

# JHARKHAND UNIVERSITY OF TECHNOLOGY

Diploma 3rd Semester Sample Paper ( DIPLOMA WALLAH )

## MACHINE TOOL TECHNOLOGY (MEC 302)

More Model Sets & Study Materials available here [DiplomaWallah.in](https://DiplomaWallah.in)

Time: 3 Hours

Full Marks: 70

SET: 2

### INSTRUCTIONS:

1. Question No. 1 is Compulsory.
2. Answer any **FOUR** questions from the remaining (Q.2 to Q.7).
3. Use the provided figures/formulas for numerical problems.

### Q.1. Multiple Choice Questions

[2 × 7 = 14]

(i) In a Capstan lathe, the turret is mounted on:

- |                   |                         |
|-------------------|-------------------------|
| (a) The saddle    | (b) A short slide (Ram) |
| (c) The tailstock | (d) The headstock       |

(ii) Continuous chips with Built-Up Edge (BUE) are formed while machining:

- |                                     |                                    |
|-------------------------------------|------------------------------------|
| (a) Brittle materials               | (b) Ductile materials at low speed |
| (c) Ductile materials at high speed | (d) Hard materials                 |

(iii) Size of a shaper is specified by:

- |                      |                       |
|----------------------|-----------------------|
| (a) Length of stroke | (b) Size of table     |
| (c) Motor power      | (d) Weight of machine |

(iv) Which bond is most commonly used in grinding wheels?

- |                    |                   |
|--------------------|-------------------|
| (a) Vitrified bond | (b) Rubber bond   |
| (c) Shellac bond   | (d) Silicate bond |

(v) The tool used to cut internal threads on a lathe is:

- |                  |                    |
|------------------|--------------------|
| (a) Parting tool | (b) Knurling tool  |
| (c) Boring tool  | (d) Threading tool |

(vi) In a twist drill, the angle between the two cutting lips is usually:

- |          |          |
|----------|----------|
| (a) 90°  | (b) 118° |
| (c) 135° | (d) 60°  |

(vii) Gang milling involves:

- |                                   |                                     |
|-----------------------------------|-------------------------------------|
| (a) One cutter                    | (b) Two cutters on different arbors |
| (c) Several cutters on same arbor | (d) End milling                     |

### SECTION B (Long Answer Type)

Q.2. (a) [Numerical] In a machining test with a cutting tool, the following data was obtained:

(i) Cutting Speed = 20 m/min, Tool Life = 60 min.

(ii) Cutting Speed = 25 m/min, Tool Life = 30 min.

Determine the values of **n** and **C** in Taylor's Tool Life Equation ( $VT^n = C$ ).

[7]

**Q.2. (b) [Theory]** Describe the different types of **Chips** formed in metal cutting (Continuous, Discontinuous, Continuous with BUE). State conditions for each.

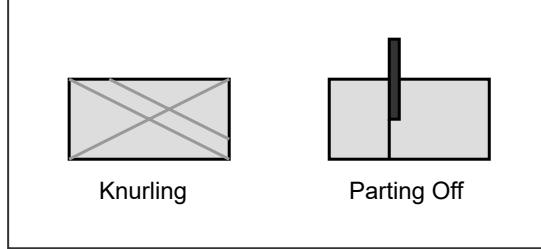
[7]

**Q.3. (a) [Theory]** Differentiate between **Capstan Lathe** and **Turret Lathe**. Why are they called semi-automatic lathes?

[7]

**Q.3. (b) [Theory/Diagram]** Explain the following Lathe Operations with sketches: **(i) Knurling, (ii) Parting Off, (iii) Facing.**

[7]

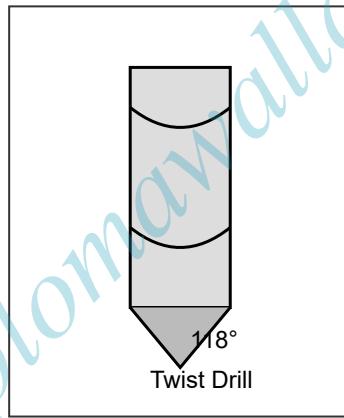


**Q.4. (a) [Theory]** Explain the construction of a **Radial Drilling Machine**. Why is it preferred for heavy workpieces?

[7]

**Q.4. (b) [Figure Based]** Draw the geometry of a **Twist Drill** showing Point Angle, Helix Angle, and Lip Clearance Angle.

[7]



**Q.5. (a) [Numerical]** Find the indexing movement for **26 divisions** using Simple Indexing. (Standard Index Plates: 15, 16, 17, 18, 19, 20... holes).

[7]

**Q.5. (b) [Theory]** Describe the construction of a **Column and Knee type Milling Machine** with a block diagram.

[7]

**Q.6. (a) [Theory]** What is **Centreless Grinding**? Explain its principle and advantages (Through-feed vs In-feed).

[7]

**Q.6. (b) [Theory]** Differentiate between **Honing** and **Lapping**. Which one is used for correcting geometry vs surface finish?

[7]

**Q.7. Write Short Notes on (Any FOUR):**

**[3.5 × 4 = 14]**

- Steady Rest vs Follower Rest

- b. Whitworth Quick Return Mechanism
  - c. Counter-boring vs Spot Facing
  - d. Types of Milling Cutters
  - e. Cutting Tool Materials (HSS, Carbide)
- 

## **Diploma Wallah: Solution Key**

**MCQ:** (i) b, (ii) b, (iii) a, (iv) a, (v) c, (vi) b, (vii) c.

**Q2(a) Hint:**  $20(60)^n = 25(30)^n$ . Take log on both sides to find 'n'. Then find 'C'.

**Q5(a) Hint:** Crank movement =  $40/N = 40/26 = 1 + 14/26 = 1 + 7/13$ . Multiply  $7/13$  by  $3/3 = 21/39$ . So, 1 full turn + 21 holes on 39 hole circle.