NPR
College of Engineering & Technology
Approved by AICTE, Affiliated to Anna University,
Accredited by NAAC WITH 'A' GRADE Recognized by UGC under 2 (f)
NGatham, Dindigul - 624 401. Web: www.nprcet.org

	CRITERION 1 – CURRICULAR ASPECTS	
	KEY INDICATOR 1.1 – CURICULUM PLANNING & IMPLEMENTATION	
	Metric No. 1.1.1. The institution ensures effective curriculum delivery through a well planned and documented process	
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Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

CRITERION -1
CURRICULAR ASPECTS

KEY INDICATOR 1.1 – CURICULUM PLANNING & IMPLEMENTATION

Metric No. 1.1.1. The institution ensures effective curriculum delivery through a well planned and documented process

Academic schedule from affiliating University - Anna University

Date: 02.11.2022

REVISED – I

CENTRE FOR ACADEMIC COURSES

ANNA UNIVERSITY:: CHENNAI – 600 025

ACADEMIC SCHEDULE FOR NON-AUTONOMOUS AFFILIATED COLLEGES

August 2022 – December 2022 (Semester III)

UG (FT/PT) & PG (FT/PT) Degree Programmes

Sl. No.	Programme	Semester	Commencement of Classes	Last working day		Commencement of Practical Examinations		Commencement of End Semester Examinations	
				Existing	Revised	Existing	Revised	Existing	Revised
1.	B.E. / B.Tech. (Full-Time)	III	22.08.2022	08.12.2022	27.12.2022	10.12.2022	18.01.2023	21.12.2022	29.12.2022
2.	B.Arch. (Full-Time)	III							
3.	B.E. / B.Tech (Part-Time)	III	22.08.2022	08.12.2022	-	10.12.2022	18.01.2023	21.12.2022	29.12.2022
4.	M.B.A. (5 Yrs-Integrated)	III							
5.	M.B.A. (Full-Time & Part-Time)	III	01.09.2022	19.12.2022	-	21.12.2022	18.01.2023	02.01.2023	29.12.2022

RE - OPENING DAY FOR THE NEXT SEMESTER: 01.02.2023 (Wednesday)

NOTE:

1. The Theory and Practical Examination schedules will be published in due course (Practical Examinations will be conducted before the theory examinations).

2. If necessary, loss of classes due to various curricular / co-curricular activities of the department / college may be compensated by conducting classes on Saturdays.

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DIRECTOR
ACADEMIC COURSES

DAC - SB

4

Date: 02.11.2022

REVISED

CENTRE FOR ACADEMIC COURSES

ANNA UNIVERSITY:: CHENNAI – 600 025

ACADEMIC SCHEDULE FOR NON-AUTONOMOUS AFFILIATED COLLEGES

August 2022 – December 2022 (ODD SEMESTER – Except Semester III)

UG Programmes

Sl. No	Programme	Semester	Commencement of Classes	Last working day		Commencement of Practical Examinations		Commencement of End Semester Examinations	
				Existing	Revised	Existing	Revised	Existing	Revised
1.	B.E. / B.Tech.(Full-Time)	V, VII	10.08.2022	19.11.2022	06.12.2022**	21.11.2022	18.01.2023	01.12.2022	08.12.2022
2.	B.E. / B.Tech (Part-Time)	V, VII	10.08.2022	19.11.2022	-	21.11.2022	-	01.12.2022	-
3.	B.Arch. (Full-Time)	V, VII, IX							-

RE - OPENING DAY FOR THE NEXT SEMESTER: 30.01.2023 (Monday)

NOTE:

1. The Theory and Practical Examination schedules will be published in due course (Practical Examinations will be conducted before the theory examinations).

2. If necessary, loss of classes due to various curricular / co-curricular activities of the department / college may be compensated by conducting classes on Saturdays.

