

(3 Hours)

[Total Marks : 80]

- N.B.** (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**.



1. Attempt any FOUR of the following : (20)
- (a) What are the features of a horizontal CNC machine?
 - (b) Distinguish between gear hobbing and gear shaping.
 - (c) Discuss the assumptions made in Merchant's circle diagram.
 - (d) Explain with neat sketch any one type of lathe tool dynamometer.
 - (e) Describe radial drilling machine with neat sketch.
2. (a) Discuss various broach terms with neat sketch. Write the formulae for the following elements- (10)
- i. Tool pitch
 - ii. Rise per tooth
 - iii. Total number of teeth in a broach
 - iv. Effective length
- (b) Write short notes on: Nomenclature of drilling tool. (6)
- (c) Write in brief about tool signature. (4)
3. (a) In an orthogonal cutting, the following observations were made, (10)
- Rake angle = 10° , Cutting speed = 50 m/min, chip thickness = 0.4mm, uncut chip thickness = 0.148 mm, depth of cut = 2mm, cutting force = 1500N, Thrust force = 1000N. Calculate (i) chip reduction coefficient, (ii) shear angle (iii) shear force (iv) force normal to the shear plane (v) frictional force (vi) normal to frictional force (vii) shear stress (viii) shear strain (ix) coefficient of friction (x) resultant force.
- (b) Explain the mechanism of chip formation. (6)
- (c) Explain orthogonal rake system in detail. (4)
4. (a) How is gear manufactured? and also explain the limitations of the different processes. (10)
- (b) Explain shaping machines with neat diagram. (6)
- (c) Write notes on single point cutting tools. (4)
5. (a) State various machining centers. Describe any one in detail. (10)
- (b) Explain NC, CNC and DNC machine with block diagram. (6)
- (c) Explain automatic tool changer. (4)

Turn Over

6. Write short notes on any **FOUR** :

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- (a) Geometry of milling cutter.
 - (b) Oil based cutting fluids.
 - (c) Taylor's tool life equation.
 - (d) GM codes in CNC machines.
 - (e) Types of chips.
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