

# 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: 3**

### **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) The hardest cutting tool material is:**

(a) High Speed Steel (HSS)	(b) Cemented Carbide
(c) Ceramics	(d) Diamond

**(ii) 18-4-1 High Speed Steel contains:**

(a) 18% Tungsten, 4% Cr, 1% V	(b) 18% Cr, 4% W, 1% V
(c) 18% V, 4% Cr, 1% W	(d) 18% Co, 4% Cr, 1% W

**(iii) The hydraulic shaper uses which principle for quick return?**

(a) Crank and slotted lever	(b) Whitworth mechanism
(c) Difference in piston area	(d) Gear train

**(iv) In which milling operation do the cutter and workpiece rotate/move in opposite directions?**

(a) Down milling	(b) Up milling
(c) Climb milling	(d) Face milling

**(v) Superfinishing is a:**

(a) Grinding process	(b) Micro-finishing process
(c) Boring process	(d) Drilling process

**(vi) A mandrel is used to:**

(a) Hold a hollow workpiece	(b) Hold the tool
(c) Support the tailstock	(d) Turn tapers

**(vii) The spacing of abrasive grains in a grinding wheel is called:**

(a) Grade	(b) Grit
(c) Structure	(d) Bond

### **SECTION B (Long Answer Type)**

**Q.2. (a) [Theory] What are Cutting Fluids? List their main functions (Cooling, Lubrication, Chip flushing). Name two common types of cutting fluids.**

**[7]**

**Q.2. (b) [Theory]** Explain the properties of an ideal **Cutting Tool Material**. Compare **HSS (High Speed Steel)** and **Cemented Carbide** in terms of hardness and toughness. [7]

**Q.3. (a) [Theory/Numerical Concept]** Explain the **Thread Cutting** operation on a lathe. How is the speed ratio between the spindle and lead screw determined? [7]

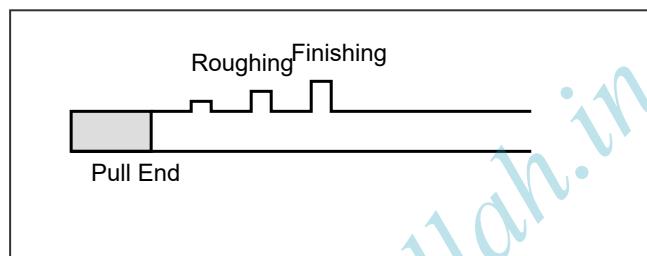
**Q.3. (b) [Theory]** What are **Lathe Accessories**? Explain the construction and function of:

- (i) **3-Jaw Chuck**
- (ii) **4-Jaw Chuck**
- (iii) **Face Plate.**

[7]

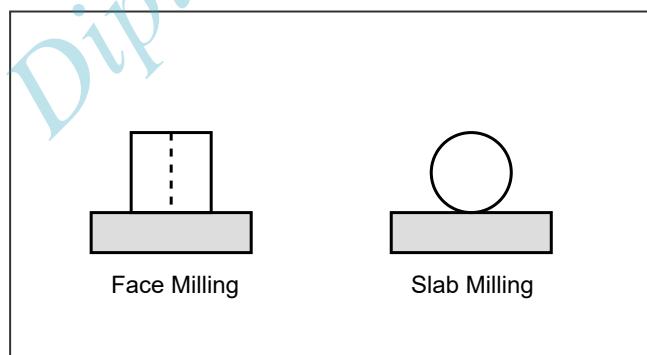
**Q.4. (a) [Theory]** Explain the working of a **Horizontal Boring Machine**. How does it differ from a Vertical Boring Machine? [7]

**Q.4. (b) [Theory/Diagram]** Describe **Broaching**. Explain the geometry of a Broach tool. What are its advantages over other machining processes? [7]



**Q.5. (a) [Theory]** Explain **Universal Dividing Head**. How does it work for indexing? Explain the role of the index plate and worm gear. [7]

**Q.5. (b) [Figure Based]** Differentiate between **Face Milling** and **Peripheral (Slab) Milling** with diagrams. [7]



**Q.6. (a) [Theory]** Explain **Superfinishing** processes. Describe the difference between **Buffing** and **Polishing**. [7]

**Q.6. (b) [Theory]** What are the **Safety Precautions** to be taken while working on a Grinding Machine? (Wheel mounting, Guards, Goggles, etc.) [7]

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

$[3.5 \times 4 = 14]$

- a. Slitting Machine

- b. Gear Hobbing (Brief)
- c. Tool Signature
- d. Magnetic Chuck
- e. Machinability

---

## **Diploma Wallah: Solution Key**

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

**Q3(a) Formula:** Change Gears Ratio = (Driver Teeth / Driven Teeth) = (Pitch to be cut / Pitch of Lead Screw).

**Q6(a) Note:** Buffing uses a soft cloth wheel with loose abrasive; Polishing uses abrasives glued to the wheel.