** In order to ensure minimum no. of working days, the following Saturdays are declared as working days.

Sl. No.	Working Days (Saturdays)	Time Table of the Week Day to be Followed
1.	20.08.2022	Monday
2.	03.09.2022	Friday
3.	17.09.2022	Wednesday
4.	15.10.2022	Tuesday
5.	29.10.2022	Wednesday

Sl. No.	Working Days (Saturdays)	Time Table of the Week Day to be Followed
6.	05.11.2022	Monday
7.	12.11.2022	Tuesday
8.	19.11.2022	Wednesday
9.	26.11.2022**	Thursday
10.	03.12.2022**	Friday

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DAC - SB

Date: 04.05.2023

CENTRE FOR ACADEMIC COURSES

ANNA UNIVERSITY: : CHENNAI – 600 025

ACADEMIC SCHEDULE FOR NON-AUTONOMOUS AFFILIATED COLLEGES

May 2023 – August 2023 (Even Semester)

UG (FT/PT) & PG (FT) Degree Programmes

Sl. No.	Programme	Semester	Commencement of Classes	Last working day	Commencement of Practical Examinations	Commencement of End Semester Examinations
1.	B.E. / B.Tech.(Full-Time)	II	10.05.2023	07.08.2023**	09.08.2023	21.08.2023
2.	B.Arch. (Full-Time)	II				
3.	B.E. / B.Tech (Part-Time)	II				
4.	M.E. / M. Tech. / M. Arch. (FT)	IV				

RE - OPENING DAY FOR THE NEXT SEMESTER: 11.09.2023 (Monday)

NOTE:

1. The Theory and Practical Examination schedules will be published in due course (Practical Examinations will be conducted before the theory examinations).

2. If necessary, loss of classes due to various curricular / co-curricular activities of the department / college may be compensated by conducting classes on Saturdays.

** In order to ensure minimum no. of working days, the following Saturdays are declared as working days.

Sl. No.	Working Days (Saturdays)	Time Table of the Week Day to be Followed
1.	13.05.2023	Friday
2.	20.05.2023	Monday
3.	27.05.2023	Tuesday
4.	03.06.2023	Wednesday
5.	10.06.2023	Thursday
6.	17.06.2023	Friday

Sl. No.	Working Days (Saturdays)	Time Table of the Week Day to be Followed
7.	24.06.2023	Monday
8.	01.07.2023	Tuesday
9.	08.07.2023	Wednesday
10.	15.07.2023	Thursday
11.	22.07.2023	Friday
12.	05.08.2023	Monday

DIRECTOR
ACADEMIC COURSES

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DAC - SB

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Date: 30.03.2023

REVISED

CENTRE FOR ACADEMIC COURSES
ANNA UNIVERSITY:: CHENNAI – 600 025

ACADEMIC SCHEDULE FOR NON-AUTONOMOUS AFFILIATED COLLEGES
February 2023 – June 2023 (Even Semester – Except Semester II)
UG / PG (FT/PT) Degree Programmes

Sl. No.	Programme	Semester	Commencement of Classes	Last working day Existing	Last working day Revised	Commencement of Practical Examinations Existing	Commencement of Practical Examinations Revised*	Commencement of End Semester Examinations Existing	Commencement of End Semester Examinations Revised*
1.	B.E. / B.Tech.(Full-Time)	IV,VI	06.02.2023	12.05.2023	24.05.2023***	15.05.2023	26.05.2023	26.05.2023	05.06.2023
2.	B.E. / B.Tech.(Full-Time)	VIII							
3.	B.Arch. (Full-Time)	IV,VI,VIII,X							
4.	B.E. / B.Tech. (Part-Time)	IV,VI	06.02.2023	12.05.2023**	-	15.05.2023	-	26.05.2023	-
5.	M.B.A.(Full-Time & Part-Time)	IV							
6.	M.B.A. (5 Yrs-Integrated)	IV,VI,VIII,X							

RE - OPENING DAY FOR THE NEXT SEMESTER: 07.08.2023 (Monday)

* To provide additional classes for Skill Based Courses.

