Indra Ganesan
COLLEGE OF ENGINEERING

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Accredited by NAAC with 'B+' Grade, 2(f) & 12B Status Institution by UGC
IG Valley, Madurai Main Road, Manikandam, Tiruchirappalli - 620012

NAAC DOCUMENTS

QUALITY INDICATOR FRAME WORK

CRITERION – 1

CURRICULAR ASPECTS

SUBMITTED BY

IQAC

INTERNAL QUALITY ASSURANCE CELL

INDRA GANESAN COLLEGE OF ENGINEERING

Criteria 1	Curricular Aspects	100

1.1 Curricular Planning and Implementation (20)

1.1.1 The Institution ensures effective curriculum planning and delivery through a well-planned and documented process including Academic calendar and conduct of continuous internal Assessment

Table of Content

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF MECHANICAL ENGINEERING

PREFACE OF THE COURSE FILE

Batch	: **2021-2025**
Academic Year	: **2022-2023 / EVEN**
Program	: **MECHANICAL ENGINEERING**
Year & Semester	: **2nd Year / 4th Semester**
Course Code	: **ME3493**
Name of the Course	: **Manufacturing Technology**
Faculty in-charge	: **Mr.G.Deepankumar, AP/Mechanical**

Signature of the Faculty in-charge

HoD/ Mechanical

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

Indra Ganesan College of Engineering

Madurai Main Road (NH-45B), Manikandam, Tiruchirappalli-620012
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Department of Mechanical Engineering

Curriculam - Even Semester 2021-2022

Sl No	Contents	Course Code	Course Name	Year/Semester	L	T	P	Credits	Contact Periods	Total Periods
I YEAR MECHANICAL										
1	THEORY	GE8152	Engineering Graphics	I / II	2	0	4	4	5	90
3		BE8252	Basic Civil and Mechanical Engineering	I / II	3	0	0	4	3	45
4		PH8251	Materials Science	I / II	3	0	0	3	3	45
1	LAB	GE8261	Engineering Practices Laboratory	I / II	0	0	4	2	4	60
II YEAR MECHANICAL										
1	THEORY	MA8452	Statistics and Numerical Methods	II / IV	4	0	0	4	4	60
2		ME8492	Kinematics of Machinery	II / IV	3	0	0	3	3	45
3		ME8451	Manufacturing Technology – II	II / IV	3	0	0	3	3	45
4		ME8491	Engineering Metallurgy	II / IV	3	0	0	3	3	45
5		CE8395	Strength of Materials for Mechanical Engineering	II / IV	3	0	0	3	0	45
6		ME8493	Thermal Engineering- I	II / IV	3	0	0	3	3	45
1	LAB	ME8462	Manufacturing Technology Laboratory – II	II / IV	0	0	4	2	4	60
2		CE8381	Strength of Materials and Fluid Mechanics and Machinery Lab	II / IV	0	0	4	2	4	60
3		HS8461	Advanced Reading and Writing	II / IV	0	0	2	1	2	30
III YEAR MECHANICAL										
1	THEORY	ME8651	Design of Transmission Systems	III / VI	3	0	0	3	3	45
2		ME8691	Computer Aided Design and Manufacturing	III / VI	3	0	0	3	3	45
3		ME8693	Heat and Mass Transfer	III / VI	3	2	0	4	5	75
4		ME8692	Finite Element Analysis	III / VI	3	0	0	3	3	45
5		ME8694	Hydraulics and Pneumatics	III / VI	3	0	0	3	3	45
6		ME8091	Automobile Engineering (Professional Elective - I)	III / VI	3	0	0	3	3	45
1	LAB	ME8681	CAD / CAM Laboratory	III / VI	0	0	4	2	4	60
2		ME8682	Design and Fabrication Project	III / VI	0	0	4	2	4	60
3		HS8581	Professional Communication	III / VI	0	0	2	1	2	30
IV YEAR MECHANICAL										
1	THEORY	MG8591	Principles of Management	IV / VIII	3	0	0	3	3	45
2		IE8693	Production planning and Control (Professional Elective– IV)	IV / VIII	3	0	0	3	3	45
1	LAB	ME8811	Project Work	IV / VIII	0	0	20	10	20	300

S.No	Year	No. of Theory Subject	No. of Laboratory
1	I	4	1
2	II	5	2
3	III	6	2
4	IV	2	1
TOTAL		16	6

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DEPARTMENT OF MECHANICAL ENGINEERING

ME3493 **MANUFACTURING TECHNOLOGY** **L T P C**

3 0 0 3

Course Objectives:

1. To study the concepts and basic mechanics of metal cutting and the factors affecting machinability
2. To learn working of basic and advanced turning machines.
3. To teach the basics of machine tools with reciprocating and rotating motions and abrasive finishing processes.
4. To study the basic concepts of CNC of machine tools and constructional features of CNC.
5. To learn the basics of CNC programming concepts to develop the part programme for Machine centre and turning centre
6. Identify with about the advanced manufacturing technologies like Industry 4, applying artificial Intelligence to manufacturing and recent abrasive finishing processes.

Unit -1Mechanics of Metal Cutting **9**

Mechanics of chip formation, forces in machining, Types of chip, cutting tools – single point cutting tool nomenclature, orthogonal and oblique metal cutting, thermal aspects, cutting tool materials, tool wear, tool life, surface finish, cutting fluids and Machinability.

Unit – 2 Turning Machines **9**

Centre lathe, constructional features, specification, operations – taper turning methods, thread cutting methods, special attachments, surface roughness in turning, machining time and power estimation. Special lathes - Capstan and turret lathes- tool layout – automatic lathes: semi-automatic – single spindle: Swiss type, automatic screw type – multi spindle

Unit – 3 Reciprocating Machine Tools **9**

Reciprocating machine tools: shaper, planer, slotter: Types and operations- Hole making: Drilling, reaming, boring, tapping, type of milling operations-attachments- types of milling cutters– machining time calculation - Gear cutting, gear hobbing and gear shaping – gear finishing methods Abrasive processes: grinding wheel – specifications and selection, types of grinding process – cylindrical grinding, surface grinding, centreless grinding, internal grinding - micro finishing methods

Unit – 4 CNC Machines **9**

Computer Numerical Control (CNC) machine tools, constructional details, special features – Drives, Recirculating ball screws, tool changers; CNC Control systems – Open/closed, point-to-point/continuous -

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Turning and machining centres – Work holding methods in Turning and machining centres, Coolant systems, Safety features.

Unit – 5 Programming of CNC Machine Tools 9

Coordinates, axis and motion, Absolute vs Incremental, Interpolators, Polar coordinates, Program planning, G and M codes, Manual part programming for CNC machining centers and Turning centers – Fixed cycles, Loops and subroutines, Setting up a CNC machine for machining.

Total 45 Periods

Outcomes At the end of the course the students would be able to

1. Apply the mechanism of metal removal process and to identify the factors involved in improving machinability.
2. Describe the constructional and operational features of centre lathe and other special purpose lathes.
3. Describe the constructional and operational features of centre lathe and other special purpose lathes.
4. Apply the constructional features and working principles of CNC machine tools.
5. Demonstrate the Program CNC machine tools through planning, writing codes and setting up CNC machine tools to manufacture a given component.

Text books

1. Kalp akjian. S, "Manufacturing Engineering and Technology", Pearson Education India,7th Edition, 2018.
2. Mich ael Fitzpatrick, Machining and CNC Technology, McGraw-Hill Education; 4th edition, 2018.

References

1. Ro y. A. Lindberg, Processes and materials of manufacture, PHI / Pearson education, 2006.
2. Ge ofrey Boothroyd, "Fundamentals of Metal Machining and Machine Tools", McGraw Hill, 1984.
3. Ra o. P.N "Manufacturing Technology," Metal Cutting and Machine Tools, Tata McGraw- Hill, New Delhi, 2009.
4. A. B. Chattopadhyay, Machining and Machine Tools, Wiley, 2nd edition, 2017.
5. Pe ter Smid, CNC Programming Handbook, Industrial Press Inc.;Third edition, 2007.

Hod/Mech

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DEPARTMENT OF MECHANICAL ENGINEERING

Lecture Schedule

Degree/Program: **B.E / MECHANICAL** Course code &Name: ME 3493-Manufacturing Technology
Duration: **Dec 2022 - Apr 2023** Semester: **IV** Faculty: **Mr.G.Deepankumar**

AIM:

To expose the students to basics mechanics of metal cutting, turning, reciprocating & CNC machines and programming of CNC machine tools.

OBJECTIVES:

To impart knowledge on

(i) To study the concepts and basics mechanics of metal cutting and the factors affecting machinability.

(ii) To learn working of basic and advanced turning machines.

(iii) To teach the basics of machine tools with reciprocating and rotating motions and abrasive finishing processes.

(iv) To study the basics concepts of CNC of machine tools and constructional features of CNC.

(v) To learn the basics of CNC programming concepts to develop the part programme for machine centre and turning centre.

PREREQUISITES: Manufacturing Processes

COURSE OUTCOMES:

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C213.1	Apply the mechanism of metal removal process and to identify the factors in improving machinability.	1,2,3,4,5,6,7,10,12	1,2,3
C213.2	Describe the constructional and operational features of centre lathe and other special purpose lathes.	1,2,3,4,5,6,7,10,12	1,2,3
C213.3	Describe the constructional and operational features of reciprocating machine tools.	1,2,3,4,5,6,7,10,12	1,2,3
C213.4	Apply the constructional features and working principles of CNC machine tools.	1,2,3,4,5,6,7,10,12	1,2,3
C213.5	Demonstrate the program CNC machine tools through planning, writing codes and setting up CNC machine tools to manufacture a given component.	1,2,3,4,5,6,7,10,12	1,2,3
C213.6	Identify with about the advanced manufacturing technologies like Industry 4, applying artificial Intelligence to manufacturing and recent abrasive finishing processes.	1,2,3,4,5,6,7,10,12	1,2,3

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Register Number: | | | | | | | | | | | | |

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Model Examination			Date		Marks	100
Course code	ME 3493	Course Title	Manufacturing Technology			
Regulation	2021	Duration	3 hrs	Academic Year	2022-23	
Year	II	Semester	IV	Department	Mechanical Engg	

COURSE OUTCOMES

C213.1	Apply the mechanism of metal removal process and to identify the factors in improving machinability.
C213.2	Describe the constructional and operational features of centre lathe and other special purpose lathes.
C213.3	Describe the constructional and operational features of reciprocating machine tools.
C213.4	Apply the constructional features and working principles of CNC machine tools.
C213.5	Demonstrate the program CNC machine tools through planning, writing codes and setting up CNC machine tools to manufacture a given component.
C213.6	Identify with about the advanced manufacturing technologies like Industry 4, applying artificial Intelligence to manufacturing and recent abrasive finishing processes.

