QP Code: R261B020 | Reg. No | | | | | | | | | | | AY 25

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

M.Tech. (Second Semester - Regular) Examinations, May – 2026

24MMTPC12001 – Metal Cutting – Theory and Practice

Time: 3 hrs | Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. List the elements of the Orthogonal Rake System (ORS).	CO1	K1
b. Calculate the chip reduction coefficient in a machining process	CO2	K3
c. Explain the significance of shear angle in Merchant's analysis.	CO3	K2
d. Compare conventional cutting tools with indexable insert tools.	CO5	K4
e. Classify the types of chatter in machining operations.	CO6	K2

PART – B **(10 x 5=50 Marks)**

Answer ***ALL*** the questions	Marks	CO #	Blooms Level
2. a. Explain the differences between ASA and ORS systems of tool geometry	5	CO1	K2
b. Compare orthogonal and oblique cutting processes based on machining characteristics.	5	CO1	K4
(OR)			
c. In an orthogonal cutting process, the following observations were made: Depth of cut = 0.25 mm; width of cut = 4 mm, chip thickness ratio = 0.45 cutting velocity = 40 m/ min cutting force parallel to the cutting vector = 1150 N cutting force component normal to cutting velocity vector = 140 N, rake angle =18o. Determine resultant cutting force. Shear plane angle, friction angle and force component parallel to shear plane	5	CO1	K3
d. Describe the mechanics of chip formation and the different types of chips produced during machining.	5	CO2	K2
3.a. Calculate chip reduction coefficient, shear angle, and shear strain for a machining operation.	5	CO2	K3
b. Draw the merchant circle and express the normal and shear forces, cutting forces and thrust force	5	CO3	K3
(OR)			
c. Explain the various wear mechanisms involved in cutting tools during machining.	5	CO3	K2
d. Analyze the factors affecting machinability and their influence on tool performance.	5	CO3	K4
4.a. Define the geometry and main elements of a drilling tool used in machining processes.	5	CO4	K1
b. Explain the procedures to classify milling cutters.	5	CO4	K2
(OR)			
c. Evaluate the power consumption and specific cutting energy in machining processes.	5	CO3	K5
d. Interpret the working principle of surface grinding processes with neat sketch	5	CO4	K2

5.a.	Compare different cutting tool materials based on their properties and applications.	5	CO5	K4
b.	Define heat distribution in machining and identify the sources of heat generation during metal cutting.	5	CO5	K1
	(OR)			
c.	Illustrate the applications of indexable inserts in modern machining processes	5	CO5	K3
d.	Evaluate the role of cutting fluids in heat dissipation and enhancement of tool life.	5	CO6	K5
6.a.	Estimate the moment, thrust force and power required for 12.7 mm drill having a feed of 0.254 mm/rev, turning at 100 rpm, cutting a steel of brinell hardness 200.	5	CO4	K4
b.	Mention four important factors that influence the selection of grinding wheel	5	CO3	K3
	(OR)			
c.	Explain the various measuring techniques used in machining processes	5	CO6	K2
d.	With neat sketch explain the mechanism of machining	5	CO1	K3

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