NOTE:
1. The Theory and Practical Examination schedules will be published in due course (Practical Examinations will be conducted before the theory examinations).
2. If necessary, loss of classes due to various curricular / co-curricular activities of the department / college may be compensated by conducting classes on Saturdays.

** In order to ensure minimum no. of working days, the following Saturdays are declared as working days.

Sl. No.	Working Days (Saturdays)	Time Table of the Week Day to be Followed
1.	11.02.2023	Monday
2.	18.02.2023	Tuesday
3.	25.02.2023	Wednesday
4.	04.03.2023	Thursday
5.	11.03.2023	Friday
6.	18.03.2023	Monday

Sl. No.	Working Days (Saturdays)	Time Table of the Week Day to be Followed
7.	25.03.2023	Tuesday
8.	01.04.2023	Wednesday
9.	29.04.2023	Thursday
10.	06.05.2023	Friday
11.	13.05.2023	Monday***
12.	20.05.2023	Tuesday***

30/3/2023

DIRECTOR
ACADEMIC COURSES

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N.P.R. College of Engineering & Technology
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DAC - SB

Subject Willingness

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DEPARTMENT OF MECHANICAL ENGINEERING
SUBJECT WILLINGNESS
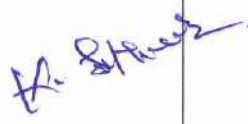
Course: B.E   **Department: MECH**   **Semester: ODD**

Academic year: 2022-2023   **Date:31.01.2023**

S.No.	Name of Faculty & Designation	Subject Code & Name	Year & Branch	Signature
1.	Dr. T. Saravana Kannan HOD	ME3391- Engineering Thermodynamics	II MECH	
		ME8501- Metrology and Measurements	III MECH	
		ME8793- Process Planning and Cost Estimation	IV MECH	
2.	Dr.S.Paulsingarayar ASP	ME8097- Non Destructive Testing and Materials	IV MECH	
		ME8593- Design of Machine Elements	III MECH	
		MG8591- Principles of Management	IV CSE	
3.	Dr. N. Mathan Kumar ASP	ME3392- Engineering Materials and Metallurgy	II MECH	
		MG8591- Principles of Management	IV CSE	
		ME3351- Engineering Mechanics	II MECH	
4.	Dr. M. Palpandi AP	ME8501- Metrology and Measurements	III MECH	
		ME8791- Mechatronics	IV MECH	
		ME3351- Engineering Mechanics	II MECH	
5.	Mr.K.Aruna Senthil Kumar AP	ME8595- Thermal Engineering- II	II MECH	
		OAT551- Automotive Systems	III MECH	
		ME8792- Power Plant Engineering	IV MECH	
6.	Mr.G.Sundararajan AP	OAT551- Automotive Systems	III MECH	
		ME3351- Engineering Mechanics	II Mech	
		ME8793- Process Planning and Cost Estimation	IV MECH	
7.	Mr.S.Sureshkumar AP	CE3391- Fluid Mechanics and Machinery	II MECH	
		ME8501- Metrology and Measurements	III MECH	
		ME8792- Power Plant Engineering	IV MECH	

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8.	Mr.T.Balsubramani AP	OAT551- Automotive Systems	III MECH	
		ME3351- Engineering Mechanics	II MECH	
		OEI751- Robotics	IV CSE	
9.	Mr. M. Mathan Raj AP	OEI751- Robotics	IV MECH	
		ME3351- Engineering Mechanics	II MECH	
		ME8594- Dynamics of Machines	III MECH	
10.	Mr. K.Sathishkumar AP	OAT551- Automotive Systems	III MECH	
		ME8073- Unconventional Machining Process	IV MECH	
		OEI751- Robotics	IV CSE	
11.	Mr. B.Gopi AP	BA4023- Materials Management	MBA	
		OEI751- Robotics	IV CSE	
		OML751- Testing of Materials	IV EEE	
12.	Mr.M. Shaanmaadhuran AP	OML751- Testing of Materials	IV EEE	
		ME8792- Power Plant Engineering	IV MECH	
		ME3393- Manufacturing Processes	II MECH	

