



Bangladesh University of Engineering and Technology

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Department of Industrial and Production Engineering (IPE), BUET

IPE 432 (Machine Tools Sessional)

Experiment No.:03 (Study of Engine Lathes)

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Note: While answering the following questions, consider the Engine Lathe studied in this experiment.

1. Label the schematic diagram of the engine lathe shown in Figure 1.

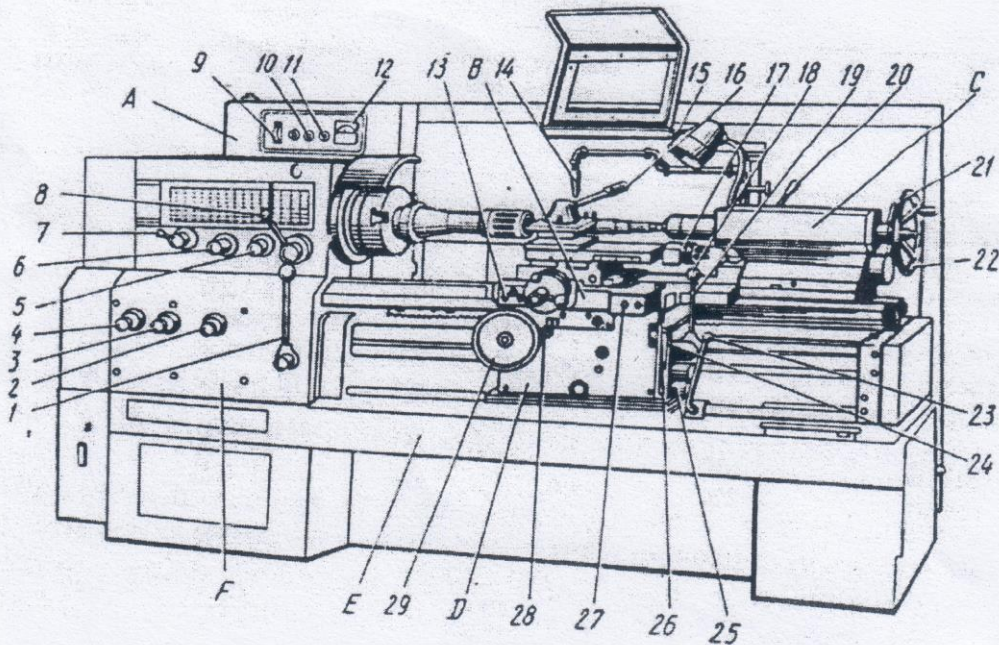


Figure 1

A. Headstock	1. Main drive friction clutch hand lever.
B. Carriage	2. Feed stopping, Feed rate, thread pitch selection
C. Tailstock	3. Feed rate, type of feed selection
D. Apron	4. Feed rate, thread pitch selection
E. Bed	5. Left hand & right hand thread change over control.
F. Feed gear box	6. Setting for coarse and extra coarse thread pitch and multi start thread.

7. Selection of spindle speeds.	19. Saddle and cross slide motion control.
8. " " " "	20. Tailstock spindle clamp
9. Automatic master switch.	21. Tailstock hold down clamp.
10. Signal light.	22. Tailstock spindle hand wheel.
11. Coolant pipe start button	23. Spindle rotation control.
12. Load indicator	24. Split nut engagement.
13. Cross slide hand wheel	25. Feed engagement.
14. Adjustable coolant nozzle.	26. Carriage lock screw
15. Local lighting	27. Main drive motor on/off push buttons.
16. Square turret clamping lever	28. Rack & pinion engagement.
17. Top slide hand wheel.	29. Carriage hand wheel.
18. Carriage rapid transverse control	

