



N.B. : (1) Question No.1 is **Compulsory**. Attempt any **Three** questions from remaining.

- (2) **All** questions carry **equal** marks.
- (3) Answer to each new question should be started on a fresh page
- (4) **Figure** in brackets on the **right** hand side indicate full **marks**.
- (5) Assume suitable data if necessary.

1. (a) List operations which may be performed on a Milling machine and explain any two operations with sketch. 5
- (b) What do you understand from machinability of a material? List any two properties, which have a bearing on machinability. 5
- (c) Compare Gear shaping and Gear shaving processes. 5
- (d) Explain coordinate measuring machine. Explain its application. 5
2. (a) Write Part Program using G and M-Code for machining external contour as shown in Figure 1 below. Write Process plan for a turning operation and an efficient CNC part program for the same. 10



RAW MATERIAL: MS BAR OF DIAMETER 70 MM
AND LENGTH 160 MM
DIAGRAM NOT TO SCALE
ALL DIMENSIONS ARE IN MM

- (b) Derive an expression for shear angle in orthogonal cutting in terms of rake angle and chip thickness ratio. 6
- (c) List the various gear cutting processes. How are they classified. 4

3. (a) With neat sketch explain different angles associated with drill tool. 8
- (b) Two cutting tools are being compared for a machining operation. 6
The tool life equations are :
Carbide tool : $VT^{1.6} = 2850$
HSS tool: $VT^{0.6} = 180$
where V is the cutting speed in m/min and T is the tool life in min.
Calculate the cutting speed value which exceeds so that, the carbide tool will provide higher tool life.
- (c) Compare Lapping and Honing process 6
4. (a) Give Classification, Selection procedure and applications of drilling Machines. 8
- (b) Explain procedure to estimate cutting forces. 5
- (c) List different types of dynamometers and explain with sketch electromagnetic dynamometer. 7
5. (a) Design and explain steps involved in Broach tool design. 10
- (b) How do you define tool life? Explain the parameters that control the tool life of a single point cutting tool. 10
6. Write Short Notes on: 20
- (1) Single point cutting tool geometry.
 - (2) Types of coolants
 - (3) Operations performed on shaping machine (any FIVE).
 - (4) Dressing & truing of Grinding wheels
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