

**B.E. MECHANICAL ENGINEERING THIRD YEAR SECOND SEMESTER-2022
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 the basic principle and general features of generative manufacturing processes (10)
- b) Explain the steriolithography with photo polymerization. (10)
3. a) Discuss the selective laser sintering process. (8)
- b) Explain fused deposition modelling and laminated object manufacturing process. (12)
4. a) Discuss about diamond micromachining process. (10)
- b) Explain the etching processes. (10)
5. a) Why adaptive control is needed? (5)
- b) Explain different adaptive control systems. (15)
6. 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)
7. a) Differentiate between ECM and EDM processes. During an electric discharge drilling of 10-mm square hole in a low carbon steel plate of 5 mm thickness, brass tool and kerosene are used. The resistance and capacitance in the relaxation circuit are 50 Ω and 10μF, respectively. The supply voltage is 200 volts and the gap is maintained at such a value that the discharge (sparking) takes place at 150 volts. Estimate the time required to complete the drilling operation. (10)
- b) Discuss working principle of ECM process with necessary equations. (10)
8. The part in below figure1 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

[Turn over

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. (20)

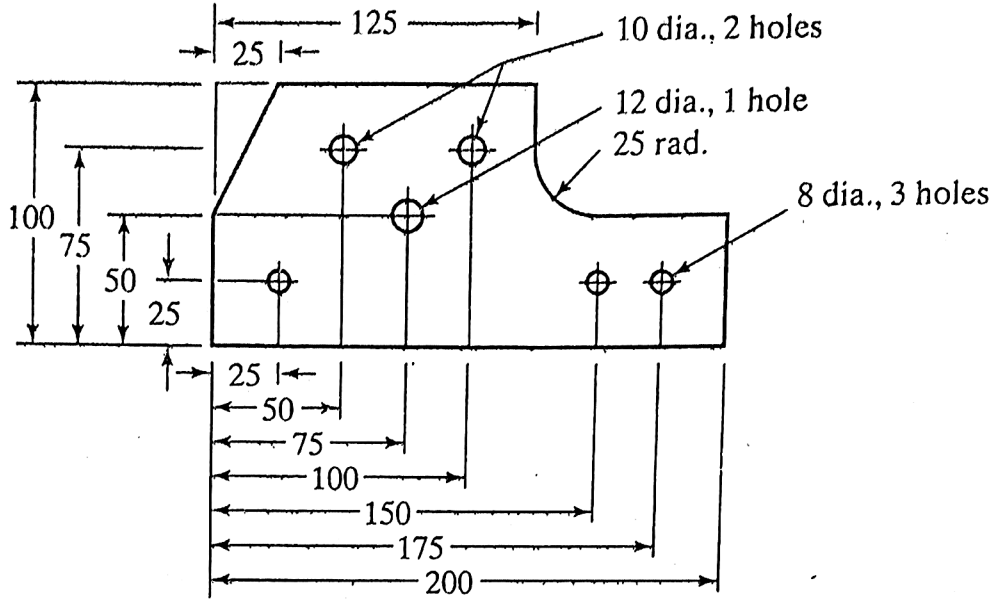


Fig.1