

Manufacturing Technology (ME – 604)

Full marks: 70

Time: 3 hour

Use separate Answer script for each half

Attempt any three questions from each half

All the questions carry equal marks

First Half

1. (a) Explain the basic differences between grinding and other conventional machining operations
(b) State the advantages of grinding as compared to machining by cutting tools with defined geometry.
(c) Name the different types of abrasives used in grinding wheels. State their characteristics and applications.
2. (a) Name the different types of bond materials used in grinding wheels. State their characteristics and applications.
(b) What do you understand by the term Grade of a grinding wheel? How grinding wheels are classified on the basis of grade?
(c) Explain the reason behind the selection of hard grinding wheel for grinding a soft material and vice-versa.
3. (a) What are the selection criteria of grinding wheel for thread grinding?
(b) Discuss how variation of wheel speed and work speed affects grinding operation.
(c) Discuss on the effects of feeds on the grinding operation.
4. (a) How grinding machines are classified based on surface generated.
(b) With neat sketches explain the working principles of centreless external cylindrical grinding.
(c) Write a short note on surface grinding operations.
5. Write short notes on any four:
(i) Structure of grinding wheel (ii) Marking system for grinding wheels, (iii) Truing and dressing of grinding wheels (iv) Balancing of grinding wheel (v) Broach materials

SECOND HALF

[Answer any **THREE** questions]

6. (a) Draw the schematic diagram of a 'Column and knee' type milling machine and label its various components.
- (b) Name the different methods of indexing.
- (c) It is required to cut 30 teeth on a spur gear blank. The numbers of holes available on the index plates are as follows:

| | | | | | | |
|--------------|----|----|----|----|----|----|
| Plate No. 1: | 15 | 16 | 17 | 18 | 19 | 20 |
| Plate No. 2: | 21 | 23 | 27 | 29 | 31 | 33 |
| Plate No. 3: | 37 | 39 | 41 | 43 | 47 | 49 |

Name the indexing method that can be adopted and calculate the crank movement.

7. (a) Name the different types of milling operations.
- (b) With neat sketches describe the up milling and down milling methods.
- (c) Why down milling operation is not performed on old machines ?
8. (a) State the relationship between (i) feed per tooth (s_z), (ii) feed per revolution (s_r) and (iii) feed per minute (s_m) in milling operation.
- (b) Show that in plain milling operation, the approach length is given by: $L_o = \sqrt{t(D-t)}$; where, ' t ' is the depth of cut and ' D ' is the cutter diameter.
- (c) The following data were obtained during slab milling of a mild steel block:
Cutter diameter = 70 mm, number of teeth = 12, cutting speed = 25 m/ min, feed = 0.08 mm/ tooth, length of the job = 250 mm, depth of cut = 2 mm. Calculate (i) feed per minute and (ii) machining time.
9. (a) Write down the advantages of Metal working processes over other manufacturing processes.
- (b) Enumerate the different types of defects which can be observed in rolled products. With the help of necessary sketches explain any two of them.
10. (a) Draw a neat sketch of closed-die forging process.
- (b) Enumerate the characteristics of closed-die forging process.
- (c) State and explain the different forging defects.