

(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**.(5) **Assume** suitable data wherever **necessary**.

1. **Attempt any FOUR of the following :** (20)
- What is undercutting of gear teeth?
 - Explain about closed loop systems in CNC machines.
 - Explain the expression for shear plane angle in metal cutting.
 - What is surface finish?
 - Explain different types of milling cutters.
2. (a) What are the basic elements of drilling machine? Explain function of each. (10)
- (b) Write about GM codes in CNC machines. (6)
- (c) Write about the maintenance of CNC machines. (4)
3. (a) While machining a mild steel rod on the lathe, following results were obtained: (10)
Width of cut = 2.5 mm, Uncut chip thickness = 0.27 mm, Chip thickness = 0.7 mm, Rake angle = 0 degree, Cutting force = 900 N, Thrust force = feed force = 450 N. Determine (i) Chip thickness ratio (ii) Chip reduction ratio (iii) Shear plane angle (iv) Coefficient of friction (v) Friction angle.
- (b) What is gear grinding? (6)
- (c) Explain gear hobbing process of gear manufacturing. (4)
4. (a) State the requirement of dynamometer and explain any one mechanical dynamometer. (10)
- (b) Explain machinability. (6)
- (c) Write about tool angles in ASA (American Standards Association) system with neat sketch. (4)
5. (a) Describe HSS (High Speed Steel) tool. (10)
- (b) Write about Single point cutting tool. (6)
- (c) Describe various broach terms with neat sketch. Write the formula for the following elements- Total number of teeth in a broach, Effective length. (4)
6. Write short notes on: (20)
- Classification of shapers.
 - Geometry of milling cutter.
 - Nomenclature of drilling tool.
 - Form tool.
 - Factors affecting tool life.