Sanjay Ghodawat University, Kolhapur 2018-19

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Year and Program:2018-19 | **School of Technology** | **Department of Mechanical Engineering**

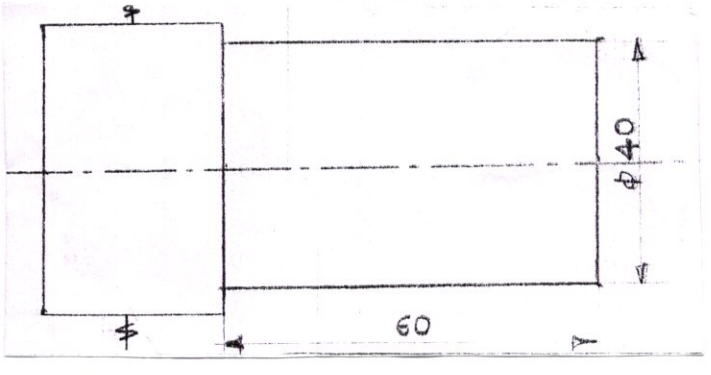
Course Code: MET205 | **Course Title: Manufacturing Processes** | **Semester – III**

Day and Date Sunday 01 Dec 18 | **End Semester Examination (ESE)** | **Time:** 2:30pm to 5:30pm **Max Marks: 100**

Instructions:
1) All questions are compulsory.
2) Assume suitable data wherever necessary.
3)Figures to the right indicate full marks.
4) Refer to the tables provided

Q.1	**Solve any Two**	Marks	Bloom's Level	CO
a)	Select suitable cutting parameters for turning (Refer Table275 Turning) job diameter from ϕ45mm to ϕ40mm for a length of 60 mm as shown in **Fig A**below. Also calculate the machining time for the same operation. Available speed steps on lathe are given below.	07	L_3	CO1

Lever position	A	B	C	D
High Speed	400	250	600	900
Low Speed	80	45	120	180



Note:1) All dimensions are in mm 2) Figure not to scale**Fig A**

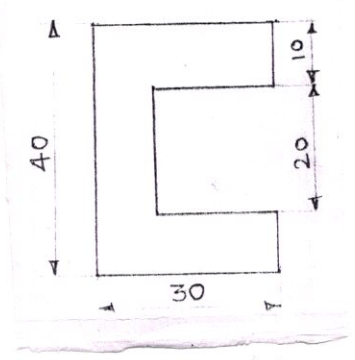
Cutting material: Carbide Raw Material: Mild Steel
Raw Material Size: ϕ45mm x 120 mm

OR

a)	Explain with neat sketch quick return mechanism used in shaping machine	07	L_2	CO1
b)	Compare up milling and down milling. When do you prefer up milling and down milling?	08	L_2	CO2

OR

b)	What is indexing? State and explain method of indexing used to produce hexagonal head of a bolt?	08	L_2	CO2
Q.2	**Solve any Two**			
a)	The component shown in **Fig B is** to be punched out of sheet metal. Draw three possible layouts separately for the following blank.	07	L_3	CO5



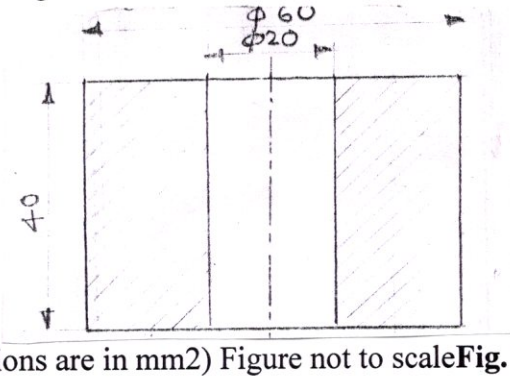
Note: 1) All dimensions are in mm 2) Figure not to scale **Fig B**

OR

a)	List a product manufactured by each of the following sheet metal operations i) Drawing ii) Bending iii) Spinning iv) Blanking v) Punching vi) Embossing	07	L_3	CO5
b)	Explain the process of centrifugal casting for manufacturing of piston rings.	08	L_3	CO4

OR

b)	Explain in brief the properties of molding sand required to produce quality casting.	08	L_2	CO4
Q.3	**Solve any Two**			
a)	A lathe is provided with a gear train from 20 teeth to 120 teeth in steps of 5 teeth and an additional gear of 127 teeth. Calculate the gears for cutting metric threads of 2.5 mm pitch on a lathe having a leadscrew of 4 TPI. Briefly explain process of thread cutting on lathe.	08	L_3	CO1
b)	Select suitable cutting parameters for drilling (Refer Table 277 & Table 278) hole of ϕ20mm in the job as shown in **Fig C** Also calculate the machining time for the same operation.	08	L_3	CO2



Note:1)All dimensions are in mm2) Figure not to scale**Fig. C**

Cutting material: HSS Raw Material: Mild Steel

Available speed steps on drilling machine are as given below-

Lever position	Speed in RPM	Lever position	Speed in RPM	Lever position	Speed in RPM
A1	260	B1	1225	C1	415
A2	70	B2	340	C2	110
A3	205	B3	870	C3	300

	c)	Following L shape blanks as shown in **Fig D** are to be punched out of 1.2 mm thick strips. If the margin between blank and strip edge is 2.5mm and that between two blank is 2 mm, determine the blank size. Calculate percentage utilization of strip. The strip width can be adjusted to accommodate blanks. Also explain ways to reduce scrap.	08	L_3	CO5

