271

(6)

Scoring Indicator

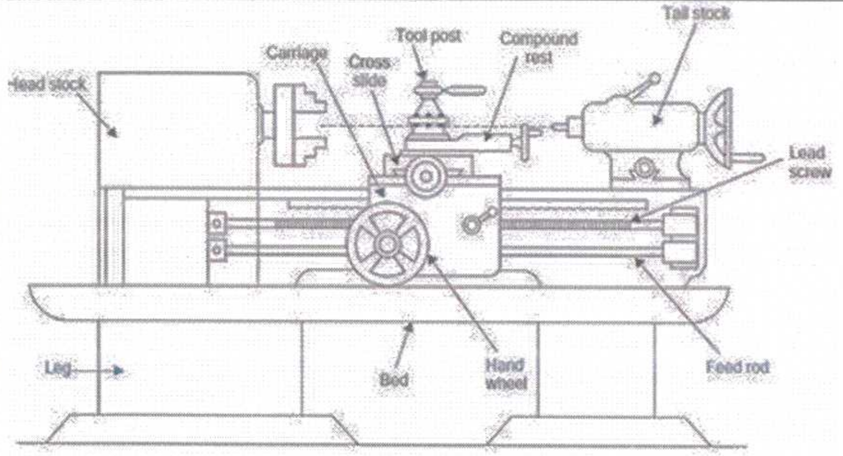
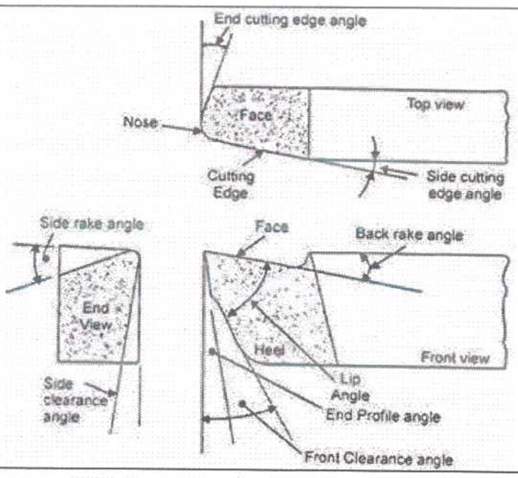
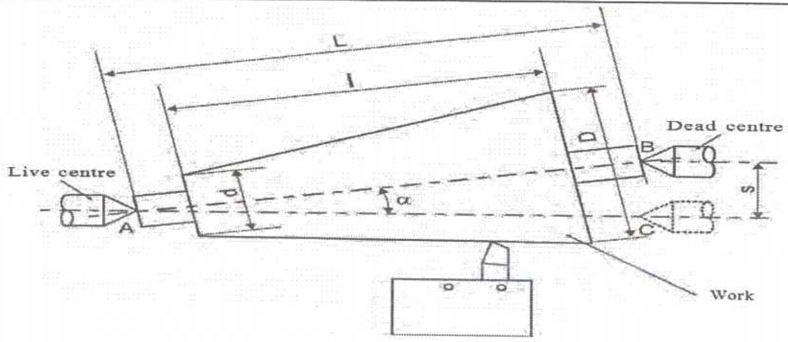
Version - A

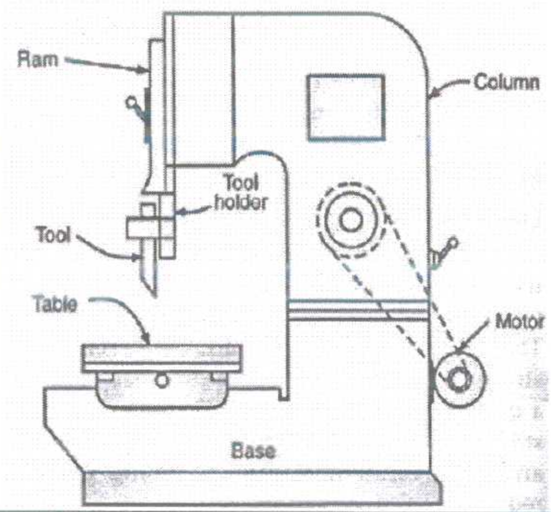
Course Name: **Machine Tools**

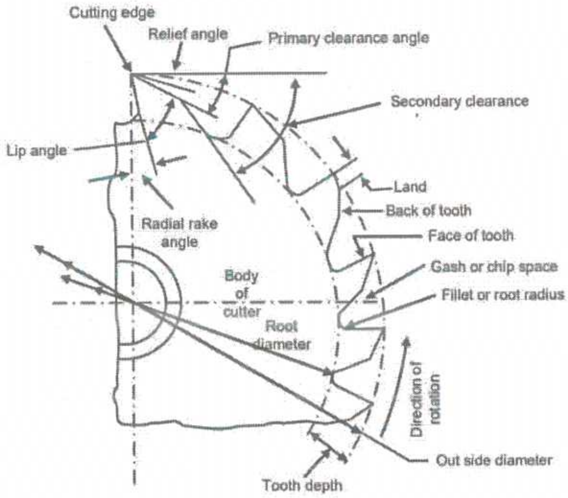
Course Code: **Rev (21)-3023** QID: 2110220185