Time Table Coordinator

HoD/Mech

Principal

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NAAC

DEPARTMENT OF MECHANICAL ENGINEERING

SUBJECT WILLINGNESS

Course: B.E **Department: MECH** **Semester: EVEN**

Academic year: 2022-2023 **Date:31.01.2023**

S.No.	Name of Faculty & Designation	Subject Code & Name	Year & Branch	Signature
1.	Dr. T. Saravana Kannan HOD	ME8693-Heat and Mass Transfer	III MECH	
		GE3251- Engineering Graphics	I MECH	
		ME8691- Computer Aided Design and Manufacturing	III MECH	
2.	Dr.S.Paulsingarayar ASP	ME8651-Design of Transmission Systems	III MECH	
		GE3251- Engineering Graphics	I CIVIL	
		ME8691- Computer Aided Design and Manufacturing	III MECH	
3.	Dr. N. Mathan Kumar ASP	ME8691- Computer Aided Design and Manufacturing	III MECH	
		GE3251- Engineering Graphics	I EEE	
		ME8651-Design of Transmission Systems	III MECH	
4.	Dr. M. Palpandi AP	ME3491- Theory of Machines	II MECH	
		GE3251- Engineering Graphics	I IT	
		ME8694- Hydraulics and Pneumatics	III MECH	
5.	Mr.K.Aruna Senthil Kumar AP	ME3451- Thermal Engineering	II MECH	
		GE3251- Engineering Graphics	I ECE	
		ME8694- Hydraulics and Pneumatics	III MECH	
6.	Mr.G.Sundararajan AP	IE8693- Production Planning and Control	IV MECH	
		GE3251- Engineering Graphics	I CSE	
		ME8651-Design of Transmission Systems	III MECH	
7.	Mr.S.Sureshkumar AP	ME8694- Hydraulics and Pneumatics	III MECH	
		GE3251- Engineering Graphics	I EEE	
		ME8692- Finite Element Analysis	III MECH	

No.	Faculty	Subject	Class	Signature
8.	Mr.T.Balsubramani AP	ME8692- Finite Element Analysis	III MECH	
		GE3251- Engineering Graphics	I MECH	
		ME8691- Computer Aided Design and Manufacturing	III MECH	
9.	Mr. M. Mathan Raj AP	GE3451- Environmental Science and Sustainability	II MECH	
		BE3255- Basic Civil and Mechanical Engineering	I EEE	
		GE3251- Engineering Graphics	I MECH	
10.	Mr. K.Sathishkumar AP	CE3451- Strength of Materials	II MECH	
		BE3255- Basic Civil and Mechanical Engineering	I EEE	
		GE3251- Engineering Graphics	I CSE	
11.	Mr. B.Gopi AP	ME3492- Hydraulics and Pneumatics	II MECH	
		GE3251- Engineering Graphics	I MECH	
		CE3451- Strength of Materials	II MECH	
12.	Mrs. K.R. Kavitha AP	MG8591- Principles of Management	IV MECH	
		GE3251- Engineering Graphics	I Civil	
		MG8591- Principles of Management	IV MECH	
13.	Mr. R. Dhievendiran AP	ME3493- Manufacturing Technology	II MECH	
		GE3251- Engineering Graphics	I MECH	
		ME8692- Finite Element Analysis	III MECH	
14.	Mr. S. Latsu Kumar AP	GE3251- Engineering Graphics	I EEE	
		MG8591- Principles of Management	IV MECH	
		ME3492- Hydraulics and Pneumatics	II MECH	

Time Table Coordinator   **HoD/Mech**   **Principal**

NATHAM

Workload for Faculty

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WORK LOAD DETAILS

Course: B.E   Department: MECHANICAL ENGINEERING   Semester: ODD   Academic year: 2022-2023   Date: 16.09.2022