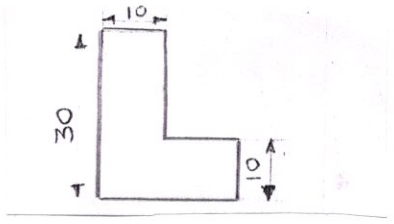


Fig D

	d)	List the elements of gating system. Explain the function of riser in the gating system. Does riser take care of solid shrinkage?	08	L_2	CO4
Q.4		**Solve any Two**			
	a)	Explainwith sketch different stages in the drop forging process in the production of spanner.	09	L_3	CO3
	b)	Indicate by means of a flow diagram the different stages in manufacture of a 50 mm diameter rod from steel ingot. Briefly explain the same.	09	L_{3om} o	CO3
	c)	What are different types of extrusion process? Explain with neat sketch indirect extrusion process.	09	L_2	CO3
Q.5		**Solve any Two**			
	a)	With a neat sketch explain construction of ECM (Electro chemical machining). State its advantages and applications.	09	L_2	CO6
	b)	Classify non-conventional manufacturing processes. Explain with neat sketch working of USM (Ultrasonic machining) processes.	09	L_2	CO6
	c)	Draw block diagram of AJM. State its characteristics, advantages and limitations.	09	L_2	CO6
Q.6		**Solve any Three**			
	a)	How does hot working is different than cold working in terms of process and product?	06	L_2	CO3
	b)	Distinguish between wire drawing and tube drawing with sketch.	06	L_2	CO3
	c)	Why non-conventional machining processes are used? What are the limitations of non-conventional machining processes.	06	L_2	CO6
	d)	Draw labelled diagram of electro discharge machining and state its characteristics.	06	L_2	CO6

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CUTTING CONDITIONS

Table 275 Turning

Work material	Tool material	Cutting speed, *m/min.*			
		Depth, *mm*			
		5 - 10	2 - 5	0.5 - 2	0.1 - 0.5
		Feed *mm/rev.*			
		0.4 - 0.6	0.25 - 0.5	0.2 - 0.3	0.05 - 0.2
Free-machining steels	*HSS*	20 - 40	40 - 70	40 - 110	50 - 120
	Carbide	90 - 150	120 - 180	150 - 250	200 - 500
Mild steels	*HSS*	25 - 35	30 - 50	30 - 60	40 - 80
	Carbide	60 - 120	80 - 150	120 - 200	150 - 450
Medium carbon steels	*HSS*	15 - 25	25 - 45	25 - 50	30 - 70
	Carbide	50 - 110	60 - 120	90 - 150	120 - 300
Alloy steels	*HSS*	10 - 15	15 - 25	15 - 35	20 - 45
	Carbide	30 - 65	40 - 80	60 - 100	80 - 180
Tool steels	*HSS*	15 - 20	20 - 25	20 - 30	30 - 60
	Carbide	50 - 110	60 - 120	90 - 150	120 - 300
Stainless steels	*HSS*	15 - 20	15 - 25	15 - 30	20 - 50
	Carbide	40 - 60	40 - 70	50 - 80	50 - 90
Cast iron: Grey, Ductile Malleable.	*HSS*	20 - 25	25 - 30	35 - 45	40 - 60
	Carbide	60 - 90	70 - 100	80 - 110	80 - 120
Aluminium alloys	*HSS*	40 - 70	70 - 100	90 - 120	100 - 200
	Carbide	60 - 150	80 - 180	90 - 450	150 - 600
Copper alloys	*HSS*	40 - 60	60 - 100	90 - 120	100 - 200
	Carbide	50 - 110	60 - 150	90 - 180	120 - 310
Magnesium alloys	*HSS*	40 - 70	70 - 100	90 - 120	100 - 200
	Carbide	60 - 150	80 - 180	90 - 450	150 - 600
Titanium alloys	*HSS*	10 - 15	15 - 30	30 - 50	50 - 90
	Carbide	15 - 30	30 - 50	50 - 90	60 - 120

CUTTING CONDITIONS

Table 277 Drilling-Reaming-Tapping

Work material	Cutting speed, *m/min.*		
	Drilling	Reaming	Tapping
Free machining steels	20-30	11-15	9-12
Mild steels	20-23	11-14	11-12
Medium carbon steels	14-20	9-14	8-11
Alloy steels	18-22	10-14	10-12
Tool steels	5-8	3-5	3-5
Stainless steels	12-15	9-25	8-9
Cast iron: Grey, Ductile and Malleable	20-23	12-17	9-12
Aluminium alloys	35-55	25-30	14-18
Copper alloys	30-45	20-40	9-12
Magnesium alloys	60-105	30-40	15-25
Titanium alloys	12-15	9-25	8-9

Table 278

Hole dia. *mm*	Feed, *mm/rev.*	
	Drilling	Reaming
1.5-2.5	0.04-0.06	0.08-0.13
3-4	0.05-0.1	0.1 -0.2
4.5-5.5	0.05-0.13	0.15-0.3
6-8.5	0.1 -0.18	0.2 -0.4
9-11.5	0.12-0.2	0.3 -0.51
12-14.5	0.15-0.25	0.41-0.61
15-18	0.18-0.28	0.46-0.66
18.5-20.5	0.2 -0.3	0.5 -0.71
21-24	0.23-0.33	0.56-0.76
25-29	0.25-0.36	0.61-0.81
30-38	0.28- 0.41	0.71-0.91
over 38	0.3 -0.41	0.81-1.00