Q.6		Attempt any two:							
	i.	Explain the standard gauges and limit gauges with neat sketches.	**5**	2	1	5	2		
	ii.	Explain the gauge wear allowances with suitable example.	**5**	1	1	5	2		
	iii.	Write short note on (a) Taylor's principle of gauge design (b) Computer aided tool design	**5**	1	1	5	1		

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Total No. of Questions: 6 *Total No. of Printed Pages:4*

Enrollment No.....

Faculty of Engineering
End Sem Examination Dec 2024
ME3EL09 Tool Design

Programme: B.Tech. Branch/Specialisation: ME

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

			Marks	**BL**	**PO**	**CO**	**PSO**
Q.1	i.	In which of the following operation jigs are preferred over fixture? (a) Drilling (b) Turning (c) Milling (d) Grinding	**1**	1	1	1	1
	ii.	In the 3-2-1 principle of fixture design, 3 refer to- (a) Clamps required (b) Locator on the datum face (c) Degree of freedom of the workpiece (d) Operations carried on the datum face	**1**	1	1	1	1
	iii.	Which of the following dies is not the type of cutting dies in the metal cutting operations? (a) Bending dies (b) Blanking dies (c) Piercing dies (d) Notching dies	**1**	1	1	2	1
	iv.	If the initial diameter is 50 mm^2 and the final diameter after drawing is 40 mm^2, then the degree of drawing in % is? (a) 64 (b) 20 (c) 80 (d) 36	**1**	2	2	2	2
	v.	In which of the forging process metal is kept in between a pair of dies and a gutter is provided in the lower die? (a) Open die (b) Closed die (c) Impression dies (d) Hold dies	**1**	1	1	3	1

vi.	In the deep drawing of cups, blanks show a tendency to wrinkle up around the periphery (flange). The most likely cause and remedy of the phenomenon are, respectively, (a) Buckling due to circumferential compression; Increase blank holder pressure (b) High blank holder pressure and high friction; Reduce blank holder pressure and apply lubricant (c) High temperature causing increase in circumferential length; Apply coolant to blank (d) Buckling due to circumferential compression; decrease blank holder pressure	**1**	2	1	3	1
vii.	In which scenario would a solid tool generally be more advantageous than a tipped tool? (a) When machining soft materials at low cutting speeds (b) When performing high-speed cutting operations (c) When frequent tool changes are required (d) When dealing with high-temperature environments	**1**	1	1	4	2
viii.	What is the purpose of providing a relief angle in the design of a milling cutter? (a) To increase the strength of the tool (b) To reduce the weight of the cutter (c) To prevent rubbing against the workpiece (d) To increase the cutting edge length	**1**	2	1	4	3
ix.	What is the purpose of gauge wear allowance? (a) To increase the size of the gauge for easier handling (b) To compensate for material expansion in the workpiece (c) To account for the gradual wear of the gauge during use (d) To reduce the cost of gauge manufacturing	**1**	1	1	5	3

	x.	‘Go limit’ applied to which limit condition? (a) Maximum material limit (b) Minimum material limit (c) Lower limit of shaft and upper limit of hole (d) Moderate material limit	**1**	1	2	5	3
Q.2	i.	Write two main objectives of tool designer.	**2**	2	1	1	1
	ii.	Differentiate between jigs and fixtures with any three key points.	**3**	1	1	1	1
	iii.	Explain design principle for drill jigs. Enumerate any one drill jig with neat sketch?	**5**	2	1	1	3
OR	iv.	Explain any five-design principle to common for both jigs and fixture.	**5**	2	1	1	3
Q.3	i.	Explain the ironing process in sheet metal process with neat sketch.	**2**	2	1	2	3
	ii.	Explain the working of following dies with neat sketch. (a) Compound die (b) Combination die (c) Progressive die	**8**	2	1	2	3
OR	iii.	Explain the working of following blanking die design with neat sketch. (a) Drop through die (b) Inverted type die	**8**	2	1	2	2
Q.4	i.	Differentiate any three key points between open and closed die forging.	**3**	1	1	3	1
	ii.	Explain the die design principle for machine forging with neat sketch.	**7**	2	3	3	3
OR	iii.	Explain the important factors to be considered for selection of forging equipment.	**7**	2	1	3	3
Q.5	i.	What do you mean by chip breaker? Explain the concept of chip breaker with neat sketch.	**4**	2	1	4	2
	ii.	Explain the design factors to be considered during designing the cutting element of tool.	**6**	2	3	4	3
OR	iii.	Discuss the key design considerations involved to make a single point cutting tool.	**6**	2	1	4	2

Marking Scheme
ME3EL09 (T) Tool Design (T)

Q.1	i)	a) Drilling	**1**
	ii)	b) Locator on the datum face	**1**
	iii)	a) Bending dies	**1**
	iv)	(b) 20	**1**
	v)	c) Impression dies	**1**
	vi)	a) Buckling due to circumferential compression; Increase blank holder pressure	**1**
	vii)	a) When machining soft materials at low cutting speeds	**1**
	viii)	c) To prevent rubbing against the workpiece	**1**
	ix)	c) To account for the gradual wear of the gage during use	**1**
	x)	a) Maximum material limit	**1**
Q.2	i.	Explain main objectives of tool designer.	**2**
	ii.	Differentiate between jigs and fixtures with any three key points.	**3**
	iii.	Explain design principle for drill jigs. Enumerate any one drill jig with neat sketch?	**5**
		Design principle for drill jigs -3 marks	
		Any one drill jig with neat sketch -2 marks	
OR	iv.	Explain any five-design principle to common for both jigs and fixture.	**5**
Q.3	i.	Explain the ironing process in sheet metal process with neat sketch.	**2**
		Ironing process principle 1 mark	
		Neat sketch 1 mark	
	ii.	Explain the working of following dies with neat sketch.	**8**
		a. Compound die -3 marks	
		b. Combination die -3 marks	
		c. Progressive die -2 marks	
OR	iii.	Explain the working of following blanking die design with neat sketch.	**8**
		a. Drop through die -4 marks	
		b. Inverted type die -4 marks	
Q.4	i.	Differentiate any three key points between open and closed die forging.	**3**
	ii.	Explain the die design principle for machine forging with neat sketch.	**7**
		Die design principle - 5 marks	
		Neat sketch -2 marks	
OR	iii.	Explain the important factors to be considered for selection of forging equipment.	**7**
		Each factor - 1x7 mark	
Q.5	i.	What do you mean by chip breaker? Explain the concept of chip breaker with neat sketch.	**4**
		Explanation of chip breaker - 2 marks	
		Neat sketch - 2 marks	
	ii.	Explain the design factors to be considered during designing the cutting element of tool.	**6**
		Each factor (2 Marks*3) or (1 mark*6)	
OR	iii.	Discuss the key design considerations involved to make a single point cutting tool.	**6**
		Each design consideration - 4 marks	
		Sketch - 2 marks	
Q.6		Attempt any two:	
	i.	Explain the Standard Gauges and limit gauges with neat sketches.	**5**
		Standard Gauges with neat sketches - 2.5 marks	
		limit gauges with neat sketches -2.5 marks	
	ii.	Explain the gauge wear allowances with suitable example.	**5**
		Explain the gauge wear allowances – 3 marks	
		Suitable example. – 2 marks	
	iii.	Write short note on	**5**
		a. Taylor's principle of gauge design -3 marks	
		b. Computer aided tool design - 2 marks	

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