S.No	NAME OF FACULTY & DESIGNATION	SUBJECT CODE	SUBJECT TITLE	YEAR / BRANCH / SECTION	L	T	P	T	DEPARTMENT WORK	INSTITUTION WORK	SIGN
1	Dr.T.SARAVANA KANNAN PROF	ME3391	Engineering Thermodynamics	II MECH	6	0	0	9	HOD Department work, DRDO Work.	NBA Work	
		ME8513	Metrology and Measurements Laboratory	III MECH	0	0	3				
2	Dr.S.PAULSINGARAYAR ASP	ME8593	Design of Machine Elements	III MECH	7	0	0	13	Asst. HOD MT Lab I/C, Mentor-IV year, Industrial Visit I/C	NBA Criteria-4 Admission team, Bus Mentor	
		ME8511	Kinematics and Dynamics Laboratory	III MECH	0	0	6				
3	Dr. N. MATHAN KUMAR ASP	ME3392	Engineering Materials and Metallurgy	II MECH	5	0	0	12	Association I/C, II Mech Class I/C, Mentor-II Year	NBA Criteria-5, Bus Mentor	
		ME3381	Computer Aided Machine Drawing	II MECH	0	0	6				
		LIB	Library	II MECH	1	0	0				
4	Dr.M.PALPANDI ASP	MG8591	Principles of Management	IV CSE	6	0	0	13	MM Lab I/C,	NBA Criteria-3	
		ME8513	Metrology and Measurements Laboratory	III MECH	0	0	6				
		LIB	Library	II MECH	1	0	0				
5	Mr.K.ARUNA SENTHIL KUMAR AP	ME8595	Thermal Engineering- II	III MECH	7	0	0	7		IQAC Co-ordinator ISO Co-ordinator Bus mentor	
6	Mr.S.SURESH KUMAR AP	CE3391	Fluid Mechanics and Machinery	II MECH	6	0	0	12	ERP I/C	Bus mentor	
		ME3382	Manufacturing Technology Laboratory	II MECH	0	0	6				

NPRCET MECH ENGG.

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S.No	Name	Code	Subject	Class				Total	Additional Responsibility	Committee / NBA	Sign
7	Mr.T.BALSUBRAMANI AP	OEI751	Robotics	IV MECH	5	0	0	18	CAD Lab I/C, IV Mech Class I/C, Mentor-IV year,	NBA Criteria-2 Robotics Club, Incubation centre, Bus Mentor	
		ME3351	Engineering Mechanics	II MECH	6	0	0				
		ME8711	Simulation and Analysis Laboratory	IV MECH	0	0	6				
		LIB	Library	IV MECH	1	0	0				
8	Mr.G.SUNDARARAJAN AP	OAT551	Automotive Systems	III MECH	6	0	0	13	Thermal Lab I/C, AICTE & Anna University Affiliation I/C, Department Alumni Incharge	NBA Criteria-4 Exam Cell Coordinator, Bus Mentor	
		ME8793	Process Planning and Cost Estimation	IV MECH	7	0	0				
9	Mr.K.SATHISHKUMAR AP	ME8073	Unconventional Machining Process	IV MECH	4	0	0	10	Placement I/C, Mentor-III year	Bus Mentor	
		ME8711	Simulation and Analysis Laboratory	IV MECH	0	0	6				
10	Mr. M. MATHAN RAJ AP	OEI751	Robotics	IV CSE	6	0	0	19	DOM LAB I/C, III Mech Class I/C, ERP I/C, Website I/C, Mentor-I Year	IPR, NBA Criteria- 6 NSS Co-Coordinator, Bus Mentor	
		ME8594	Dynamics of Machines	III MECH	7	0	0				
		ME8511	Kinematics and Dynamics Laboratory	III MECH	0	0	6				
11	Mr. B.GOPI AP	OML751	Testing of Materials	IV EEE	6	0	0	16	Mechatronics Lab I/C, Timetable I/C, Dept. Exam Cell, Mentor-III year	NBA Criteria-5, Bus Mentor	
		BA4023	Materials Management	II MBA	4	0	0				
		ME8781	Mechatronics Laboratory	IV MECH	0	0	6				
12	Mr.M. SHAANMAADHURAN AP	ME8792	Power Plant Engineering	IV MECH	6	0	0	18	EP Lab I/C, Dept. Lib I/C, Mentor-III Year, I Mech Class I/C	NBA Criteria-1 Bus Mentor	
		ME8781	Mechatronics Laboratory	IV MECH	0	0	6				
		ME3382	Manufacturing Technology Laboratory	II MECH	0	6	6				
13	Mr. S. LATSU KUMAR AP	ME8097	Non Destructive Testing and Materials	IV MECH	5	0	0	8	MOM I/C	Bus Mentor	
		ME8512	Thermal Engineering Laboratory	III MECH	0	0	3				

