Name: **Enrolment No:**	UPES

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

Course: Manufacturing Technology II **Semester: V**
Programme: B. Tech Mechanical/Mechanical with spcl. **Time: 03 hrs.**
Course Code: MHEG 232 **Max. Marks: 100**
Instructions: *Be specific, precise and neat with your work.*

SECTION A

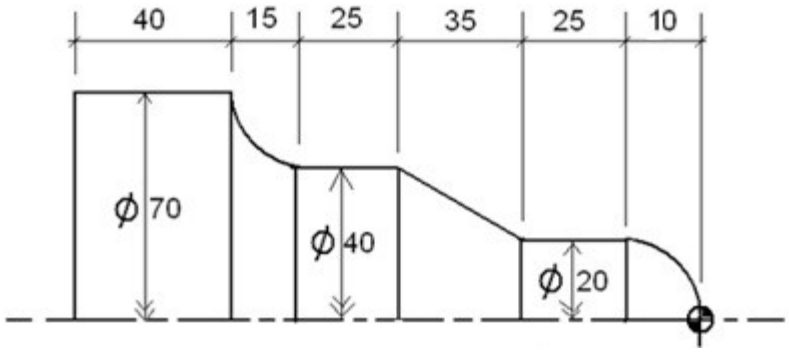
S. No.		Marks	CO
Q1	A stepper motor having resolution 1.2° is driving the lead screw of a CNC machine. The lead screw has pitch of 1.5 mm. Calculate the basic length unit for the machine.	**4**	**CO3**
Q2	Derive the expression for shear strain in metal cutting.	**4**	**CO2**
Q3	Derive the expression for average chip thickness in milling operation.	**4**	**CO2**
Q4	Differentiate between open and close loop control system in CNC.	**4**	**CO2**
Q5	State the advantages of Non-Traditional Machining processes.	**4**	**CO1**

SECTION B

Q6	Derive the expressions for the following with neat Merchant Circle Diagram. Provided that thrust force and cutting forces be measured experimentally through dynamometer. a. Shear Force and Normal to shear force b. Friction Force and Normal force **OR** Estimate the time required to machine a cast iron surface 250 mm long and 150 mm wide on a shaper with cutting to return ratio of 3:2 under following conditions. Cutting speed 10 m/min Feed 1 mm/stroke Clearance length 25mm Available strokes on shaper are: 12, 24, 48, 72 strokes per minute. Also determine the MRR if depth of cut is 2 mm.	**10**	**CO2**
Q7	Explain linear interpolation with the help of Simple DDA algorithm.	**10**	**CO1**
Q8	A gear with 69 teeth need to be produced on milling machine using dividing head with following plates with respective no. of holes.	**10**	**CO3**

		Plate No. 1	15	16	17	18	19	20		
		Plate No. 2	21	23	27	29	31	33		
		Plate No. 3	37	39	41	43	47	49		
	Suggest the Procedure for a. Simple Indexing b. Compound Indexing									
Q9	Derive the expression for shear plane angle in terms of rake angle and chip thickness ratio with a neat diagram.								**10**	**CO2**
	SECTION-C									
Q9	a. Composition of a Nickel super alloy is as follows: Ni = 70.0%, Cr = 20.0%, Fe = 5.0% and rest Titanium. Calculate rate of dissolution if the area of the tool is 1500 mm^2 and a current of 2000 A is being passed through the cell. Use the following table								**20**	**CO3**
		Element	Atomic Weight(g/mol)		Density(g/cm^3)		Valency			
		Ni	58.71		8.9		2			
		Fe	55.85		7.86		2			
		Cr	51.99		7.19		2			
		Ti	47.9		4.51		3			
	b. In an EDM operation, with R-C circuit, following data is available Supply voltage = 80 V Breakdown voltage = 60 V Resistance (R) = 12 ohms Percentage of discharge energy available for material removal= 20% Calculate the time required to drill a square hole of side 10 mm in a steel work piece having thickness of 20mm. Also calculate the MRR. Specific energy for melting steel is 2.3J/mm^3									
Q10	a. Write part program for profile turning the part shown in the figure in incremental programming mode. Spindle speed:- 1000 rpm feed:- 0.1 mm/revolution								**20**	**CO4** **CO2**

Tool location:- T4



b. Explain the usage of tool radius compensation with example.

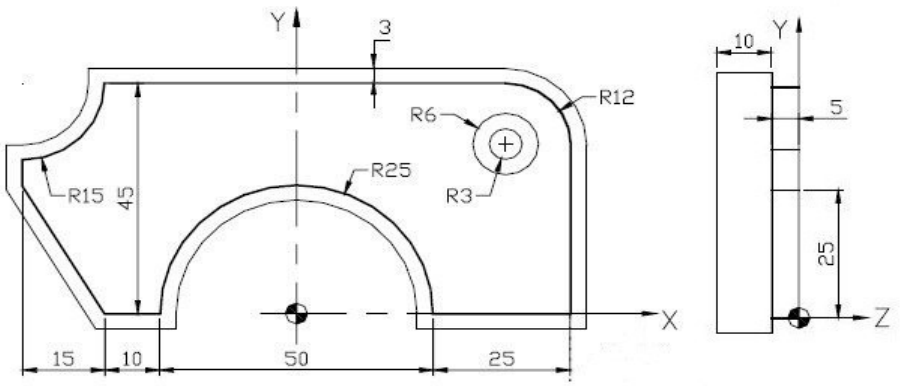
OR

a. Write CNC program for profile milling for the part shown in the figure with following parameters

Spindle speed:- 1200 rpm Tool location:- T2

Tool radius:- 10 mm feed: 100 mm/min

Step depth: 2mm



b. Explain the usage of canned cycle with example