Q.No.	Question	CO	BTS
	PART A **(Answer all the Questions 10 x 2 = 20 Marks)**		
1	Briefly, differentiate between orthogonal cutting and oblique cutting.	CO213.1	K4
2	What are the causes of wear?	CO213.1	K2
3	Write the specifications of a typical lathe.	CO213.2	K1
4	What are the functions of feed rod and lead screw?	CO213.2	K2
5	State the abrasives used in manufacture of grinding wheels.	CO213.3	K1
6	Mention four important factors that influence the selection of grinding wheel.	CO213.3	K2
7	Name the various elements of CNC machines.	CO213.4	K1
8	Define subroutine.	CO213.4	K1
9	Classify NC machines.	CO213.5	K4
10	Write the functions of codes M00 and M01.	CO213.6	K1
	PART B **(Answer all the Questions 5 x 13 = 65 Marks)**		
11a	What is the tool life equation and state the factor affecting the tool life?	CO213.1	K2
	OR		
b	What are the different types of cutting fluids used in machining process?	CO213.1	K2
12a	In Capstan and Turret lathe, explain the principle and operation of single spindle Swiss type and automatic screw type, and multi spindle with neat diagram.	CO213.2	K2
	OR		
b	Explain the Compound slide and Offset Tail stock methods of taper turning in a lathe with neat diagram.	CO213.2	K2
13a	Explain the gear cutting by a formed tool.	CO213.3	K2
	OR		
b	Explain the operations of horizontal broaching machine with neat sketch.	CO213.3	K2
14a	What are the different types of NC system? Describe with neat sketch and example.	CO213.4	K2
	OR		
b	What are the safety features to be followed in CNC machines?	CO213.4	K2
15a	Write down the part programming for CNC machining centers in fixed cycles and canned cycle with suitable examples and diagrams	CO213.5	K1
	OR		
b	What do you understand by Sinumeric and Fanuc language system in CNC machines? Explain with suitable example.	CO213.5	K2
	PART C **(Answer all the Questions 1 x 15 = 15 Marks)**		
16a	With a simple sketch, explain the working of a vertical broaching machine.	CO213.3	K2
	OR		
b	Explain Micromachining with suitable example and diagram.	CO213.3	K2

Course Faculty
(Name /Sign / Date)

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HoD
(Name /Sign / Date)

39	08/05/23	2	Reciprocating ball screws	T2
40	08/05/23	6	CNC control systems	T2
41	10/05/23	8	Turning and Machining centres	T2
42	12/05/23	2	Work holding methods in turning and machining centres	T2
43	12/05/23	6	Coolant systems	R4
44	12/05/23	8	Continued	R4
45	15/05/23	2	Safety features	R4
UNIT V – PROGRAMMING OF CNC MACHINE TOOLS				**Target Periods:09**
46	15/05/23	6	Coordinates	T2
47	15/05/23	8	Interpolation	T2
48	16/05/23	1	Program planning	T2
49	16/05/23	2	G and M codes	T2
50	16/05/23	3	Manual part programming for CNC machining centres	T2
51	16/05/23	4	Turning Centres	R5
Content Beyond the Syllabus				
52			Components of industry 4	Material

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S.No	Date	Period	Topics to be Covered	Book & Page. No.
UNIT -I - MECHANICS OF METAL CUTTING				**Target periods :09**
1	06/02/23	3	Mechanics of chip formation, Types of chip	T1
2	06/02/23	6	Forces in Machining	T1
3	08/02/23	8	Cutting tools-Single point cutting tools	T1
4	10/02/23	2	Nomenclature	T1
5	10/02/23	6	Orthogonal and oblique cutting	T1
6	10/02/23	8	Thermal Aspects	R2
7	13/02/23	3	Cutting tool materials	R2
8	13/02/23	6	Tool wear	R2
9	17/02/23	2	Tool life	R2
10	17/02/23	6	Surface Finish	T1
11	17/02/23	8	Cutting fluids	T1
12	20/02/23	3	Machinability	T1
UNIT II -TURNING MACHINES				**Target periods :09**
13	01/03/23	8	Centre lathe- Constructional features, specification	T1
14	03/03/23	2	Operations-Taper turning method, thread cutting method	T1
15	03/03/23	6	Special attachments, Surface roughness in turning	T1
16	03/03/23	8	Machining time and power estimation	T1
17	27/03/23	3	Special lathes-Capstan and turret lathes	R1
18	27/03/23	6	Tool layout	R1
19	29/03/23	8	Automatic lathes	R1
20	31/03/23	3	Semi automatic-Single spindle-Swiss type	R1
21	31/03/23	6	Automatic screw type-multi spindle	T1
22	31/03/23	8	Student seminar-I-Automatic lathes	T1
23	03/04/23	3	Quiz-I	Material
UNIT III - RECIPROCATING MACHINES				**Target Periods :09**
24	03/04/23	6	Reciprocating Machine Tools-Shaper, Planer, Slotter	T1
25	05/04/23	8	Types and operations	T1
26	10/04/23	3	Types of milling operations and attachments	T1
27	10/04/23	6	Types of milling cutting cutters	T1
28	12/04/23	8	Machining time calculation	T1
29	26/04/23	3	Gear Cutting	T1
30	26/03/23	6	Gear hobbing and gear shaping	T1
31	28/03/23	2	Gear finishing methods	R3
32	28/04/23	6	Abrasive Processes	R3
33	28/04/23	8	Grinding wheel specifications and selection	R3
34	03/05/23	3	Types of grinding process	R2
35	03/05/23	6	Internal grinding-Micro finishing methods	R3
UNIT IV - CNC MACHINES				**Target Periods :09**
36	05/05/23	2	Computer Numerical Control (CNC) machine tools	T2
37	05/05/23	6	Constructional details	T2
38	05/05/23	8	Special features	T2

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Book Reference - Text Books

Sl.	Title of the Book	Author	Publisher	Year
1.	Manufacturing Engineering & Technolgy	Kalpakjian	Pearson Eduction India, 7th Edition	2018
2.	Machining and CNC Technology	Michael Fitzpatrick	Mcgraw –Hill Education, 4th Edition	2018

Book Reference – References

Sl	Title of the Book	Author	Publisher	Year
1.	Processes and materials of manufacture	Roy. A	PHI/Pearson education	2006
2.	Fundamentals of Metal Machining and Machine Tools	Geofrey Boothroyd	Mcgraw Hill	1984
3.	Manufacturing Technology	Rao.P.N	Tata Mcgraw Hill, New Delhi.	2009
4	Machining and Machine Tools	A.B.Chatto padhyay	Wiley, 2nd edition	2017
5	CNC programming handbook	Peter Smid	Industrial Press Inc., 3rd edition	2007

Website Refereice:
http://nptel.iitm.ac.in/courses.php?branch=Mech
www.freebookspot.com

Signature of the Faculty in-charge

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Internal Assessment Test - I Even Sem Time Table (Higher Semester) - 2022-23

S.No	Branch	YEAR	06.03.23	07.03.23	08.03.23	09.03.23	10.03.23	13.03.23
1	CIVIL	II						
		III	CE8601 & DSSE	CE8602&SA-II	CE8603&IE	CE8604&HE	EN8592&WWE	
		IV						
2	CSE	II	CS3452&TOC	CS3491&AI	CS3492&DBMS	CS3401&ALG	GE3451&EVS	CS3451&OS
		III	CS8651&IP	CS8691&AI	CS8601&MC	CS8602&CD	CS8603&DS	
		IV	GE8076&PE	CS8080&IRT				
3	EEE	II	EE3404&MPMC	EE3405&EM II	EE3401&TD	EE3403&MI	GE3451&EVS	EE3402&LIC
		III	EE8601&SSD	EE8602&PSG	EE8691&ES	EE8005&SEM	EE8002&DEA	
		IV	EE8015&EEG	EE8018&MCB				
4	ECE	II	EC3452&EMF	EC3401&NS	EC3491&CS	EC3451&LIC	GE3451&EVS	EC3492&DSP
		III	MG8591&POM	EC8651&TLRF	EC8691&MPMC	EC8652&WC	EC8095&VLSI	
		IV	GE8076&PE	EC8094&SATCOM				
5	MECH	II	ME3491&TOM	ME3451 &TE	ME3493 &MT-II	ME3492&H&P	GE3451&EVS	CE3491&SM
		III	ME8651&DTS	ME8691&CAD/CAM	ME8693& HMT	ME8692&FEA	ME8694&HP	
		IV	MG8591&POM	ME8094&CIM				
6	AGRI	II	AI3401&TES	AI3402&SWC	AI3403&SOM	CE3691&HWE	GE3451&EVS	ME3391&TD
		III						
		IV						
7	AI&DS	II	MA3391&PS	AL3452&OS	AL3451&ML	AD3491&FDS	GE3451&EVS	CS3591&CN
		III						
		IV						
8	IT	II	CS3452&TOC	CS3491&AI	CS3492&DBMS	IT3491&WE	GE3451&EVS	CS3451&OS
		III	IT8601&CI	CS8592&OOAD	IT8602&MC	CS8091&BDA	CS8092&CGM	
		IV	GE8076&PE	CS8080&IRT				

Exam cell Coordinator

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DEPARTMENT OF MECHANICAL ENGINEERING

Faculty Time Table

Mr.G.Deepan Kumar AP/Mechanical Engineering								
Day Order	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
I			MT-II			MT-II		
II								
III								
IV								
V		**MT-II**				MT-II		

S.Code	**Title**	**Year / Branch**	**Hours**
ME8493	Manufacturing Technology-II	II / MECH	4
TOTAL - 4 hours			

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DEPARTMENT OF MECHANICAL ENGINEERING

Assignment Answer Sheet

Name of the Student : KANNAN.P

AU Register Number: 811221114014

Assignment – 01			Date of Issue:	03.03.2023	Marks	10
Course code	ME3493	Course Title	Manufacturing Technology			
Year	II	Semester/Section	IV/A	Date of Submission:	13.03.2023	

Q.No	Questions	CO
1	Explain orthogonal cutting and oblique cutting with its neat sketches	C204.1
2	Explain the types of chips formed during machining processes	C204.1

Mark Allocation

Rubrics	Marks Allocated	Marks obtained
Content Quality	6	4
Presentation Quality	2	2
Timely submission	2	2
Total marks	10	8

G. Deepankumar

Name and Signature of the Faculty Incharge

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DEPARTMENT OF MECHANICAL ENGINEERING

Identification of Curricular Gap & Content Beyond Syllabus(CBS)

Name of the Faculty :Mr.G.Deepankumar Course Code & Name:ME3493-Manufacturing Technology

Degree & Program:B.E. /Mechanical Semester: IV Academic Year: 2022 -2023 /EVEN

I.Mapping of Course Outcomes with POs & PSOs.(before CBS)

