

(3 Hours)

[Total Marks: 80]

- NB** (1) Question no. 1 is **compulsory**.
 (2) **Attempt** any **three** questions out of remaining **five** questions.
 (3) **Illustrate** your answer with **necessary sketch** wherever **necessary**.
 (4) **Figures** to the **right** indicate full **marks**.

- Q.1 Attempt any four: **20**
 (a) Classify various Additive Manufacturing Processes.
 (b) Classify various non-traditional machining processes
 (c) Specification of grinding wheel
 (d) Describe how a compound and combination die differ from each other.
 (e) Prove that in metal cutting, chip-flow velocity = cutting velocity \times chip thickness coefficient
- Q.2 (a) What is EDM? Write about its applications, advantages and limitations. Also state the functions and requirements of dielectric fluid **10**
 Q.2 (b) State the different sources of heat in metal cutting? **10**
- Q.3 (a) Explain various sheet metal production process with neat sketches **10**
 Q.3 (b) Define jigs and fixtures. Describe the following with neat sketches: **10**
 (i) Locators (ii) Clamping devices (any two each)
- Q.4 (a) While machining steel with a tool of [0-10-6-6-8-75-1] ORS shape following observations were made; **10**
 (i) Spindle speed 300 rpm (ii) Work diameter 40 mm
 (iii) Depth of cut 3.5 mm (iv) Tool feed rate 70 mm/min
 (v) Cut chip thickness 0.55 mm
- Determine (i) Chip thickness ratio (ii) Shear plane angle
 (iii) Dynamic shear (iv) Theoretical continuous chip length per minute
- Q.4 (b) Explain Photo Polymerization w.r.t principle of operation, process, advantages and disadvantages. Explain its application in relevance CMET (Tokyo) and 3D systems (US) **10**
- Q.5 (a) Discuss the geometry and design steps for a broach tool with the help of a diagram **10**
 Q.5 (b) Discuss in detail various factors affecting the tool life. Two cutting tools are being compared for a machining operation. The tool life equations are: Carbide tool: $VT^{1.8} = 2000$ & HSS tool: $VT^{0.8} = 135$, where V is the cutting speed in m/min and T is the tool life in min. Calculate the cutting speed value so that the carbide tool will provide higher tool life than HSS tool. **10**
- Q.6 Write short notes on: **20**
 (i) Concept and importance of Additive Manufacturing
 (ii) Laser beam machining
 (iii) Lathe tool dynamometer
 (iv) Diamond pin locator
 (v) Single point cutting tool geometry in ASA system