 4. Diamond 5. CBN	**10**	**CO3**
9	a) Calculate the dimension of the sprue to avoid air aspiration effect to feed liquid metal at the rate of 25 kg/s. height of the sprue is 20 cm and height of the pouring basin is 9 cm. assume the density of liquid metal 7800 kg/ m^3 . **[06]** b) In a gating design mould dimensions 50 x 25 x 15 cm. height of liquid metal above the gate is 15 cm. c/s area of gate 5 cm^2. Determine time required to fill the cavity using top and bottom gate. **[04]**	**10**	**CO3**
	SECTION-C **(2Qx20M=40 Marks)**		
10	a) Explain the three types of oxy-acetylene flames. Indicate with the help of sketches the various zones, respective temperature ranges and applications of each type of flame. **[14]**	**20**	**CO4**

	b) Discuss the challenges of manufacturing of aircraft components in the Indian market. **[06]** **OR** A) Design of down sprue, avoiding aspiration as shown in the figure to deliver liquid cast iron (density = 7800 kg/m^3) at a rate of 10 kg/sec against no head at the base of sprue. Neglect the frictional and orifice effects. [10] B) Sketch the pattern with allowances for casting the following articles. [10] a) Cast iron Bearing Block [Fig-01] b) Aluminum bracket [Fig-02]   Fig-01 Fig-02		
11	An XYZ company want to manufacture the following products a. Turbine blade b. Aircraft Wing c. Cylinder Head for IC engine d. Bevel Gear used for power transmission e. Small connecting rod Analyze and Prepare the proper manufacturing sheet with proper justification in terms of cost and selection of the right manufacturing process (assume suitable data to justify your answer)	**20**	**CO3**