

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 checked="" type="radio"/> The rigidity and stability of the tool | <input type="radio"/> The material of the workpiece
<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 type="radio"/> Both jigs and fixtures guide 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 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"/> Punch holder | <input type="radio"/> Die block
<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 checked="" type="radio"/> Notching | <input type="radio"/> Punching
<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 type="radio"/> Impact forging | <input checked="" type="radio"/> Press 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 type="radio"/> Lubrication type | <input checked="" type="radio"/> Flash allowance
<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 type="radio"/> Solid tools offer better heat resistance than tipped tools | <input checked="" type="radio"/> Tipped tools can combine tough tool bodies with harder cutting edges
<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 type="radio"/> Reduction in cutting force | <input checked="" type="radio"/> Tool breakage due to thermal stresses
<input type="radio"/> Improved surface finish |

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

1 5 1

- Plug
- Vernier Calliper

- Ring
- 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	4
2 marks for clamping device	

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)	6
Each type of drill jigs (4 Marks)	

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	4
2 marks for diagram	

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))

Q17. Differentiate between solid and tipped cutting tools.

Marks CO BL
4 1 1

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))

Q19. What is the difference between an instrument and a gauge in the context of measurement and inspection? 4 1 1

Marks CO BL
4 1 1

Rubric	Marks
1 mark for each diffrence	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]	6
What are the allowances to be provided on gauges [2 Marks]	

(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