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S.No	Name	Code	Subject	Class				Total	Additional Work	Role
14	Mr. U. SURIYA KUMAR AP	ME8501	Metrology and Measurements	III MECH	5	0	0		Absentees phone call	Bus Mentor
		ME3381	Computer Aided Machine Drawing	II MECH	0	0	6	11		
15	Mrs. K. R. KAVITHA AP	ME8791	Mechatronics	IV MECH	6	0	0		Notice board I/C	Bus Mentor
		ME8513	Metrology and Measurements Laboratory	III MECH	0	0	3	11		
		ME8712	Technical Seminar	IV MECH	0	0	2			
16	Mr. R. DHEIVENDRAN AP	ME8512	Thermal Engineering Laboratory	III MECH	0	0	3		Circular file I/C	Hostel Mentor
		ME3393	Manufacturing Processes	II MECH	4	0	0	9		
		ME8712	Technical Seminar	IV MECH	0	0	2			

Head of the Department
Department of Mechanical Engineering
NPR College of Engineering & Technology
Natham, Dindigul (DT) - 624 401

HoD - Mech

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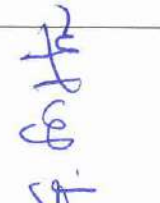Natham, Dindigul - 624 401. Web: www.nprcet.org

WORK LOAD DETAILS

Course: B.E Department: MECHANICAL ENGINEERING Semester: EVEN Academic year: 2022-2023

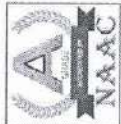| S.No.	NAME OF FACULTY & DESIGNATION	SUBJECT CODE	SUBJECT TITLE	YEAR / BRANCH / SECTION	LOAD			T	DEPARTMENT WORK	INSTITUTION WORK	SIGN
					L	T	P				
1.	Dr. T. Saravana Kannan HOD	ME8693	Heat and Mass Transfer	III MECH	7	0	0	13	Accreditation Coordinator , Autonomous NAAC, NBA, ADC coordinators	Internal and External Auditing	
		GE3251	Engineering Graphics	I MECH	6	0	0				
2.	Dr.S.Paulsingarayar ASP	ME8651	Design of Transmission Systems	III MECH	8	0	0	17	Accreditation oordinator , Autonomous, NAAC, NBA, Manufacturing Technology Lab in-charge, Value added course/Research lab, Extension activities		
		GE3251	Engineering Graphics	I AI&DS	6	0	0				
		GE3271	Engineering Practices Laboratory	I AI&DS	0	0	3				
3.	Dr. N. Mathan Kumar	ME8691	Computer Aided Design and Manufacturing	III MECH	5	0	0	18	Reearch & Development Coordinator, IIPC: Industrial Visit, In plant Training & Internship, Faculty Activities and Achievements, NPTEL & Online Courses, IITB Spoken Tutorial		
		GE3251	Engineering Graphics	I IT	6	0	0				
		ME8811	Project Work	IV MECH	0	0	1				
		ME8681	CAD / CAM Laboratory	III MECH	0	0	6				
4.	Dr. M. Palpandi	ME3491	Theory of Machines	II MECH	7	0	0	22	Project Coordinator, Budget, Metrology Lab, Professional societies & Technical Clubs		
		GE3251	Engineering Graphics	I EEE	6	0	0				
		ME8811	Project Work	IV MECH	0	0	9				

