

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

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:

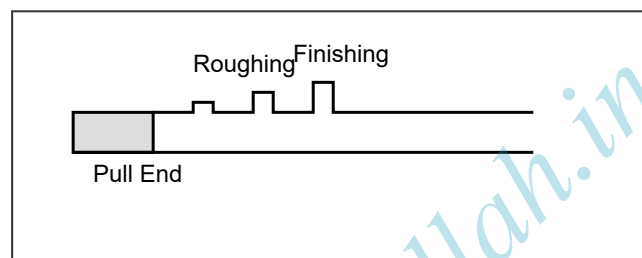
(i) **3-Jaw Chuck**

(ii) **4-Jaw Chuck**

(iii) **Face Plate**. [7]

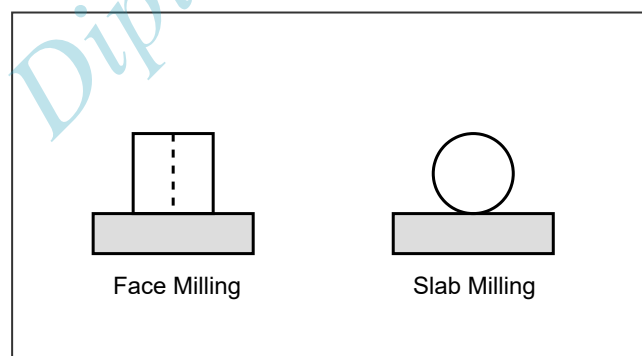
Q.4. (a) [Theory] Explain the working of a **Horizontal Boring Machine**. How does it differ from a Vertical Boring Machine? [7]

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 × 4 = 14]

a. Slotting 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.

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