Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree (S,FE) Examination January 2022 (2015 Scheme)

Course Code: ME303

Course Name: MACHINE TOOLS AND DIGITAL MANUFACTURING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any three full questions, each carries 10marks. Marks

1 a) What are the different types of chips produced in a machining process? (4)

b) What are the various force components involved in an orthogonal cutting process? Derive the relationship between the different force components using Merchant's analysis. (6)

2 a) Turning tests resulted in one-minute tool life at a cutting speed of 4m/min and 20 minute tool life at a speed of 2m/min. Project how long tool would last at a speed of 1m/min under identical machining conditions. (4)

b) What are the different types of tool wear? Explain each type. (6)

3 a) Explain any three methods for taper turning in a lathe with sketches. (6)

b) What is the function of rest and mandrel in the machining process performed in a lathe? (4)

4 a) Enumerate the uses and limitations of a sensitive drilling machine and a radial drilling machine. (6)

b) Differentiate between the following operations performed in a drilling machine (i)boring and reaming (ii) counterboring and countersinking (4)

PART B

Answer any three full questions, each carries 10marks.

5 a) How are shaping machines classified based on the type of drive used for giving reciprocating movement to the ram? Explain any one of them. (6)

b) A 600mm x 300mm flat surface of a plate is to be finish machined on a shaper. The plate is fixed with the 600mm side along the tool travel direction. If the tool over-travel at each end of plate is 20mm, cutting speed is 8m/min, feed rate is (4)

0.3mm/ double stroke and the ratio of return time to cutting time of tool is 1:2, find the time required for machining.

6	a)	Differentiate between the features of a shaping machine, slotting machine and planing machine.	(6)
	b)	Give the relative merits and demerits of an open sided planer and a double housing planer.	(4)
7	a)	Sketch and explain the features of a column and knee type milling machine.	(6)
	b)	Which milling process, up milling or down milling, gives a better surface finish? Why?	(4)
8	a)	Explain straddle milling and gang milling.	(4)
	b)	What do you mean by indexing? Index 25 divisions by simple indexing using plate I having 15, 16, 17, 18, 19, 20 holes.	(6)

PART C

Answer any four full questions, each carries 10marks.

9	a)	What are the parameters used in specifying a grinding wheel?	(6)
	b)	What are the reasons for the reduction in the grinding ability of the grinding wheel? How can this be rectified?	(4)
10	a)	Differentiate between capstan and turret lathe.	(6)
	b)	What is the difference between cylindrical grinding and surface grinding?	(4)
11	a)	What are the advantages of finishing process over grinding? Explain the honing conditions required.	(6)
	b)	Distinguish between broaching and lapping processes.	(4)
12	a)	Define digital manufacturing. With neat sketch explain the concept.	(5)
	b)	How are product life cycle management and digital manufacturing related?	(5)
13	a)	Explain the modelling technique IDEF in digital manufacturing.	(5)
	b)	How GRAI modelling is used in DM? Explain.	(5)
14	a)	What is the role of simulation in digital manufacturing?	(5)
	b)	Explain the architecture of digital manufacturing.	(5)

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