Table.1 Mapping of COs, C, PSOs with POs - before CBS.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C213.1	3	3	3	1	1	1	3	-	-	3	-	2	3	3	2
C213.2	3	3	3	1	1	1	3	-	-	3	-	2	3	2	2
C213.3	3	3	3	1	1	1	3	-	-	3	-	2	3	2	2
C213.4	3	3	3	1	1	1	3	-	-	3	-	2	3	2	2
C213.5	3	3	3	1	1	1	3	-	-	3	-	-	3	2	2
C213.6	3	3	2	1	1	1	3	-	-	3	-	-	3	2	2
C213	3	3	3	1	1	1	3	-	-	3	-	2	3	2	3

II. Identification of content beyond syllabus.

Table.2 Identification of content beyond syllabus

Details of Content Beyond Syllabus(CBS) added	POs strengthened/ vacant filled	CO/Unit
Components of industry 4	PO12(2) Vacant filled	C209.5 & C209.6/ IV & V

III. Mapping of Course Outcomes with POs & PSOs. (After CBS)

Table.3 Mapping of COs, C, PSOs with POs- after CBS.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C213.1	3	3	3	1	1	1	3	-	-	3	-	2	3	2	2
C213.2	3	3	3	1	1	1	3	-	-	3	-	2	2	2	2
C213.3	3	3	3	1	1	1	3	-	-	3	-	2	2	2	2
C213.4	3	3	3	1	1	1	3	-	-	3	-	2	2	2	2
C213.5	3	3	3	1	1	1	3	-	-	3	-	*2	2	2	2
C213.6	3	3	2	1	1	1	3	-	-	3	-	*2	2	2	2
C213	3	3	3	1	1	1	3	-	-	3	-	2	2	2	2

Signature of the Faculty

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DEPARTMENT OF MECHANICAL ENGINEERING

Assignment Question Paper

Assignment – 01			Date of Issue:	03.03.2023	Marks	10
Course code	ME3493	Course Title	Manufacturing Technology			
Year	II	Semester/Section	IV / A	Date of Submission:	13.3.2023	

Q.No	Questions	CO
1	Explain orthogonal cutting and oblique cutting with its neat sketches	C204.1
2	Explain the types of chips formed during machining processes	C204.1

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DEPARTMENT OF MECHANICAL ENGINEERING

Proof of Conduct of Content Beyond Syllabus(CBS)

Name of the Faculty :Mr.G.Deepankumar Course Code & Name:ME3493-Manufacturing Technology
Degree & Program:B.E. /Mechanical Semester: IV Academic Year: 2022 -2023 /EVEN

TOPIC: COMPONENTS OF INDUSTRY 4.0

INTRODUCTION:

Generally, Industry 4.0 refers to the means of automation and data exchange in manufacturing technologies including Cyber-Physical Systems, Internet of Things, big data and analytics, augmented reality, additive manufacturing, simulation, horizontal and vertical system integration, autonomous robots as well as cloud.

DEFINITION OF INDUSTRY 4.0

- Industry 4.0 enables the manufacturing sector to become digitalized with built-in sensing devices virtually in all manufacturing components, products and equipment.
- The analyzing of related data within a ubiquitous system with the fusion of digital data and physical objects has the ability to transform every industrial sector in the world to evolve much faster and with greater impact than any of the three previous industrial revolutions i.e. Industry 1.0,2.0 and 3.0 .
- Hence, Industry 4.0 is a contemporary issue that concerns today's industrial production as a whole and is meant to revolutionize it.
- In 2011, Germany introduced Industry 4.0 at the Hannover Fair event, symbolizing the advent of a brand new era of industrial revolution.
- When the idea was first mooted, extensive efforts were undertaken by the European manufacturing researchers and companies to embrace it.
- Their interest in this project or concept is due to the fact that under Industry 4.0, production will become more efficient and less costly.
- This is achieved by easy exchange of information and the integrated control of manufacturing products and machines acting simultaneously and smartly in interoperability

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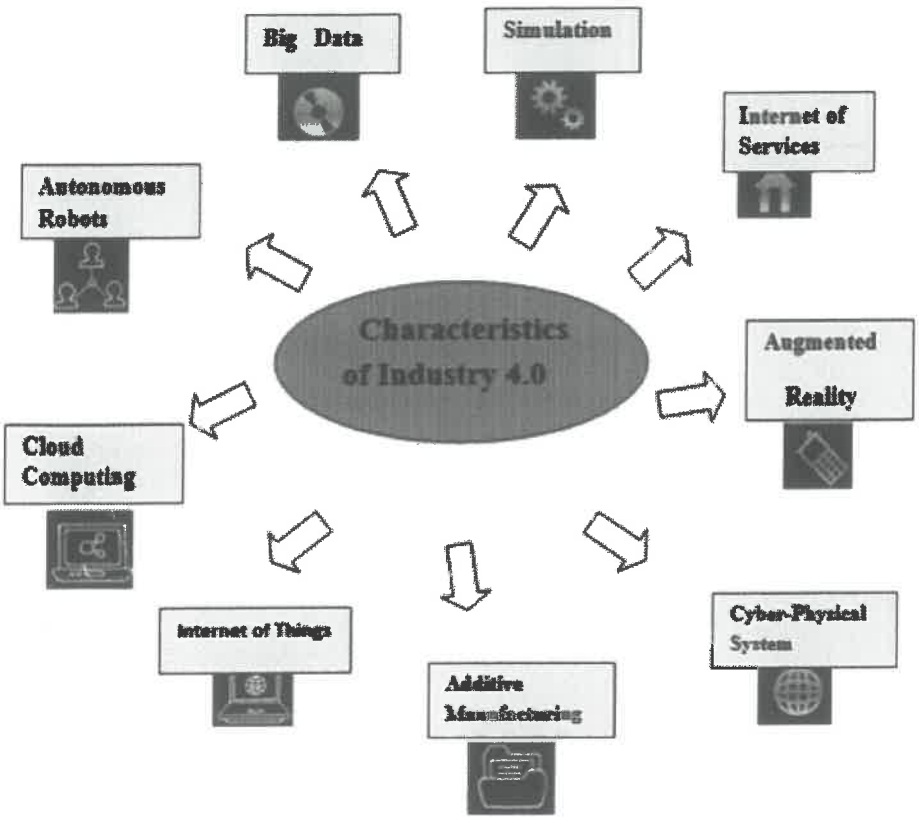
COMPONENTS OF INDUSTRY 4.0



Industry 4.0 can be classified into three components. The first is horizontal integration. It brings the concept of a new type of worldwide value chain networks. The second is vertical integration. The concept is to achieve hierarchical subsystems at the production line to produce an easy to configure and high flexibility production line. The last component is engineering integration along the whole value chain from the beginning to the end to assist in the customization of products. The horizontal integration is described as one where a corporation should both cooperate and compete with corporations that have similar characteristics to create an efficient production system. Material, financial control and knowledge can be connected in all these companies easily. Therefore, new control systems and models for business may appear (Wang et al., 2016). Vertical integration delivers the idea of a factory that has various informational and physical subsystems, for example like production management, actuator and sensor, value and corporate planning. It is important for the vertical integration of sensor and actuator signals along various stages of the enterprise resource planning (ERP) level to ensure high flexibility and ease to configure production lines. From this integration, the highly intelligent machines create an automated controlled system that is able to be automatically reconfigured according to the various types of products. The large amounts of data collected and processed enable the manufacturing system to be transparent (Wang et al., 2016). Lastly, End-To-End engineering integration in a chain of activities throughout the product-centric value creation process involves aspects such as customer requirement expression, product development and design, recycling, production engineering, production services, production planning and maintenance. From end-to-end integration, every stage can be reused for the same product model. Product design effects on services and production can be predicted by utilizing a software tool in the chain to make sure the products are customizable (Wang et al., 2016).

Website Refereıce:
http://nptel.iitm.ac.in/courses.php?branch=Mech
www.freebookspot.com

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MODEL EXAMINATION

ANSWER KEY ME 3493 – MANUFACTURING TECHNOLOGY

1 Briefly, differentiate between orthogonal cutting and oblique cutting. 2 Marks

Ans:

Sl. No.	Orthogonal cutting	Oblique cutting
1.	The cutting edge of the tool is perpendicular to the cutting velocity vector.	The cutting edge is inclined at an acute angle with the normal to the cutting velocity vector
2.	The chip flows over the tool face and the direction of chip-flow velocity is normal to the cutting edge.	The chip flows on the tool face making an angel with the normal on the cutting edge.
3.	The cutting edge clears the width of the work piece on either ends.(i.e No side flow)	The cutting edge may or may not clear the width of the work piece.
4.	The maximum chip thickness occurs at its middle.	The maximum chip thickness may not occur at the middle.

2 What are the causes of wear? 2 Marks

Ans:

The tool is subjected to three important factors such as force, temperature and sliding action due tool.

3 Write the specifications of a typical lathe. 2 Marks

Ans:

1, The length of bed. 2, maximum distance between dead and live centres. 3, Types of bed(i,e) straight, semi gap or gap type. 4, The height of dead centres. 5 bed. 6, width of the bed. 7, spindle bore. 8, spindle speed.9, H.P. of main motor and rpm.10, Number of spindle speeds. 11, spindle nose diameter. 12. Feeds

4 What are the functions of feed rod and lead screw? 2 Marks

Ans:

Feed rod:

It is used to guide the carriage in a straight line when it moves along the bed.

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	Lead screw: It is used to move the carriage while thread cutting operation is carried out. It also ensures the proper speed of work relative to the tool thread cutting operation.
5	State the abrasives seed in manufacture of grinding wheels. 2 Marks Ans: 1, corundum (75 to 90% crystalline Al2O3 +IRON OXIDE) 2, Diamond Artificial abrasives: a, Aluminium oxide b, silicon oxide
6	Mention four important factors that influence the selection of grinding wheel. 2 Marks Ans: 1. constant factors i. physical properties of material to be ground ii. Amount and rate of stock to be removed. iii. Area of contact. iv. Type of grinding machine 2. variable Factors i.work speed. ii. wheel speed. iii. condition of the grinding machine iv. personal factor
7	Name the various elements of CNC machines. 2 Marks Ans: 1.Tape reader 2.Mini computer 3. servos and interface logic 4. Motion feedback
8	Define subroutine. 2 Marks Ans: If the same machining operations, which was carried out already, is to be performed at many different positions on the work piece, it can be executed by means of a program called as subroutines
9	Write down the types of statements in APT language. 2 Marks Ans: 1. Geometric statements 2. Motion statements 3. postprocessor statement 4. special control or Auxiliary statements
10	What is the difference between incremental and absolute system? 2 Marks Ans: In absolute programming, the distance at my point at any instant will be measured the origin (X=0, Y=0). Whereas in incremental programming, the instant point will be noted as (X=0,Y=0). Further measurement will be made from the particular point only.
	PART B **(Answer all the Questions 5 x 13 = 65 Marks)**
11a	What is the tool life equation and state the factor affecting the tool life? Diagram – 5 Marks Ans: Description – 7 Marks **Tool life** Tool wear is a time dependent process. As cutting proceeds, the amount of tool wear increases gradually. But tool wear must not be allowed to go beyond a certain limit in order to avoid tool failure. The most important wear type from the process point of view is the flank wear, therefore the parameter which has to be controlled is the width of flank wear land, VB. This parameter must not exceed an initially set safe limit, which is about 0.4 mm for carbide cutting tools. The safe limit is referred to as allowable wear land (wear criterion), . The cutting time required for the cutting tool to develop a flank wear land of width is called tool life, T, a fundamental parameter in machining. The general relationship of VB versus cutting time is shown in the figure (so-called wear curve). Although the wear curve shown is for flank wear, a similar relationship occurs for other wear types. The figure shows also how to define the tool life T for a given wear criterion VBk
	OR
11b	What are the different types of cutting fluids used in machining process? Diagram – 5 Marks Ans: Description – 7 Marks **Cutting fluids** Cutting fluid (coolant) is any liquid or gas that is applied to the chip and/or cutting tool to improve cutting performance. A very few cutting operations are performed dry, i.e.,