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S.No	Faculty	Subject Code	Subject	Class				Total	Responsibilities	Additional Charge	Signature
5.	Mr.K.Aruna senthil kumar AP	ME3451	Thermal Engineering	II MECH	7	0	7	7		Accreditation Coordinator, Autonomous, NAAC. NBA, IQAC, Internal and External Auditing	
6.	Mr.G.Sundararajan AP	CE3481	Strength of Materials and Fluid Machinery Laboratory	II MECH	0	0	6	16	AICTE/Anna University related communications, Thermal Lab, Parents Teachers Association meeting in- charge, Alumni Association In charge & Higher Education	Exam cell Co-ordinator	
		IE8693	Production Planning and Control	IV MECH	10	0	0				
7.	Mr.S.Sureshkumar AP	ME8694	Hydraulics and Pneumatics	III MECH	5	0	0	12	Students Feed back, Class Committee/Department Meeting & TWM		
		LIB	Library	III MECH	1	0	0				
		ME8682	Design and Fabrication Project	III MECH	0	0	6				
8.	Mr.T.Balsubramani AP	ME8692	Finite Element Analysis	III MECH	8	0	0	21	CAD Lab, CAM Lab (AMP Lab), Class in-charge IV Mech, Students Activities and Achievements Placement coordinator	Product Development Center / Incubation Center/ Consultancy, EDC	
		ME8682	Design and Fabrication Project	III MECH	0	0	6				
		GE3251	Engineering Graphics	I ECE	6	0	0				
		ME8811	Project Work	IV MECH	0	0	1				
9.	Mr. M. Mathan raj AP	GE3451	Environmental Science and Sustainability	II MECH	4	0	0	14	Dynamics Lab, Department Website & College Website, Public Relations, Press & Media, Class in-charge III Mech,	NSS, Rotary Club, Red Ribbon Club (RRC)	
		ME3461	Thermal Engineering Lab	II MECH	0	0	6				
		BE3255	Basic Civil and Mechanical Engineering	I EEE	3	0	0				
		ME8811	Project Work	IV MECH	0	0	1				

NPRCET MECH ENGG.

NPR Group of Institutions
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NAAC

S.No	Faculty	Code	Subject	Class				Total	Responsibility	Sign
10.	Mr. K.Sathishkumar AP	CE3451	Strength of Materials	II MECH	7	0	0	14	Students Activities and Achievements,	
		LIB	Library	III MECH	1	0	0			
		CE3481	Strength of Materials and Fluid Machinery Laboratory	II MECH	0	0	6			
11.	Mr. B.Gopi AP	ME3492	Hydraulics and Pneumatics	II MECH	5	0	0	18	Time Table, Dept. Academic calendar, Internal Test/Internal Test Mark In-charge, Academic Results (Autonomous & Anna University). Mechatronics Lab, Exam Cell	
		GE3251	Engineering Graphics	I CSE B	6	0	0			
		GE3271	Engineering Practices Laboratory	I CSE B & IT	0	0	6			
		ME8811	Project Work	IV MECH	0	0	1			
12.	Mrs. K.R. Kavitha AP	MG8591	Principles of Management	IV MECH	10	0	0	23	NIRF, Project/Research Lab,	
		GE3251	Engineering Graphics	I CSE A	6	0	0			
		ME8811	Project Work	IV MECH	0	0	1			
		GE3271	Engineering Practices Laboratory	I CSE A	0	0	3			
		ME8681	CAD / CAM Laboratory	III MECH	0	0	3			
13.	Mr. R. Dhievendiran AP	ME3493	Manufacturing Technology	II MECH	5	0	0	25	Dept. Library, Engineering Practices Lab, Class in-charge II Mech, Students Activities and Achievement, Students Feedback, Class Committee/Department Meeting & TWM, Staff Club	
		GE3251	Engineering Graphics	I CIVIL	6	0	0			
		GE3271	Engineering Practices Laboratory	I CIVIL & ECE	0	0	6			
		ME3461	Thermal Engineering Lab	II MECH	0	0	6			
		ME8811	Project Work	IV MECH	0	0	1			
		LIB	Library	II MECH	1	0	0			
14.	Mr. S. Latsu Kumar AP	CE3481	Strength of Materials and Fluid Machinery Laboratory	II MECH	0	0	6	16	Circular in charge/Leave Register Maintenance, Stationary requirement/Indent, Department Profile and Soft copy, Department Profile and Soft copy	
		GE3271	Engineering Practices Laboratory	II EEE & MECH	0	0	6			
		ME8681	CAD / CAM Laboratory	III MECH	0	0	3			
		ME8811	Project Work	IV MECH	0	0	1			

