



MEDICAPS
UNIVERSITY

Faculty of Engineering

End Semester Examination May 2025

ME3EL09 Tool Design

Programme : B.Tech.

Branch/Specialisation : ME

Duration : 3 hours

Maximum Marks : 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Section 1 (Answer all question(s))		Marks	CO	BL
Q1.	In tool design, what is the most important factor to consider for achieving precision and accuracy?	1	1	1
	<input type="radio"/> The aesthetics of the tool <input type="radio"/> The material of the workpiece <input checked="" type="radio"/> The rigidity and stability of the tool <input type="radio"/> The operator's skill level			
Q2.	What is the primary difference between a jig and a fixture in manufacturing processes?	1	1	1
	<input type="radio"/> A jig holds the workpiece, while a fixture guides the cutting tool. <input checked="" type="radio"/> A fixture holds the workpiece, while a jig guides the cutting tool. <input type="radio"/> Both jigs and fixtures guide the cutting tool. <input type="radio"/> Both jigs and fixtures hold the cutting tool.			
Q3.	In blanking die design, which component holds the strip material in place to prevent it from lifting during the punching operation?	1	2	1
	<input checked="" type="radio"/> Stripper plate <input type="radio"/> Die block <input type="radio"/> Punch holder <input type="radio"/> Pilot			
Q4.	Which sheet metal cutting operation involves removing a scrap piece from the perimeter of the workpiece?	1	2	1
	<input type="radio"/> Shearing <input type="radio"/> Punching <input checked="" type="radio"/> Notching <input type="radio"/> Piercing			
Q5.	What type of forging is generally preferred for producing larger components with greater control over deformation?	1	3	1
	<input type="radio"/> Drop forging <input checked="" type="radio"/> Press forging <input type="radio"/> Impact forging <input type="radio"/> Cold forging			
Q6.	Which of the following factors must be considered when designing a forged part to ensure proper material flow?	1	3	1
	<input type="radio"/> Die material hardness <input checked="" type="radio"/> Flash allowance <input type="radio"/> Lubrication type <input type="radio"/> Tolerances and finish			
Q7.	What is a primary advantage of using tipped tools over solid tools?	1	4	1
	<input type="radio"/> Tipped tools are easier to manufacture <input checked="" type="radio"/> Tipped tools can combine tough tool bodies with harder cutting edges <input type="radio"/> Solid tools offer better heat resistance than tipped tools <input type="radio"/> Tipped tools are less expensive than solid tools			
Q8.	In cutting tool design, which of the following issues may arise due to improper heat dissipation during the cutting process?	1	4	1
	<input type="radio"/> Increased tool life <input checked="" type="radio"/> Tool breakage due to thermal stresses <input type="radio"/> Reduction in cutting force <input type="radio"/> Improved surface finish			

Q9. Which of the following is not a type of gauge?

1 5 1

- ☐ Plug
 ☐ Ring
☒ Vernier Calliper
 ☐ Snap

Q10. Which factor is not considered in the design of limit gauges?

1 5 1

- ☐ Material of the gauge
 ☐ Expected wear and tear
☒ Colour of the gauge
 ☐ Manufacturing tolerances

Section 2 (Answer all question(s))

Marks CO BL

Q11. Explain the principle of clamping. Explain any one clamping device with neat sketch.

4 2 2

Rubric	Marks
2 marks for principal 2 marks for clamping device	4

Q12. (a) Explain the 3-2-1 location principle used in fixture design with neat sketch.

6 2 2

Rubric	Marks
3 marks for explanation 3 marks for sketch	6

(OR)

(b) Explain the design principle of drilling jigs. Discuss any four types of drill jigs with diagram.

Rubric	Marks
Design principle (2 marks) Each type of drill jigs (4 Marks)	6

Section 3 (Answer all question(s))

Marks CO BL

Q13. Describe the bend allowance calculation in bending die with neat diagram.

4 2 2

Rubric	Marks
2 marks for describe 2 marks for diagram	4

Q14. (a) Explain the working of simple, compound and progressive cutting dies with neat sketches.

6 2 2

Rubric	Marks
3 marks for explanation 3 marks for neat sketches	6

(OR)

(b) Explain the drawing operation with neat sketch. Derive the equation of force required to draw a round bar.

Rubric	Marks
Explain the drawing operation with neat sketch (3 Marks) derive the equation of force required to draw a round bar. (3 Marks)	6

Section 4 (Answer all question(s))

Marks CO BL

- Q15.** Explain the factors that influence the determination of stock size in forging operations and how they affect material utilization. 4 2 2

Rubric	Marks
2 marks for factors that influence the determination of stock size in forging operations 2 marks for how they affect material utilization.	4

- Q16. (a)** Discuss the key design factors that must be considered when designing a forging die. Include explanations of how each factor influences the final product's quality and performance. 6 2 2

Rubric	Marks
3 marks for key design factors that must be considered when designing a forging die. 3 marks for Include explanations of how each factor influences the final product's quality and performance	6

(OR)

- (b) Explain the key factors to be considered when selecting forging equipment for a manufacturing process. Discuss how factors such as production volume, material type, and part complexity influence the choice of equipment.

Section 5 (Answer all question(s))

Marks CO BL
4 1 1

- Q17.** Differentiate between solid and tipped cutting tools.

Rubric	Marks
4 differences (4marks)	4

- Q18. (a)** Explain the design features to be considered for plain milling cutter. 6 4 1

Rubric	Marks
1 mark each for the design features to be considered for plain milling cutter	6

(OR)

- (b) Discuss the key design considerations involved in creating a broach.

Rubric	Marks
1 mark each for key design considerations involved in creating a broach	6

Section 6 (Answer all question(s))

Marks CO BL
4 1 1

- Q19.** What is the difference between an instrument and a gauge in the context of measurement and inspection?

Rubric	Marks
1 mark for each difference	4

Q20. (a) Explain the different types of gauges used in industrial measurement. What are the allowances to be provided on gauges?

6 2 2

Rubric	Marks
Explain the different types of gages used in industrial measurement? [4 Marks] What are the allowances to be provided on gauges [2 Marks]	6

(OR)

(b) Explain Taylor's principle in limit gauge tolerances. Give examples.

Rubric	Marks
Explain Taylor's Principle in limit gauge tolerances [4 Marks] Examples [2 Marks]	6