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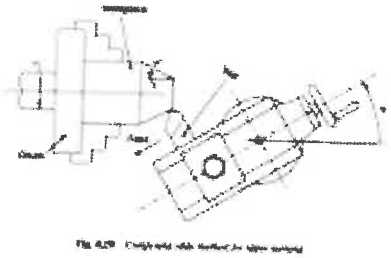
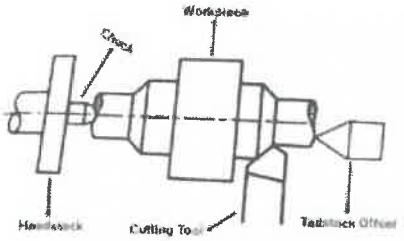
	without the application of cutting fluids. Generally, it is essential that cutting fluids be applied to all machining operations. - Cutting fluids serve three principle functions: - To remove heat in cutting: the effective cooling action of the cutting fluid depends on the method of application, type of the cutting fluid, the fluid flow rate and pressure. The most effective cooling is provided by mist application combined with flooding. Application of fluids to the tool flank, especially under pressure, ensures better cooling that typical application to the chip but is less convenient.
12a	In Capstan and Turret lathe, explain the principle and operation of single spindle Swiss type and automatic screw type, and multi spindle with neat diagram Diagram – 5 Marks Description – 7 Marks Ans: Capstan Lathe The term "capstan lathe" overlaps in sense with the term "turret lathe" to a large extent. In many times and places, it has been understood to be synonymous with "turret lathe". In other times and places it has been held in technical contradistinction to "turret lathe", with the difference being in whether the turret's slide is fixed to the bed (ram-type turret) or slides on the bed's ways (saddle-type turret). The difference in terminology is mostly a matter of United Kingdom and Common wealth usage versus United States usage. American usage tends to call them all "turret lathes". The word "capstan" could logically seem to refer to the turret itself, and to have been inspired by the nautical capstan. A lathe turret with tools mounted in it can very much resemble a nautical capstan full of handspikes. This interpretation would lead Americans to treat "capstan" as a synonym of "turret" and "capstan lathe" as a synonym of "turret lathe". However, the multi-spoked handles that the operator uses to advance the slide are also called capstans, and they themselves also resemble the nautical capstan. Turret Lathe The words "turret" and "tower", the former being a diminutive of the latter, come ultimately from the Latin "turris", which means "tower", and the use of "turret" both to refer to lathe turrets and to refer to gun turrets seems certainly to have been inspired by its earlier connection to the turrets of fortified buildings and to siege towers. The history of the rook in chess is connected to the same history, with the French word for rook, tour, meaning "tower". It is an interesting coincidence that the word "tour" in French can mean both "lathe" and "tower", with the first sense coming ultimately from Latin "tornus", "lathe", and the second sense coming ultimately from Latin "turris", "tower". "Tour revolver", "tour tourelle", and "tour tourelle revolver" are various ways to say "turret lathe" in French.
	OR
12b	Explain the Compound slide and Offset Tail stock methods of taper turning in a lathe with neat diagram. Diagram – 5 Marks Description – 7 Marks Ans: **Taper turning** - A taper is a conical shape. Tapers can be cut with lathes quite easily. There are some common methods for turning tapers on an center lathe, - Using a form tool: This type of tool is specifically designed for one cut, at a certain taper angle. The tool is plunged at one location, and never moved along the lathe slides. v Compound Slide - Method: The compound slide is set to travel at half of the taper angle. The tool is then fed - across the work by hand, cutting the taper as it goes. v Off-Set Tail Stock: In this method the - normal rotating part of the lathe still drives the workpiece (mounted between centres), but the centre at the tailstock is offset towards/away from the cutting tool. Then, as the cutting tool passes over, the part is cut in a conical shape. This method is limited to small tapers over long lengths.The tailstock offset h is defined by

h = Lsinα, where L is the length of work piece, and α is the half of the taper angle.

Taper turning by swivelling the compound rest



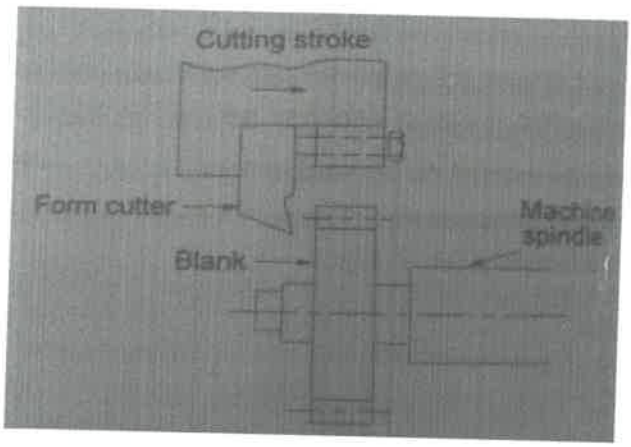
T ailstock Set Over MethodThe clamping mechanism is loosened for offsetting, adjusting the upper part of the tailstock as required, and adjusting screws are tightened which is shown in the figure. This method is also called as Offsetting Tailstock method.0



13a Explain the gear cutting by a formed tool.

Ans:

Diagram – 5 Marks
Description – 7 Marks



1.Gear Milling or Forming

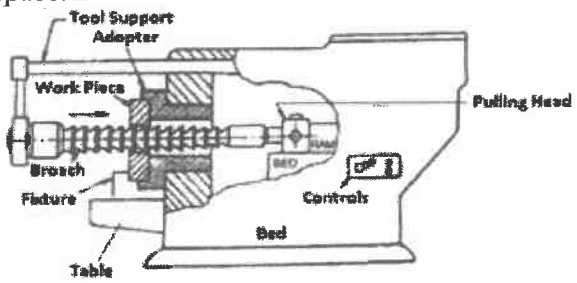
- The gear milling operation is used for gear cutting. All types of gears can be made by using gear milling.
- Milling cutter is selected specifically for a particular type of gear and module. The periphery of the gear blank is divided into required number of equi-spaced parts.
- The required number of parts should be equal to the number teeth to be made on the gear blank.
- The method of dividing the periphery is called indexing which is an integral part of the operation of gear milling.

Gear Milling

•In gear form cutting, the cutting edge of the cutting tool has a shape identical with the shape of the space between the gear teeth.

Disadvantages of Gear Milling

- Gear milling is a slower process of gear generation as compared to other gear generation process.
- In this process gear is generated by cutting one-by-one tooth.
- Gears are to be made, it is not suitable for larger batch size.
- The other methods required very high capital cost and setup cost as compared to gear milling so

	these are not economical for smaller batch size, only gear cutting by milling operation is recommended for smaller batch size.
	OR
13b	Explain the operations of horizontal broaching machine with neat sketch. Diagram – 5 Marks Ans: Description – 7 Marks Broaching machines are relatively simple as they only have to move the broach in a linear motion at a predetermined speed and provide a means for handling the broach automatically. Most machines are hydraulic, but a few specialty machines are mechanically driven. The machines are distinguished by whether their motion is horizontal or vertical. The choice of machine is primarily dictated by the stroke required. Vertical broaching machines rarely have a stroke longer than 60 in (1.5 m). Horizontal broaching machines are designed for pull broaching, surface broaching, continuous broaching, and rotary broaching. Pull style machines are basically vertical machines laid on the side with a longer stroke. Surface style machines hold the broach stationary while the workpieces are clamped into fixtures that are mounted on a conveyor system. Continuous style machines are similar to the surface style machines except adapted for internal broaching. Horizontal machines used to be much more common than vertical machines, however today they represent just 10% of all broaching machines purchased. Vertical machines are more popular because they take up less space.  **HORIZONTAL BROACHING MACHINE**
14a	What are the different types of NC system? Describe with neat sketch and example. Ans: Diagram – 5 Marks Description – 7 Marks **Types of NC (Numerical Control) Machine:** There are 3 types of NC machines and are as follows. 1. Traditional Numerical Control (NC Machine) 2. Computer Numerical Control (CNC Machine) 3. Distributed Numerical Control (DNC Machine) The explanation for the above types of NC machines are as follows. 1. Traditional Numerical Control (NC Machine): As the article is about the NC machine, you can just scroll down to know the detailed explanation of it. Anyhow I will tell you in short i.e. the NC machines are the evolution after Conventional machines. They can run with the help of a tape reader system i.e. whatever the operation you want to perform, you can punch it on the tape, and thereby the NC machine can perform that operation. The process for running the NC machine by the Tape reader system was explained in detail in this article. 2. Computer Numerical Control (CNC Machine): The Evolution of the CNC machine takes place after the evolution of NC machines. To overcome the

limitation of the NC machine, the CNC machine has come into the picture.
In the case of NC machines, the Tape Reader system is used, which after several usages, the wear and tear of the tape take place and the operator has to punch again on the new tape to carry out the operation.

3. Distributed Numerical Control (DNC Machine):

The DNC Machine is similar to CNC Machine, except a remote computer is used to control no. of machines that can perform no. of operations at a time. Here the central computer or the remote computer communicates with the local CNC computers to do the operation.

Components or Main Parts of NC Machine:

A NC Machine is consist by following parts:

1. MCU or CPU
2. Drive Unit
3. Feedback Devices
4. Tape Reader system
5. Very Few Manual Controls

Let me explain all these components.

MCU (Memory Controlled Unit):

MCU is the Memory Control Unit that is taking the information from the input devices via the keyboard or mouse and analyze the data, and send the data to the output devices available in the NC machine.

Drive Unit:

Drive unit is a device that is used for converting Electrical energy into Mechanical energy which is required for traveling the axis.

For example, Electric motor.

Here we can use Stepper Motor as the drive unit in CNC Machining.

Stepper Motor:

In case of a stepper motor, when the pulsed electrical energy is given as the input to the motor, the motor starts rotating either by changing the number of pulses of electrical energy input or by changing the rate of pulses of electrical energy input, the RPM of the motor can be changed.

In the case of the stepper motor, there is **no mechanism** available to stop the motor at the required destination. Therefore the accuracy of the component is poor.

