

# 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](http://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.

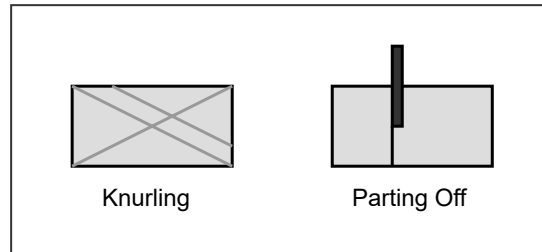
Determine the values of  $n$  and  $C$  in Taylor's Tool Life Equation ( $VT^n = C$ ).

[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]

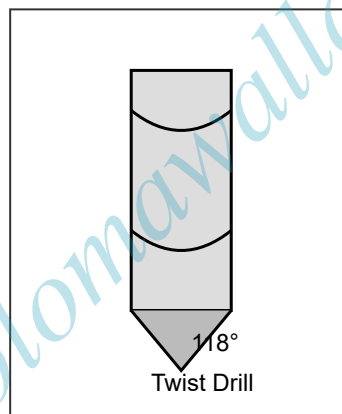
**Q.3. (a) [Theory]** Differentiate between **Capstan Lathe** and **Turret Lathe**. Why are they called semi-automatic lathes? [7]

**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]

a. 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.

Made With  by Sangam ( **Diploma Wallah** )