

B.E. MECHANICAL ENGINEERING THIRD YEAR SECOND SEMESTER - 2025**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

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

Notations bear usual meanings.

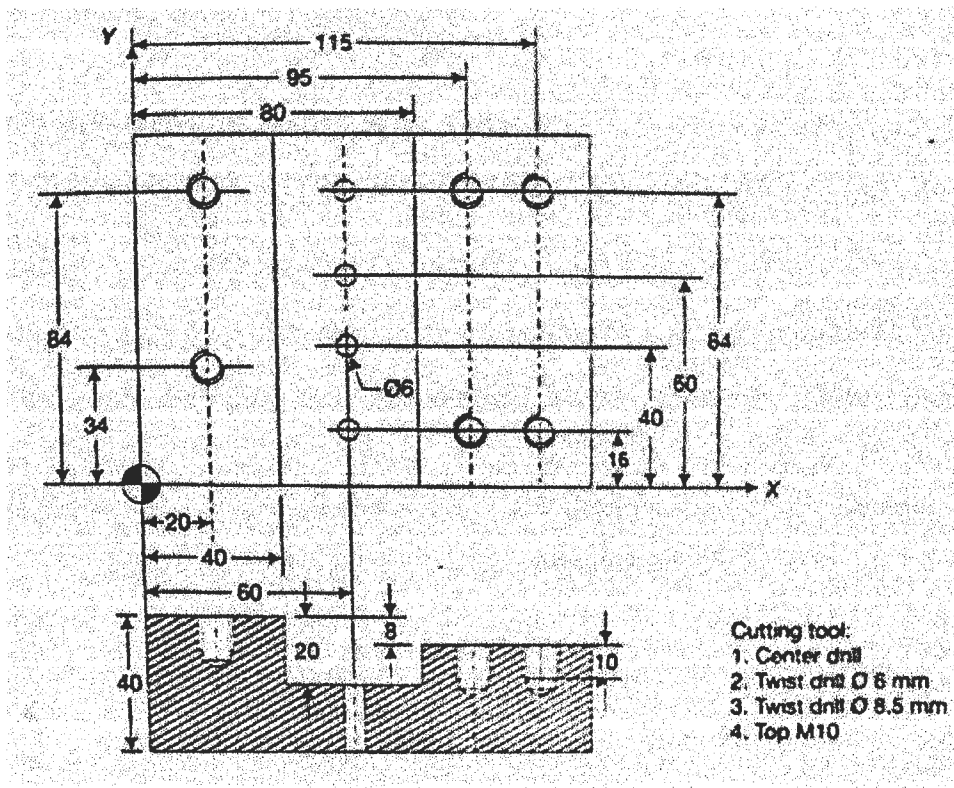
(20)

2. a) Discuss different categories production system.
b) Explain briefly three different automations.
c) Explain open loop control system and closed loop control system?
(6+6+8)
3. a) Why adaptive control is needed?
b) Explain different adaptive control systems.
(5+15)
4. a) Explain motion control systems in NC system.
b) Mention the functions of the following codes: M02, M03, M05, M30, G90, G92, G28, G41, G17, "P05 R15"
(10+10)
5. 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.

- b) Explain EDM process with a neat sketch?
 c) What are the criteria for selecting electrode material in EDM?
 d) What are the basic requirements of dielectric fluid in EDM? (10+6+2+2)
6. a) Discuss the basic principle and general features of generative manufacturing Processes
 b) Explain the stereolithography with photo polymerization. (10+10)
7. a) Describe diamond micromachining process
 b) What are the different types of lithography based micro fabrication processes.
 c) Explain steps and sequences for micromachining using lithography? (10+4+6)
8. The component to be machined is shown in Figure below. All the hole-making operations are to be machined using the tools to be specified. The point to be noted in the above component is that the top surface is at three different levels as such, the Clearance plane will be different for each of these planes. Write the part program using appropriate canned cycle (20)



(All the dimensions are in mm)