Ref. No. : Ex/ME (M2)/PE/B/T/325H/2023

B.E. MECHANICAL ENGINEERING THIRD YEAR SECOND SEMESTER - 2023

ADVANCED PRODUCTION PROCESSES

Time: **3 hour** Full Marks: **100**

Answer any ***five*** questions
Assume suitable data if necessary.

1. Derive the following expression for USM

$$Q \propto \frac{dF^{\frac{3}{4}} A^{\frac{3}{4}} C^{\frac{1}{4}}}{H_W^{\frac{3}{4}} (1+\lambda)^{\frac{3}{4}}} V$$

Notations bear usual meanings. (20)

2. a) Discuss the basic principle and general features of generative manufacturing processes (10)

   b) Explain the steriolithography with photo polymerization. (10+10)

3. a) Discuss the selective laser sintering process. (8)

   b) Explain fused deposition modelling and laminated object manufacturing process. (12)

4. a) Why adaptive control is needed? (5)

   b) Explain different adaptive control systems. (15)

5. a) What are the basic components of NC system (5)

   b) State the difference between absolute vs. incremental positioning system in NC (5)

   c) State the advantages and disadvantages of CNC (10)

6. a) An alloy contains Ni (72.5%), Cr (19.5%), Fe (5.0%), Ti (0.4%), Si (1.0%), Mn(1.0%) and Cu (0.6%). The related information about the metals is given below:

Metal	gram atomic weight	valency of dissolution	density (g/cc)
Ni	58.71	2	8.90
Cr	51.99	2	7.19
Fe	55.85	2	7.86
Ti	47.90	3	4.51
Si	28.09	4	2.33
Mn	54.94	2	7.43
Cu	63.57	1	8.96

Calculate the mrr in cc/min when a current of 1000 A is passed (10)

   b) Discuss working principle of ECM process with necessary equations (10)

7. The part in below Fig.1 is to be drilled on a turret type drill press. The part is 15.0 mm thick. There are three drill sizes to be used: 8 mm, 10 mm, 12 mm. These drills are to be specified in the part program by tool turret positions T01, T02 and T03. All tooling is high speed steel. Cutting speed=75 mm/min and feed=0.08mm/rev. Use the lower left corner of the part as origin in the x-y axis system. Write the part program in the word address format using absolute positioning. All the dimensions in Fig. are in mm. (20)

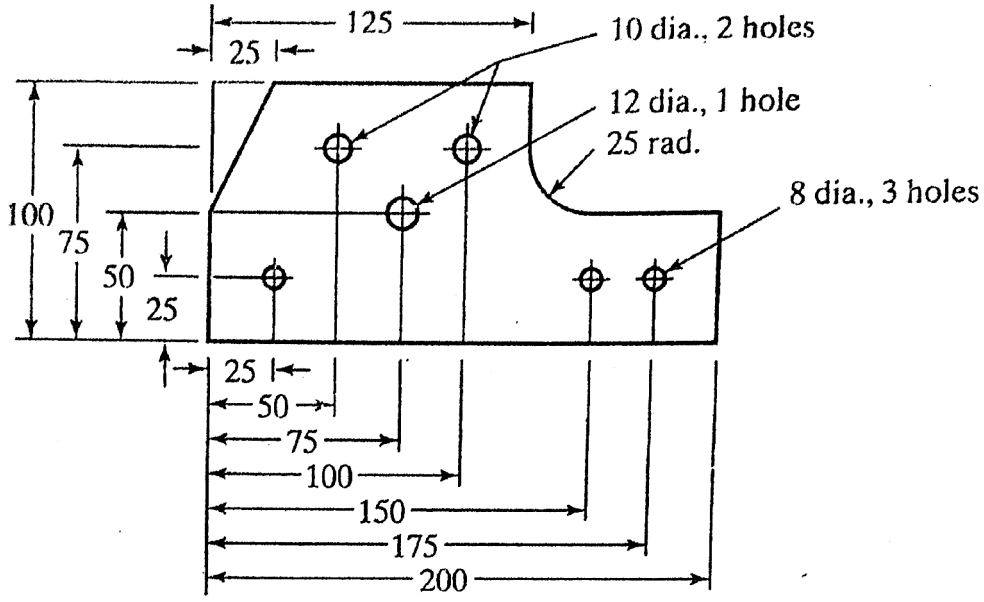

Fig.1