Feedback Devices:

Feedback device is a Displacement Measuring Equipment. MCU will compare the distance traveled by the axis with the distance to be traveled and determines the difference in distance.

The MCU will calculate the no.of pulses and send it to the drive unit. This process continues in the form of a cycle.

OR

14b What are the safety features to be followed in CNC machines? Diagram – 5 Marks
Ans: Description – 7 Marks

CNC Machine Safety

An Emergency Stop Button. The emergency stop button is used to shut down the machine instantly. ...

A Soundproof Casing. The soundproof casing reduces the noise emitted by the operating section of the machine. ...

The Curtain Guards.

The curtain guards are made out of PVC. ...

The Guard Fence. ...

The Contact Mats.

15a Write down the part programming for CNC machining centers in fixed cycles and canned cycle with suitable examples and diagrams

Ans:

A canned cycle is a way of conveniently performing repetitive CNC machine operations. Canned cycles automate certain machining functions such as drilling, boring, threading, pocketing, etc... Canned cycles are so called because they allow a concise way to program a machine to produce a feature of a part.

Fixed Cycles or canned cycles

On the CNC Milling and machining centers the most common operation done is the drilling, tapping and boring the holes. The standard center drilling, spot drilling and drilling are used

together with related operations such as reaming, tapping, single point boring, countersinking and counter boring operations. Always machining a simple hole requires only a single drill but the complex hole may require several tools to be completed. All CNC control manufacturers have incorporated the programming methods for machining holes in their control systems. These methods are called canned cycles or fixed cycles. Machining holes are operated with point to point machining; the detailed of Point to point machining is explained as below:

POINT-TO-POINT Machining:

While machining the holes actual cutting takes place is along a single axis i.e., the Z=axis. This type of machining is commonly called as point-to-point machining. This method involves the rapid motion in X and Y-axis for positioning to centre of hole and then the cutting take place in Z-Axis with machining federate. Some motions along Z axis may also include rapid motion till the tool reaches the part for machining hole. The programming structure for point to point machining can be grouped into four general steps as shown below:

Step1: Rapid motion to the hole position along X and/or Y-axis.
Step2: Rapid motion to the starting point of the cut along the Z axis.
Step3: Feedrate motion to the specified depth along Z axis
Step4: Return to a clear position along the Z axis.

These four steps represent the minimum number of blocks required to program a drilling for a single hole using manual programming method, without using fixed cycles or canned cycles. If you have one or two holes in a part with same diameter then the program is very simple with the minimum tool. Suppose you have a more holes with different diameter then we may have to call more tools to finish all the holes.

Fixed Cycles or canned cycles:

Most of the time consuming task in programming point to point operation is the repetitive information written in the program, this can be overcome by using the fixed cycles, here once the drilling cycle is called and the next the inputting the position of holes is enough, the controller repeats the drilling cycle until it is cancelled by the G-code. This method is called the canned or fixed cycle.

The canned cycle is designed by the control manufacturers to eliminate the repeated data in manual programming and allow an easy program data changes at the machine. A number of identical holes may share the same starting point, same feedrate and the same depth, only the X and Y coordinates are different for each hole on the part. The specified values become modal for the duration of the cycle and do not have to be repeated, unless there is a change in them.

These canned cycles are called in the program by a G command as following canned or fixed cycles.

G73 = High speed peck drilling cycle.
G74 = Left hand Tapping cycle.
G76 = Boring cycle
G80 = cancel of any kind of canned cycles.
G81 = general drilling or simple drilling cycle.
G83 = Peck drilling cycle.
G84 = Right hand tapping cycle.
G85 = Simple Boring Cycle.
G86 = Boring cycle with spindle stop
G87 = Back boring cycle.

Programming Format for the canned cycle:

General format for the canned cycle is a series of values specified by the unique address. The format is as shown below:

N... G... X...Y... R... Z... P... Q... I... J... F... K…

Whereas,

N = Block Number
G= Cycle Number eg: G81, G83 etc.
X = Hole position in X-axis
Y= Hole position in Y-Axis
R = Start position or the return Level
Z= depth of the hole
P= Dwell time (1s=1000ms)
Q = Depth of the peck drill
I = shift amount in X-direction for boring cycles

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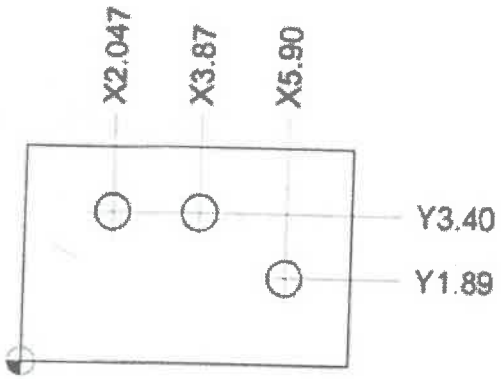
J= shift amount in Y-direction for boring cycles.
F= Feed rate

K = number of repetitions.

Programming example for Point to point position and canned cycles:



Manual Programming with Points:

```
O1000
N100 G20 G17 G40 G80
N101 G90 G54 G00 X5.9 Y1.89 S1000 M03
N102 G43 Z1 H01 M08
N103 Z0.5
N104 G01 Z-2 F5
N105 G04 P300
N106 G00 Z0.5
N107 X3.87 Y3.4
N108 G01 Z-2 F5
N109 G04 P300
N110 G00 Z0.5
N111 X 2.047
N112 G01 Z-2 F5
N113 G04 P300
N114 G00 Z0.5 M09
N115 G28 Z0
N116 M30
```

Programming with Fixed cycles or canned cycles:

```
O1000
N100 G20 G17 G40 G80
N101 G90 G54 G00 X5.9 Y1.89 S1000 M03
N102 G43 Z1 H01 M08
N103 G99 G81 R0.5 Z-2 P300 F5
N104 X3.87 Y3.4
N105 X2.047
N106 G80 G28 Z0 M09
N107 M30
```

OR

15b What do you understand by Sinumeric and Fanuc language system in CNC machines? Explain with suitable example.

Ans:

Diagram – 5 Marks
Description – 7 Marks

Whether turning, milling, grinding, additive manufacturing or other technologies – SINUMERIK covers all of these machining technologies from a single source. The mix of different technologies common to many shopfloors can be merged by applying SINUMERIK Operate across the board. Multitasking - combining several different technologies in one machine - is also supported perfectly by SINUMERIK Operate.

SINUMERIK is designed for large-scale production on production machinery as well as for the production of special parts in universal machining centers, and for individual parts on cycle-controlled machines.

While large-scale production involves the largely automated processing of orders, single part production requires a CNC machine that As the command center of your machine tools, SINUMERIK offers many

	benefits, including a wide range of powerful onboard technology features for turning, milling, grinding, or additive manufacturing. SINUMERIK therefore offers the decisive extra performance for machine tools and increases overall productivity on the shopfloor, is easy to program and operate. FANUC - From basic high-volume, high-repetition commodity production, to unique, highly complex parts that require the highest precision and advanced machining techniques.

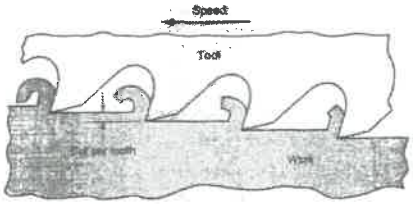
PART C

(Answer all the Questions 1 x 15 = 15 Marks)

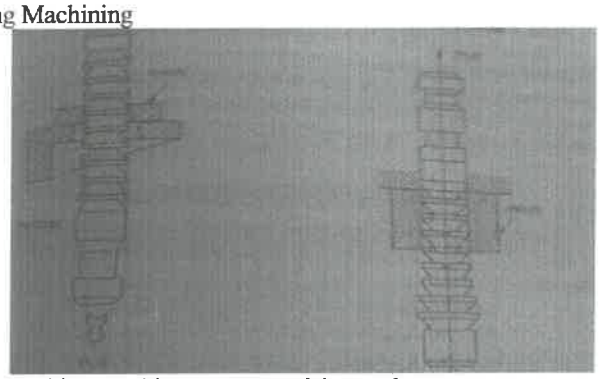
16a With a simple sketch, explain the working of a vertical broaching machine. Diagram – 7 Marks

Ans: Description – 8 Marks

Process of machining a surface with a special multipoint cutting tool called *BROACH* which has successively higher cutting edges in a fixed path



Vertical Broaching Machining



A vertical broaching machine uses a precision tool to create custom cuts in workpieces at high speeds. Once tooled properly, a vertical broach machine is capable of mass-producing parts to your exact specifications. Vertical broaching can be used in the following broaching types: Pull-down broaching Broaching is the name for the process that pushes or pulls a cutting tool (a broaching tool) over or through a surface of a workpiece or component. Broaching dates back all the way to the early 1850s. People often use it to make one-of-a-kind parts. However, you can also use it for high volume, metal-removal processes.

A broaching tool acts as a cutter, which consists of cutting teeth arranged in a row. A broaching machine works on the principle of proper offsetting of the workpiece and then performing work on it. The centerline of a workpiece and a broaching tool are aligned to each other at an offset position of 1°.

Advantages of Precision Broaching Services

The main advantage of a vertical machine is the small footprint. With a vertical orientation, you can enjoy a long stroke length without taking up a large amount of your facility's floor space. A horizontal machine, however, requires a significantly larger footprint

OR

16b Explain Micromchining with suitable example and diagram. Diagram – 7 Marks

Ans: Description – 8 Marks

Micromachining allows engineers to **create small, intricate parts**. These parts can then be used in experiments, recreating large-scale processes at a tiny scale.

Missing: ~~suitable~~ | Show results with: suitable

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Internal Assessment Test Answer Book

Name	Dhivakar. R			Year/ Semester/Section	III / IV
Reg No.	811221114008	Date/Session	24.5.23/AN	Department	MECH
Course code	ME3493	Course Title	Manufacturing Technology		
Internal Assessment Test	IAT 1 ☐	IAT 2 ☐	IAT 3 ☐	Model	☑
Name and Signature of the Invigilator with date	VAISHYAA.J Vaishyaa 24/5/23				

Instruction to the Student: Put tick mark to the question attended in the column against question.

Part A			Part B / Part C						
Q. No.	✓	Marks	Q. NO.	✓	a Marks	✓	b Marks	Total Marks
1		2	11				9	09
2		2	12		7			07
3		2	13		12			12
4		1	14		10			10
5		1	15				11	11
6		1	16		13			13
7		2					Total	~~82~~ 62
8		2						
9		2						
10		1						
Total		16						

84/100 78/100 Grand Total

G. DEEPANKUMAR 26/5/23. Name and Signature of the Examiner with date

To be filled by the examiner

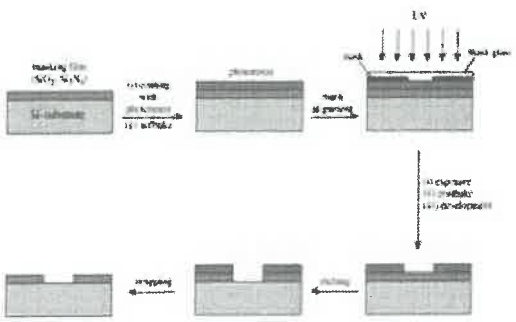
Course Outcomes	1	2	3	4	5	6	Total
Marks allotted	17	17	32	17	15	02	100
Marks Obtained	13	10	22	14	13	01	78

IQAC Audit - Remarks

Mistake found in total while distributing Page to student and Correct entered in the log book.

