

(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 x 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