Q.No	Scoring Indicator	Split Score	Sub Total	Total Score
	PART - A			9
I.1	$VT^n = C$		1	
I.2	Facing		1	
I.3	Quick Return		1	
I.4	Drill		1	
I.5	Arbour, collet, adapter, screwed arbour		1	
I.6	Abrasive		1	
I.7	Computer Numerical Control		1	
I.8	Program of instructions, Machine Control Unit, Processing Equipment or Machine Tool		1	
I.9	Cutting Fluid/Lubricant		1	
	PART - B			24
II.1	1. Discontinuous chips: 2. Continuous chips. 3. Continuous chips with build-up edge (BUE). 4. Non-homogeneous chip		3	
II.2	1. Bench lathe 2. Speed lathes 3. Engine lathe 4. Tool room lathe 5. Capstan and turret lathe 6. Automatic lathe 7. Special purpose lathes	0.5 x 6	3	
II.3	1. Horizontal, Vertical and Travelling Head Shapers 2. Crank, Geared and Hydraulic Shapers		3	
II.4	Reaming is a finishing process that is performed with the multi-edged tools that provide high precision holes and also used for enlarging or finishing a hole previously drilled.	3	3	
II.5	Punching holes, Cutting groves, Making slots, Cutting internal and external gears, Cutting keyways.	1 x 3	3	
II.6	Simple indexing on a milling machine is passed out through the use also a plain indexing head or universal dividing head. This process of indexing involves the use of a worm, crank, index head, and worm wheel. The worm wheel usually carries 40 teeth, with the worm is single-threaded. By this arrangement, as a crank completes one revolution, the work wheel turns through 1/40th of the revolution.		3	

	Also, a worm wheel turns through 2/40 (1/20)th of revolution, and presently, therefore, for one revolution of a workpiece, a crank wants to create 40 revolutions—holes in index plate extra help in subdividing rotation of the workpiece.			
II.7	Grinding wheel will have grains of abrasive materials and these grains of abrasive material will be termed as grit. These grains of abrasive material i.e. grits will have sharp edges or points with enough hardness as compared to workpiece surface hardness and wear resistance and these grits will act as cutting tool in process of grinding to remove small-small particles from workpiece surface.		3	
II.8	1. Program of instructions 2. Machine control unit 3. Machine tool or Processing equipment or other controlled processes	1 Mark/Poi	3	
II.9	An open-loop system is a type of control system in which the output of the system depends on the input but the input or the controller is independent of the output of the system. These systems do not contain any feedback loop and thus are also known as non-feedback system.		3	
II.10	• A cutting fluid should have a low viscosity so that it can easily flow above the workpiece. • It should have a high flash point so that it can be used at high temperatures. • It should stable at high temperatures. • It should have a non-foaming tendency. • It should have a high heat absorption rate so that during cutting operation it can easily absorb the generated heat. • It should have a good lubricating property to reduce the friction between tool and workpiece and chips can easily get out from the workpiece. • Should not react chemically; it has to be chemically active in nature. • It should have odourless to avoid any bad smell even at higher temperatures. • It should be transparent in a property so that the operator can easily see the cutting area. • It should be harmless to the operator.	Any Three	3	
	PART - C			

III.1	**<u>Orthogonal Cutting :</u>** Orthogonal Cutting Is a Type of Cuttings in Which the Cutting Tool Is Perpendicular to the Direction of Motion. the Chip Flow in This Cutting Is State-Of-The-Art. This Type of Cutting Has a Lower Life Cutting Capacity in the Tool. **<u>Oblique Cutting:</u>** Oblique cutting is a type of cuttings in which the cutting tool is at an oblique angle in the direction of the tool's motion. The chip flow in this cutting is not cutting edge. The tool has a longer cutting life than orthogonal cutting.		7	7
III.2			7	7
III.3			7	7
III.4	 Long work pieces with a small taper angle (not exceeding 80) are usually turned by setting over the tail stock centre. The amount of setover – s, can be calculated as follows	Figure 4, Ex p. 3	7	7