Dr. G. Balakrishnan, M.E., Ph.D. Principal Indra Ganesan College of Engineering Name and Signature

IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.



- MEMS micromachining refers to fashioning microscopic mechanical parts out of a silicon substrate or on a silicon substrate. The overall process of obtaining the small structure is called micromachining.
- The term LIGA is an acrorym derived from the German words lithography (lithographie) electroforming (galvan forming) and molding (abforming). This technique was developed at karlsruhe Nuclear Research center in karlsruhe, Germany The LIGA process is completely different from the bulk and surface micromachining processes for fabricating microstructers. It is a versatile process and can be used to incorporate materials other than silicon in the manufacturing sequence. Fig(a) shows major steps involved in the LIGA process. Patterns and created in Photo resist wing deep X-ray lithography technique. Since one of the major attraction of LIGA process is the ability to fabricate thick microstructure, a thick photoresist is used in the photolithography step X-ray lithography is chosen over conventionaI lithography due to the short wavelengths that are required to penetrate and develop thick photoresist material. This short wavelength leads to high resolution and ultimately results in the capability to fabricate structures with high aspect ratios. Typically line width of 0.2μm with aspect ratios greater than 100:1 are achievable. X-rays are provided by a synchrotron radiation source. Due to the high flux of collimated way from a synchrotron source the exposure time can be considerably shortened inspite of the use of thick photo resists. A popular photoresist material is polymethimethacrylate. (PMNA). X-ray lithography requires appropriate masking moterial. Thin layer of Silicon Nitride with gold layer on top good masking combination
- The substrate in LIGA process is called the Base plate. Electroplating process is carried out for refilling the trenches in the photoresists for electroplated metal refilling process, the substrate or the base plate should either be a conductor or should have a suitable coating of a conductor.

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Register Number:

INDRA GANESAN COLLEGE OF ENGINEERING

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(Approved by AICTE, New Delhi and affiliated to Anna University, Chennai)

Remodel Examination - I			**Date**	**Marks**	**100**
Course code	**ME 3493**	**Course Title**	**Manufacturing Technology**		
Regulation	**2021**	**Duration**	**3 hrs**	**Academic Year**	**2022-23**
Year	**II**	**Semester**	**IV**	**Department**	**Mechanical Engg**

COURSE OUTCOMES

C213.1	Apply the mechanism of metal removal process and to identify the factors in improving machinability.
C213.2	Describe the constructional and operational features of centre lathe and other special purpose lathes.
C213.3	Describe the constructional and operational features of reciprocating machine tools.
C213.4	Apply the constructional features and working principles of CNC machine tools.
C213.5	Demonstrate the program CNC machine tools through planning, writing codes and setting up CNC machine tools to manufacture a given component.
C213.6	Identify with about the advanced manufacturing technologies like Industry 4, applying artificial Intelligence to manufacturing and recent abrasive finishing processes.

Q.No.	Question	CO	BTS
	PART A		
	(Answer all the Questions 10 x 2 = 20 Marks)		
1	List the various metal removal processes?	CO213.1	K2
2	Briefly, differentiate between orthogonal cutting and oblique cutting?	CO213.1	K2
3	Write the specifications of a typical lathe?	CO213.2	K1
4	What are the uses of headstock?	CO213.2	K2
5	Mention the differences between shaper and planer.	CO213.3	K1
6	Mention four important factors that influence the selection of grinding wheel?	CO213.3	K2
7	What are linear bearings?	CO213.4	K1
8	Name the various elements of CNC machines?	CO213.4	K1
9	State the limitations of CNC machine tools.	CO213.5	K2
10	What is the difference between incremental and absolute system?	CO213.6	K1
	PART B		
	(Answer all the Questions 5 x 13 = 65 Marks)		
11a	Explain orthogonal cutting and oblique cutting with its neat sketches and compare.	CO213.1	K2
	OR		
b	What are the different types of cutting fluids used in machining process?	CO213.1	K2
12a	Explain the construction and working principle of a lathe with sketch.	CO213.2	K2
	OR		
b	Explain the Compound slide and Offset Tail stock methods of taper turning in a lathe with neat diagram?	CO213.2	K2
13a	Explain various milling cutters with neat sketches?	CO213.3	K2
	OR		
b	Explain the gear cutting by a formed tool?	CO213.3	K2
14a	Define CNC and DNC. With a help of a diagram explain the working of NC machine tool.	CO213.4	K2
	OR		
b	What are the safety features to be followed in CNC machines?	CO213.4	K2
15a	What do you understand by Sinumeric and Fanuc language system in CNC machines? Explain with suitable example.	CO213.5	K2
	OR		
b	Write down the part programming for CNC machining centers in fixed cycles and canned cycle with suitable examples and diagrams	CO213.5	K2
	PART C		
	(Answer all the Questions 1 x 15 = 15 Marks)		
16a	Explain the operations of horizontal broaching machine with neat sketch?	CO213.6	K2
	OR		
b	Explain different types of drilling machines with their special features?	CO213.6	K2

Course Faculty
(Name /Sign / Date)

HoD
(Name /Sign / Date)

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Manikandam, Trichy-620 012.

INDRA GANESAN COLLEGE OF ENGINEERING

IG VALLEY, MANIDANDAM, TIRUCHIRAPPALLI – 620 012

DEPARTMENT OF MECHANICAL ENGINEERING

ACADEMIC YEAR 2022 – 2023 (EVEN SEMESTER)

STUDENTS MARK STATEMENT- CO BASED

MODEL EXAM

SUBJECT CODE &TITLE: ME3493 & MANUFACTURING TECHNOLOGY

YEAR/SEM: II/IV **MONTH & YEAR: MAY & 2023**

S.NO	REG NO	STUDENT NAME	Marks Alloted COX						Marks Obtained COY						Total (100)
			CO 1	CO 2	CO 3	CO 4	CO 5	CO 6	CO 1	CO 2	CO 3	CO 4	CO 5	CO 6	
1.	811221114006	Dhanasekaran D	17	17	32	17	15	02	08	12	25	13	9	02	**69**
2.	811221114008	Dhivakar R	17	17	32	17	15	02	13	10	27	14	13	01	**78**
3.	811221114014	Kannan P	17	17	32	17	15	02	05	02	15	07	08	0	**37**
4.	811221114022	Naveen M	17	17	32	17	15	02	12	10	22	15	10	01	**70**
5.	811221114030	Santhosh R	17	17	32	17	15	02	15	13	26	14	12	02	**82**

MARKS RANGE:

<20	20-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
0	0	1	0	0	2	1	1	0

Total No.of Candidates Present	5
Total No.of Candidates Absent	0
Total No.of Students Pass	4
Total No. of Students Fail	1
Percentage of Pass	80

STAFF INCHARGE **HoD/MECH** **PRINCIPAL**

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(Approved by AICTE, New Delhi and affiliated to Anna University, Chennai)

ReInternal Assessment Test Answer Book

Name	Kannan. P			Year/ Semester/Section	II / IV
Batch No.	8112211 4014	Date/Session	3.6.23/FN	Department	MECH
Course code	ME3493	Course Title	Manufacturing Technology		
Internal Assessment Test		IAT 1 ☐	IAT 2 ☐	IAT 3 ☐	Re-Model ☑
Name and Signature of the Invigilator with date		VAIBHYAA. J 3.6.23			

Instruction to the Student: Put tick mark to the question attended in the column against question.

Part A			Part B / Part C					Total Marks
Q. No.	✓	Marks	Q. NO.	✓	a Marks	✓	b Marks	
1	✓	2	11			✓	10	10
2			12	✓	10			10
3			13	✓	08			08
4.	✓	2	14			✓	10	10
5	✓	1	15	✓	10			10
6	✓	2	16	✓	07			07
7							Total	55
8	✓	2	65 Grand Total				G. DEEPANKUMAR 4.6.23. Name and Signature of the Examiner with date	
9								
10	✓	1						
Total		10						

To be filled by the examiner							
Course Outcomes	1	2	3	4	5	6	Total
Marks allotted	17	17	17	17	15	17	100
Marks Obtained	12	12	11	12	10	08	65

IQAC Audit - Remarks

–

Name and Signature of the IQAC member

Dr. G. Balakrishnan, M.E., Ph.D.,
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IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

Indra Ganesan
COLLEGE OF ENGINEERING

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Approved by AICTE, NewDelhi & Affiliated to Anna University, Chennai
NAAC Accredited, 2(F) Status Institution by UGC

Model Exam Time Table (Re test) Even Sem (Higher Semester) - 2022-23

S.No	Branch	YEAR	29.05.23 AN	30.05.23 AN	31.05.23 AN	01.06.23 AN	02.06.23 AN	03.06.23 AN
1	CIVIL	II						
		III		CE8601 & DSSE	CE8602&SA-II	CE8603&IE	CE8604&HE	EN8592&WWE
		IV						
2	CSE	II	CS3452&TOC	CS3491&AI	CS3492&DBMS	CS3401&ALG	GE3451&EVS	CS3451&OS
		III		CS8651&IP	CS8691&AI	CS8601&MC	CS8602&CD	CS8603&DS
		IV					GE8076&PE	CS8080&IRT
3	EEE	II	EE3404&MPMC	EE3405&EM II	EE3401&TD	EE3403&MI	GE3451&EVS	EE3402&LIC
		III	EE8601&SSD	EE8602&PSG	EE8691&ES	EE8005&SEM		
		IV					EE8015&EEG	EE8018&MCB
4	ECE	II	EC3401&NS	EC3452&EMF	EC3491&CS	EC3451&LIC	GE3451&EVS	EC3492&DSP
		III	MG8591&POM	EC8652&WC	EC8691&MPMC	EC8651&TLRF	EC8095&VLSI	
		IV					GE8076&PE	EC8094&SATCOM
5	MECH	II	ME3491&TOM	ME3451 &TE	CE3491&SM	ME3492&H&P	GE3451&EVS	ME3493 &MT-II
		III	ME8651&DTS	ME8091&CAD/CAM	ME8693& HMT	ME8692&FEA	ME8694&HP	
		IV					MG8591&POM	ME8094&CIM
6	AGRI	II	AI3401&TES	AI3402&SWC	AI3403&SOM	CE3691&HWE	GE3451&EVS	ME3391&TD
		III						
		IV						
7	AI&DS	II	MA3391&PS	CS3591&CN	AL3451&ML	AD3491&FDS	GE3451&EVS	AL3452&OS
		III						
		IV						
8	IT	II	CS3452&TOC	CS3491&AI	CS3492&DBMS	IT3491&WE	GE3451&EVS	CS3451&OS
		III		IT8601&CI	CS8592&OOAD	IT8602&MC	CS8091&BDA	CS8092&CGM
		IV					GE8076&PE	CS8080&IRT