2. Mention the functions of the following components of an engine lathe.

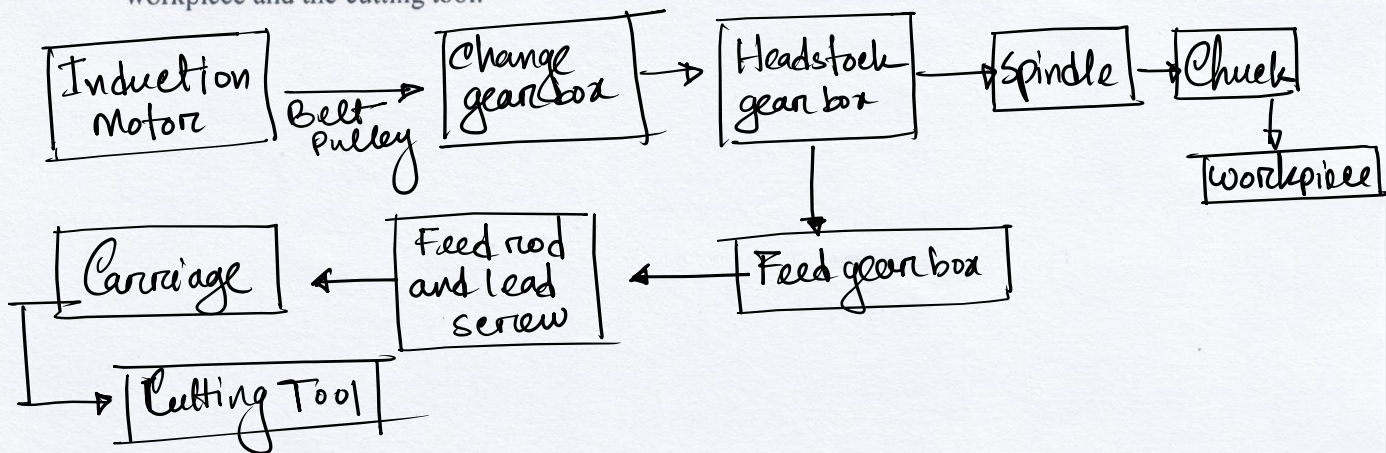
Components	Functions
1. Headstock	Holds the workpiece and transfers rotational motion to the workpiece from the motor through spindle.
2. Tailstock	Supports the other end of the workpiece so that the workpiece doesn't bend while machining.
3. Spindle	Supplies rotational motion to the work holding devices (chucks or collets mounted to it).
4. Saddle	It helps cross slide to move back and forth on the machine.
5. Compound Rest	Swivels for tool positioning.
6. Feed Rod	Provides longitudinal automatic feed to the apron.
7. Lead Screw	Provides automatic feed to the apron for cutting threads.
8. Half Nut	Engages lead screw with the apron to provide automatic feed.

Components	Functions
9. Apron	Provides power and hand feed to both carriage and cross slide

3. Mention the functions of the following lathe accessories.

Lathe Accessories	Functions
1. Lathe Centers	They ensure that concentric work is produced.
2. Lathe Dogs	Provide a firm connection between the headstock spindle and the workpiece.
3. Steady Rest	Lets long round pieces of work to rotate without eccentric movement.
4. Follower Rest	Keeps long or small diameter work from deflecting when a cutting tool is applied.
5. Face Plates	Are used for clamping irregularly shaped workpieces.
6. Mandrels	Are used to hold workpieces that require machining on both ends, or on their cylindrical surfaces.
7. Taper Turning Attachment	Taper turning attachment lets the cross slide to move freely and cuts the material in a guided path.

4. Draw a block diagram showing how motions are transmitted from the prime mover to the workpiece and the cutting tool.



5. Briefly explain how the following taper turning operations are performed.

Setting over the tailstock	By rotating the hand wheel behind the tailstock, we can offset the workpiece at an angle up to 4°
Using taper turning attachment	The cross slide is made free from the feed rod and then attached to the taper turning attachment. The taper turning attachment provides a guided path so that a tapered shape is produced.
Two feeds method	If the carriage is given an automated motion and the top slide is manually operated, it creates a 2D feed, which cuts the material in a tapered shape.
Swiveling the swivel plate with the top slide	Cutting tool is set at an required angle by swivelling the swivel plate as well as the top slide, so the tool gives a tapered shape.

6. Explain how to center workpiece in a three jaw self centering chuck and a four jaw independent chuck.

Three-jaw self-centering chuck:

The jaws have a series of teeth. The teeth mesh with spiral grooves on a circular plate called scroll plate within the chuck. A chuck wrench is inserted into one of the pinions. When the wrench is rotated, all the three jaws move simultaneously. So in this way the jaws open and close and can center the workpiece.

Four jaw Independent Chuck:

Each jaw can be moved separately by screw. The jaws will clamp almost any shape of workpiece.

7. Write down the specifications of the following for the engine lathe you have studied in this experiment.

- (a) Motor specification: 3 phase induction motor, 3 hp.
- (b) Belt specification: V belt.
- (c) Number of feeds: 30
- (d) Range of feeds: 0.05 mm ~ 2.8 mm
- (e) Number of speeds: 8
- (f) Range of speeds: 815, 590, 375, 230, 130, 75, 60, 38 (in rpm)