

**UNIVERSITY COLLEGE TATI (UC TATI)****FINAL EXAMINATION QUESTION BOOKLET**

COURSE CODE	: FEW 1022
COURSE	: WORKSHOP TECHNOLOGY
SEMESTER/SESSION	: 3-2024/2025
DURATION	: 2 HOURS

Instructions:

1. This booklet contains 4 questions. Answer **ALL** questions.
2. All answers should be written in answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 6 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

- a) **Sketch** a diagram that compares measuring and gauging processes based on the following aspects: Information provided, ease of use, time required, cost, and type of worker needed. (6 marks)
- b) **Illustrate** the Go and No-Go end sizes for a plug gauge. (4 marks)
- c) **Explain** and **sketch** how to perform diagonal, transverse, and longitudinal filing on a rectangular workpiece to achieve flatness. (9 marks)
- d) **Define** the milling process and **explain** how it differs from turning operations. (4 marks)
- e) **Give** any two (2) important factors that influence the selection of cutting fluids in machining operations. (2 marks)

QUESTION 2

- a) **Demonstrate** how a thread pitch gauge is used to inspect the pitch of a threaded bolt and **explain** why proper pitch identification is important in mechanical assembly. (4 marks)
- b) A student complains that their hacksaw blade keeps breaking. **Demonstrate** possible mistakes they might be making during the sawing process. (4 marks)
- c) **Explain** why a flat chisel is not suitable for shearing chiseling on thin sheet metal and **illustrate** the correct technique of this process. (4 marks)
- d) **Explain** in detail the three main cutting parameters in turning operations: cutting speed, feed rate, and depth of cut. **Discuss** how each parameter affects surface finish, tool wear, and machining efficiency. **Illustrate** how these three parameters are interrelated. (10 marks)
- e) **Explain** any four (4) important properties that a good cutting fluid should have. (4 marks)

QUESTION 3

- a) **Demonstrate** two common sources of error during use of micrometer and **explain** how they can affect the reading. (6 marks)
- b) **Describe** the process to inspect the reamed hole using the GO and NO GO sides of the plug gauge. (2 marks)
- c) You are asked to prepare a hole that will hold a socket head cap screw flush with the surface of a metal part.
- i) **Identify** the three (3) machining processes for this task. (3 marks)
- ii) **Sketch** a simple diagram to show these three (3) processes. (3 marks)
- d) **Explain** the role of point angle in selecting a twist drill for various workpiece materials. (2 marks)
- e) A 60 mm diameter aluminium shaft is being turned with a high-speed steel (HSS) cutting tool.
- i) Based on the material and tool, **indicate** a suitable cutting speed for roughing operation. (3 marks)
- ii) **Find** the appropriate spindle speed (RPM) for roughing operation. (3 marks)
- iii) **Indicate** a suitable feed rate for roughing and finishing. (4 marks)

QUESTION 4

- a) You have been assigned to perform a countersinking operation on a drilled hole. **illustrate** the correct step-by-step procedure to carry out this task effectively. (5 marks)
- b) **Describe** two possible causes of drill breakage during drilling and suggest two (2) preventive actions. (4 marks)
- c) **Describe** the difference between outside turning and inside turning (4 marks)
- d) **Explain** and **illustrate** the difference between conventional (up) milling and climb (down) milling. (6 marks)
- e) **Explain** two (2) basic types of wear that affect a cutting tool during machining. (4 marks)

-----End of questions-----

WORKSHOP TECHNOLOGY (FEW 1022)

APPENDICES

Table 1: Lathe cutting speed in feet and meters per minute using HSS cutting tool						
Material	Turning and Boring				Threading	
	Rough Cut		Finish Cut			
	ft/min	m/min	ft/min	m/min	ft/min	m/min
Machine steel	90	27	100	30	35	11
Tool steel	70	21	90	27	30	9
Cast iron	60	18	80	24	25	8
Bronze	90	27	100	30	25	8
Aluminium	200	61	300	93	60	18

Table 2: Feeds for various materials (using HSS)				
Material	Turning and Boring			
	Rough Cut		Finish Cut	
	in.	mm	in.	mm
Machine steel	.010-.020	0.25-0.5	.003-.010	0.07-0.25
Tool steel	.010-.020	0.25-0.5	.003-.010	0.07-0.25
Cast iron	.015-.025	0.4-0.65	.005-.012	0.13-0.3
Bronze	.015-.025	0.4-0.65	.003-.010	0.07-0.25
Aluminium	.015-.030	0.4-0.75	.005-.010	0.13-0.25