EXAM CELL COORDINATOR

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PRINCIPAL

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IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

IQAC Academic Audit Form

ACADEMIC YEAR: 2022-2023 EVEN SEMESTER

Name of Department : MECH | Year / Sem: 2 / IV | No. of Students Registered : 05

Details of Examination : Model Examination

S.No.	Course Code	List of Reg.No Verified	Course Log Book Verified (Y / N)	Course File Verified (Y / N)	No of students Attended	No of Absentees	No of Failures	Pass %	Remarks
1	ME3493	811221114006	Y	Y	05	-	01	80	-
2	ME3493	811211140008	Y	Y	05	-	01	80	-
3	ME3493	811221114014	Y	Y	05	-	01	80	-
4	ME3493	811221114022	Y	Y	05	-	01	80	-
5	ME3493	811221114030	Y	Y	05	-	01	80	-

External Member Name and Signature: Verified by

Internal Member Name and Signature: R. Ramesh (R.RAMESH BABU)

Overall Remarks:

-

HoD/ MECHANICAL

IQAC Co-ordinator

Principal

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
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Manikandam, Tiruchirappalli

INDRA GANESAN COLLEGE OF ENGINEERING

IG VALLEY, MANIDANDAM, TIRUCHIRAPPALLI – 620 012

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ACADEMIC YEAR 2022 – 2023 (EVEN SEMESTER)

STUDENTS MARK STATEMENT- CO BASED

RE MODEL EXAM

SUBJECT CODE &TITLE: ME3493- MANUFACTURING TECHNOLOGY

YEAR/SEM: II/IV **MONTH & YEAR: JUNE/2023**

S.NO	REG NO	STUDENT NAME	Marks Alloted COX						Marks Obtained COY						Total (100)
			Co 1	Co 2	Co 3	Co 4	Co 5	Co 6	Co 1	Co 2	Co 3	Co 4	Co 5	Co 6	
1.	811221114014	Kannan P	17	17	17	17	15	17	12	12	11	12	10	8	65

STAFF INCHARGE **HoD/Mech** **PRINCIPAL**

Dr. G. Balakrishnan, M.E., Ph.D.,
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Model Exam Time Table Even Sem (Higher Semester) - 2022-23

S.No	Branch	YEAR	17.05.23 AN	18.05.23 AN	19.05.23 AN	22.05.23 AN	23.05.23 AN	24.05.23 AN
1	CIVIL	II						
		III		CE8601 & DSSE	CE8602&SA-II	CE8603&IE	CE8604&HE	EN8592&WWE
		IV						
2	CSE	II	CS3452&TOC	CS3491&AI	CS3492&DBMS	CS3401&ALG	GE3451&EVS	CS3451&OS
		III		CS8651&IP	CS8691&AI	CS8601&MC	CS8602&CD	CS8603&DS
		IV					GE8076&PE	CS8080&IRT
3	EEE	II	EE3404&MPMC	EE3405&EM II	EE3401&TD	EE3403&MI	GE3451&EVS	EE3402&LIC
		III	EE8601&SSD	EE8602&PSG	EE8691&ES	EE8005&SEM		
		IV					EE8015&EEG	EE8018&MCB
4	ECE	II	EC3401&NS	EC3452&EMF	EC3491&CS	EC3451&LIC	GE3451&EVS	EC3492&DSP
		III	MG8591&POM	EC8652&WC	EC8691&MPMC	EC8651&TLRF	EC8095&VLSI	
		IV					GE8076&PE	EC8094&SATCOM
5	MECH	II	ME3491&TOM	ME3451 &TE	CE3491&SM	ME3492&H&P	GE3451&EVS	ME3493 &MT-II
		III	ME8651&DTS	ME8091&CAD/CAM	ME8693& HMT	ME8692&FEA	ME8694&HP	
		IV					MG8591&POM	ME8094&CIM
6	AGRI	II	AI3401&TES	AI3402&SWC	AI3403&SOM	CE3691&HWE	GE3451&EVS	ME3391&TD
		III						
		IV						
7	AI&DS	II	MA3391&PS	CS3591&CN	AL3451&ML	AD3491&FDS	GE3451&EVS	AL3452&OS
		III						
		IV						
8	IT	II	CS3452&TOC	CS3491&AI	CS3492&DBMS	IT3491&WE	GE3451&EVS	CS3451&OS
		III		IT8601&CI	CS8592&OOAD	IT8602&MC	CS8091&BDA	CS8092&CGM
		IV					GE8076&PE	CS8080&IRT

EXAM CELL COORDINATOR

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Internal Assessment Test - II Even Sem Time Table (Higher Semester) - 2022-23

S.No	Branch	YEAR	17.04.23 AN	18.04.23 AN	19.04.23 AN	20.04.23 AN	21.04.23 AN	24.04.23 AN
1	CIVIL	II						
		III	CE8601 & DSSE	CE8602&SA-II	CE8603&IE	CE8604&HE	EN8592&WWE	
		IV						
2	CSE	II	CS3452&TOC	CS3491&AI	CS3492&DBMS	CS3401&ALG	GE3451&EVS	CS3451&OS
		III	CS8651&IP	CS8691&AI	CS8601&MC	CS8602&CD	CS8603&DS	
		IV	GE8076&PE	CS8080&IRT				
3	EEE	II	EE3404&MPMC	EE3405&EM II	EE3401&TD	EE3403&MI	GE3451&EVS	EE3402&LIC
		III	EE8601&SSD	EE8602&PSG	EE8691&ES	EE8005&SEM		
		IV	EE8015&EEG	EE8018&MCB				
4	ECE	II	EC3401&NS	EC3452&EMF	EC3491&CS	EC3451&LIC	GE3451&EVS	EC3492&DSP
		III	MG8591&POM	EC8652&WC	EC8691&MPMC	EC8651&TLRF	EC8095&VLSI	
		IV	GE8076&PE	EC8094&SATCOM				
5	MECH	II	ME3491&TOM	ME3451 &TE	CE3491&SM	ME3492&H&P	GE3451&EVS	ME3493 &MT-II
		III	ME8651&DTS	ME8691&CAD/CAM	ME8693& HMT	ME8692&FEA	ME8694&HP	
		IV	MG8591&POM	ME8094&CIM				
6	AGRI	II	AI3401&TES	AI3402&SWC	AI3403&SOM	CE3691&HWE	GE3451&EVS	ME3391&TD
		III						
		IV						
7	AI&DS	II	MA3391&PS	CS3591&CN	AL3451&ML	AD3491&FDS	GE3451&EVS	AL3452&OS
		III						
		IV						
8	IT	II	CS3452&TOC	CS3491&AI	CS3492&DBMS	IT3491&WE	GE3451&EVS	CS3451&OS
		III	IT8601&CI	CS8592&OOAD	IT8602&MC	CS8091&BDA	CS8092&CGM	
		IV	GE8076&PE	CS8080&IRT				

EXAM CELL COORDINATOR

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Internal Assessment Test - II (Retest) Even Sem Time Table for Higher Semester - 2022-23

S.No	Branch	YEAR	01.05.23 AN	02.05.23 AN	03.05.23 AN	04.05.23 AN	05.05.23 AN	08.05.23 AN
1	CIVIL	II						
		III	CE8601 & DSSE	CE8602&SA-II	CE8603&IE	CE8604&HE	EN8592&WWE	
		IV						
2	CSE	II	CS3452&TOC	CS3491&AI	CS3492&DBMS	CS3401&ALG	GE3451&EVS	CS3451&OS
		III	CS8651&IP	CS8691&AI	CS8601&MC	CS8602&CD	CS8603&DS	
		IV	GE8076&PE	CS8080&IRT				
3	EEE	II	EE3404&MPMC	EE3405&EM II	EE3401&TD	EE3403&MI	GE3451&EVS	EE3402&LIC
		III	EE8601&SSD	EE8602&PSG	EE8691&ES	EE8005&SEM		
		IV	EE8015&EEG	EE8018&MCB				
4	ECE	II	EC3401&NS	EC3452&EMF	EC3491&CS	EC3451&LIC	GE3451&EVS	EC3492&DSP
		III	MG8591&POM	EC8652&WC	EC8691&MPMC	EC8651&TLRF	EC8095&VLSI	
		IV	GE8076&PE	EC8094&SATCOM				
5	MECH	II	ME3491&TOM	ME3451 &TE	CE3491&SM	ME3492&H&P	GE3451&EVS	ME3493 &MT-II
		III	ME8651&DTS	ME8691&CAD/CAM	ME8693& HMT	ME8692&FEA	ME8694&HP	
		IV	MG8591&POM	ME8094&CIM				
6	AGRI	II	AI3401&TES	AI3402&SWC	AI3403&SOM	CE3691&HWE	GE3451&EVS	ME3391&TD
		III						
		IV						
7	AI&DS	II	MA3391&PS	CS3591&CN	AL3451&ML	AD3491&FDS	GE3451&EVS	AL3452&OS
		III						
		IV						
8	IT	II	CS3452&TOC	CS3491&AI	CS3492&DBMS	IT3491&WE	GE3451&EVS	CS3451&OS
		III	IT8601&CI	CS8592&OOAD	IT8602&MC	CS8091&BDA	CS8092&CGM	
		IV	GE8076&PE	CS8080&IRT				

EXAM CELL COORDINATOR

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Internal Assessment Test - I Retest Even Sem Time Table (Higher Semester) - 2022-23

S.No	Branch	YEAR	12.03.23	13.03.23	14.03.23	15.03.23	16.03.23	17.03.23
1	CIVIL	II						
		III	CE8601 & DSSE	CE8602&SA-II	CE8603&IE	CE8604&HE	EN8592&WWE	
		IV						
2	CSE	II	CS3452&TOC	CS3491&AI	CS3492&DBMS	CS3401&ALG	GE3451&EVS	CS3451&OS
		III	CS8651&IP	CS8691&AI	CS8601&MC	CS8602&CD	CS8603&DS	
		IV	GE8076&PE	CS8080&IRT				
3	EEE	II	EE3404&MPMC	EE3405&EM II	EE3401&TD	EE3403&MI	GE3451&EVS	EE3402&LIC
		III	EE8601&SSD	EE8602&PSG	EE8691&ES	EE8005&SEM	EE8002&DEA	
		IV	EE8015&EEG	EE8018&MCB				
4	ECE	II	EC3452&EMF	EC3401&NS	EC3491&CS	EC3451&LIC	GE3451&EVS	EC3492&DSP
		III	MG8591&POM	EC8651&TLRF	EC8691&MPMC	EC8652&WC	EC8095&VLSI	
		IV	GE8076&PE	EC8094&SATCOM				
5	MECH	II	ME3491&TOM	ME3451 &TE	ME3493 &MT-II	ME3492&H&P	GE3451&EVS	CE3491&SM
		III	ME8651&DTS	ME8691&CAD/CAM	ME8693& HMT	ME8692&FEA	ME8694&HP	
		IV	MG8591&POM	ME8094&CIM				
6	AGRI	II	AI3401&TES	AI3402&SWC	AI3403&SOM	CE3691&HWE	GE3451&EVS	ME3391&TD
		III						
		IV						
7	AI&DS	II	MA3391&PS	AL3452&OS	AL3451&ML	AD3491&FDS	GE3451&EVS	CS3591&CN
		III						
		IV						
8	IT	II	CS3452&TOC	CS3491&AI	CS3492&DBMS	IT3491&WE	GE3451&EVS	CS3451&OS
		III	IT8601&CI	CS8592&OOAD	IT8602&MC	CS8091&BDA	CS8092&CGM	
		IV	GE8076&PE	CS8080&IRT				