<table>
<tr><td></td><td>$$s = L \times \frac{D - d}{2l}$$
where s - Amount of setover, D – Larger diameter
d – Smaller diameter, L - Length of the work
l – Length of the taper</td><td></td><td></td><td></td></tr>
<tr><td>III.5</td><td>1. Drilling:
2. Boring:
3. Spot Facing:
4. Tapping:
5. Counterboring:
6. Reaming:
7. Countersinking:</td><td>4
+
3</td><td>7</td><td>7</td></tr>
<tr><td>III.6</td><td>
</td><td></td><td>7</td><td>7</td></tr>
<tr><td>III.7</td><td>
<table>
<tr><th></th><th>Up or Conventional Milling</th><th>Down or Climb Milling</th></tr>
<tr><td>1</td><td>Direction of rotation of cutter and the feed are in opposite direction.</td><td>Direction of rotation of cutter and the feed are in same direction.</td></tr>
<tr><td>2</td><td>The material removed by each tooth starts with a minimum thickness and ends with a maximum thickness.</td><td>The material removed by each tooth starts with a maximum thickness and ends with a minimum thickness.</td></tr>
<tr><td>3</td><td>Cutting forces tend to lift the work off the table, necessitating greater clamping forces.</td><td>Cutting forces tend to hold the work against the table, permitting lower clamping forces.</td></tr>
<tr><td>4.</td><td>Scale on the surface of the workpiece does not affect the tool life.</td><td>Scale on the surface of the workpiece reduces the tool life. Hence, not suitable for machining forged & Cast metals.</td></tr>
</table>
</td><td></td><td>7</td><td>7</td></tr>
</table>

III.8	 **Plain Milling Cutter and its Elements**		7	7
III.9	Natural Abrasives: These are produced by uncontrolled forces of nature. The following are the generally found and used natural abrasives: (a) Sand stone or solid quartz, (b) Emery (50-60% crystalline A12O3 + Iron oxide), (c) Corundum (75-90% crystalline A12O3 + Iron oxide, (d) Diamonds, (e) Garnet **Artificial or Manufactured Abrasive:** The quality and composition of these particles can be easily controlled and their efficiency is far better than that of natural abrasives. Most commonly used manufactured abrasives are: (a) Silicon Carbide (SiC), (b) Aluminium Oxide (Al2O3), (c) Boron Carbide, (d) Boron Nitrite (CBN)		7	7
III.10	**Honing:** Honing is an abrasive machining process that is a combination of grinding and drilling processes. A honing process uses an Abrasive grinding tool to accurately machine the given workpiece. A honing process improves the surface quality of the workpiece as well as provides dimensional accuracy to the part being machined. **Lapping:** Lapping is a low-pressure machining process used to increase the dimensional accuracy and surface finish of the workpiece. The lapping process uses fine Abrasive particles to perform cutting action on the surface of the workpiece. The workpiece is rubbed against the lapping plate with the help of a machine or by hand, with powdered Abrasive particles or Abrasive paste in between.		7	7

III.11	• NC stands for Numerical Control whereas CNC stands for Computer Numerical Control. • In NC Machine the programs are fed into the punch cards. But in CNC machine the programs are fed directly into the computer with the help of a small keyboard similar to our traditional keyboard. • In NC machine if an error occurs in the program than its debugging and modification is not easy. In CNC machine the debugging and modification is very easy. • High skilled operator is required to operate the NC machine whereas to operate a CNC machine, a semiskilled operator may work. • The cost of the NC machine is less as compared with the computer control machines. • The maintenance cost of NC is less whereas it is costly in the case of CNC machine. • No programs can be stored in the NC machine. In CNC machine, numbers of programs can be stored and can be used again and again for the production. • The accuracy of the NC is less as compared with the CNC. • In NC machine the execution of the job takes more time but the CNC machine executes the job without taking much time. • NC cannot be run continuously for 24 hours but CNC machine can be run for 24 hours continuously.		7	7
III.12	**Temperature Control:** Cutting fluid support to minimize the friction & heat produced between tool and workpiece as an increase in the temperature can reduce the tool's life. **Lubricating:** Cutting Fluidshelps in lubricating the tool and the workpiece to reduce the friction and cutting forces to increase the tool's life and surface finish. **Cleaning the Machine:** Cutting Fluids helps in cleaning the chips, particles, and debris which can further damage the surface finish. **Prevents Harmful Contamination:** Cutting Fluids develops a thin layer on the workpiece thus, prevent contamination from harmful gases like SO2, O2, H2S2 in the atmosphere.		7	7