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Department of Mechanical Engineering 2022-2023 EVEN SEM

III-yr/VI-Sem — **CC: Mr.S.Rahul Bharath**

DAY	Test	1	BREAK	2	3	4	LUNCH	5	6	BREAK	7	8
	9.15 - 10.00	10.00-10.45		11.00-11.45	11.45-12.30	12.30-13.15		14.00-14.45	14.45-15.25		15.35-16.15	16.15-17.00
MON	Test	HMT		DTS		CAD/CAM		FEA	Technical Seminar		Sports	
TUE	Test	DTS		CAD/CAM	DTS	HMT		H&P	LIBRARY		T&P	
WED	Test	FEA		HMT	Professional Communication Lab			FEA	FEA		CAD/CAM	Counselling
THU	Test	CAD/CAM		H&P	H&P	Technical Seminar		CAD/CAM LAB			CAD/CAM LAB	
FRI	Test	HMT		H&P	HMT	FEA		D&F PROJECT			D&F PROJECT	

SUBJECT CODE		COURSE NAME	ERP CODE	CREDITS/ HOURS	STAFF IN-CHARGE
ME8651		Design of Transmission Systems		3/45	Mr. R.Ganesh AP/Mech
ME8691		Computer Aided Design and Manufacturing		3/45	Mr.C.Saravana Kumar/AP/Mech
ME8693		Heat and Mass Transfer		4/75	Mr.G. Deepan Kumar AP/Mech
ME8692		Finite Element Analysis		3/45	Mr.V.Kamalakannan AP/Mech
ME8694		Hydraulics and Pneumatics	IGCE0308	3/45	Mr. R.Ramesh Babu, HOD/S&H
ME8681		CAD / CAM Laboratory		2/60	Mr. T.David Ubahara samy AP/Mech
ME8682		Design and Fabrication Project	IGCE0308	2/60	Mr. R.Ramesh Babu, HOD/S&H
HS8581		Professional Communication		1/30	Mr.Roy John Paul
		Traning and Placement			Dr. Mahaveer Shree Jayan /S&H
		LIBRARY			Mr.V.Kamalakannan AP/Mech
		Technical Seminar			Mr. S. Rahul Bharath AP/Mech
		Counselling			Mr. V.Balaji AP/Mech

Time Table Incharge

HOD

Principal

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Department of Mechanical Engineering 2022-2023 EVEN SEM

IV-yr/VIII-Sem **CC: Mr. G. Deepan Kumar**

DAY	1	2	BREAK	3	4	5	LUNCH	6	7	BREAK	8	SCC/CCA
	9.15 - 10.00	10.00-10.45		11.00-11.45	11.45-12.30	12.30-13.15		14.00-14.45	14.45-15.25		15.35-16.15	16.15-17.00
MON	POM	POM		POM	CIM			PROJECT WORK			Sports	
TUE	CIM	CIM		CIM	POM			PROJECT WORK			T&P	T&P
WED	PROJECT WORK	PROJECT WORK		PROJECT WORK	PROJECT WORK			PROJECT WORK			PROJECT WORK	
THU	PROJECT WORK	PROJECT WORK		PROJECT WORK	PROJECT WORK			PROJECT WORK			PROJECT WORK	
FRI	PROJECT WORK	PROJECT WORK		PROJECT WORK	PROJECT WORK	PROJECT WORK		PROJECT WORK	PROJECT WORK		PROJECT WORK	

SUBJECT CODE		COURSE NAME	ERP CODE	CREDITS/ HOURS	STAFF IN-CHARGE
MG8591		Principle of Management		3/45	Dr. V.S.Thangarasu Prof/Mech
ME8094		Computer Integrated Manufacturing (Professional Elective-IV)		3/45	Mr.V.Kamalakannan AP/Mech
ME8811		Project Work		10/300	Dr. V.Vaithiyanathan HOD/Mech

Time Table Incharge

HOD

Principal

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Department of Mechanical Engineering 2022-2023 EVEN SEM

II-yr/IV-Sem — **CC: Mr V.Kamalakannan**

DAY	1	2	BREAK	3	4	5	LUNCH	6	7	BREAK	8	SCC/CCA
	9.15 - 10.00	10.00-10.45		11.00-11.45	11.45-12.30	12.30-13.15		14.00-14.45	14.45-15.25		15.35-16.15	16.15-17.00
MON	SOM	EVS		MT-II	TOM	TE		MT-II	Library		Sports	
TUE	TE	TOM		EVS	TE	TE LAB		TE LAB			TE LAB	H&P
WED	H&P	TE		EVS	SOM	SOM/FMM LAB		SOM/FMM LAB			SOM/FMM LAB	Counselling
THU	TOM	EVS		H&P	H&P	SOM		TOM	Seminar/NPTE		SOM	T&P
FRI	MT-II	MT-II		H&P	TOM	TE		TE	MT-II		SOM	T&P

SUBJECT CODE		COURSE NAME	ERP CODE	CREDITS/ HOURS	STAFF IN-CHARGE
ME3491		Theory of Machines (TOM)		3/45	Dr. V.Vaithiyanathan HOD/Mech
ME3451		Thermal Engineering		4/45	Mr. S. Rahul Bharath AP/Mech
ME3493		Manufacturing Technology - II		3/45	Mr.G. Deepan Kumar AP/Mech
ME3492		Hydraulics and Pneumatics	IGCE0308	3/45	Mr. R.Ramesh Babu, HOD/S&H
CE3491		Strength of Materials		3/45	Mr.V.Kamalakannan AP/Mech
GE3451		Environmental Sciences and Sustainability		2/45	Dr. Baskaran
CE8381		Strength of Materials and Fluid Mechanics and Machinery Lab		2/60	Mr.V.Kamalakannan AP/Mech
ME3461		Thermal Engineering Laboratory		2/60	Mr.G. Deepan Kumar AP/Mech

Time Table Incharge

HOD

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Department of Mechanical Engineering

Work Load Allocation - Even Semester 2022-2023

S.NO.	Staff Name	Course Code	Course Name	Semester	Credits	Lecture / week	Total
1	Dr.V.S.Thangarasu/Prof/Mech	MG8591	Principles of Management	VIII	3	4	4
2	Dr. V.Vaithiyanathan HOD/Mech (2+1)	**ME3491**	Theory of Machine	IV	3	4	10
		GE3251	Engineering Graphics (C Section)	II	4	6	
		ME8811	Project Work	VIII	10		
3	Mr.R.Ramesh Babu HOD/S&H (2+1)	AI3401	Tractors Engine (Agri)	IV	4	5	13
		ME8694	Hydraulics and Pneumatics (II and III Year)	VI	3	4	
		ME8682	Design and Fabrication Project	VI	2	4	
4	Mr.C.Saravana kumar/AP/Mech (2+1)	ME8691	Computer Aided Design and Manufacturing	VI	3	4	12
		BE3252	BCM (EEE)	II	3	4	
		AI3412	Tractors and Farm Engine Lab	IV	2	4	
5	Mr.V.Kamalakkannan AP/Mech (2+1)	CE3491	Strength of Material (Mech + Agri)	IV	4	5	13
		ME8692	Finite Element Analysis	VI	3	4	
		CE3481	Strength of Materials and Fluid Mechanics and Machinery Lab	IV	2	4	
6	Mr. S.Rahul Barath AP/Mech (2+2)	**GE3251**	Engineering Graphics (A Section)	II	4	6	20
		GE3251	Engineering Graphics (B Section)	II	4	6	
		GE8261	Engineering Practices Laboratory ('A Sections)	II	2	4	
		GE8261	Engineering Practices Laboratory (B Sections)	II	2	4	
7	Mr.G. Deepan Kumar AP/Mech (3+1)	ME8693	Heat and Mass Transfer	VI	4	5	17
		ME3493	Manufacturing Technology	IV	3	4	
		ME3491	Engineering Thermodynamics (AGRI)	IV	3	4	
		ME3461	Thermal Engineering LAB	IV	2	4	
8	Mr. R.Ganesh AP/Mech (2+2)	ME8651	Design of Transmission Systems	VI	3	4	18
		GE3251	Engineering Graphics (A Section)	II	4	6	
		GE8261	Engineering Practices Laboratory ('A Sections)	II	2	4	
		GE8261	Engineering Practices Laboratory (B Sections)	II	2	4	
9	Mr.G.Dineshwaran AP/Mech (3+1)	IE8693	Computer Integrated Manufacturing	VIII	3	4	13
		ME3451	Thermal Engineering- I	IV	4	5	
		ME8681	CAD / CAM Laboratory	VI	2	4	

HOD

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7.	Is the teacher distributing answer scripts of students as per schedule?	✓							
8.	Is the teacher addressing grievances on answer scripts of IA while distributing?		✓						
9.	Is the teacher covering content beyond syllabus (CBS)?	✓							
10.	Is the teacher punctual to class?	✓							

HoD/ MECHANICAL

IQAC Co-Ordinator

Principal

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INDRA GANESAN COLLEGE OF ENGINEERING
IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
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STUDENT FEEDBACK ON FACULTY
THEORY COURSE
ACADEMIC YEAR: 2022-2023 EVEN SEMESTER

Name of Department :	MECH	Year / Sem: III / IV	2 / IV	Faculty Name	Mr. A Deepan kumar.
Subject Code & Name	ME 3493-MANUFACTURING TECHNOLOGY				

S.No.	QUESTIONS	Excellent	Very Good	good	Satisfactory	Somewhat Satisfactory	Not Satisfactory	Total Weight age	Percentage
		5	4	3	2	1	0		
1.	Delivery of Lectures by Interactive Communication	✓							
2.	Use of Teaching Aids and ICT	✓							
3.	Level of Preparedness & Knowledge Level	✓							
4.	Involvement in mentoring and guiding		✓						
5.	Effective Time management	✓							
6.	Is the teacher completing syllabus as per lecture schedule?	✓							

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