NPRCET MECH ENGG.

Dr. J.SUNDARARAJAN
B.E., M.Tech., Ph.D.
Principal
N.P.R. College of Engineering & Tech:
Natham, Dindigul - 624 401.
Page 3 of 4.

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Time Table

NPR College of Engineering & Technology

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Natham, Dindigul – 624 401. Web: www.nprcet.org

DEPARTMENT OF MECHANICAL ENGINEERING- CLASS TIMETABLE

Department & Section	II MECH	Course	B.E
Batch	2021 – 2025	Academic year	2022-2023
Year & semester	II & III	Hall No.	RBLH - 106
Class In-charge	Dr. N.Mathan Kumar	With effect from	16.09.2022

Period	1	10.05a.m to 10.30a.m	2	3	4	12.50pm to 1.35p.m	5	6	7
Hour →	9.10 a.m to 10.05 a.m	BREAK	10.30 a.m to 11.20 a.m	11.20 a.m to 12.05 p.m	12.05 p.m to 12.50 p.m	LUNCH	1.35 p.m to 2.25 p.m	2.25 p.m to 3.10 p.m	3.10 p.m to 4.00 p.m
MON	MP RD	BREAK	MAT KRS	EMM NMK	MP RD	LUNCH	CAD LAB(BATCH 1) NMK/ MT LAB (BATCH 2) MSM		
TUE	ETD TSK	BREAK	FM SSK	EMM NMK	EM TBS	LUNCH	MP RD	EMM NMK	PD/RRP
WED	EMM NMK	BREAK	ETD TSK		MAT KRS	LUNCH	EM TBS	EMM NMK	FM SSK
THU	MAT KRS	BREAK		FM SSK	ETD TSK	LUNCH	EMM NMK	MP RD	MAT KRS
FRI	EM TBS	BREAK	FM SSK	LIB NMK	EM TBS	LUNCH	CAD LAB(BATCH 2) NMK/ MT LAB (BATCH 1 MSM)		
SAT	FM SSK	BREAK	EM TBS	ETD TSK	EMM NMK	LUNCH	MAT KRS	EM TBS	ETD TSK

Sub. code	Subject Name		Handled by		Dept.	Hours
MA3351	Transforms and Partial Differential Equations	TPDE	Dr.K. RAJACHANDRA SEKAR	KRS	MATHS	6
ME3351	Engineering Mechanics	EM	Mr. T.BALASUBRAMANI	TBS	MECH	6
ME3391	Engineering Thermodynamics	ETD	Dr.T.SARAVANA KANNAN	TSK	MECH	6
CE3391	Fluid Mechanics and Machinery	FM	Mr.S.SURESH KUMAR	SSK	MECH	6
ME3392	Engineering Materials and Metallurgy	EMM	Dr.N. MATHAN KUMAR	NMK	MECH	5
ME3393	Manufacturing Processes	MP	Mr. R. DHEIVENDRAN	RD	MECH	4
ME3382	Manufacturing Technology Laboratory	MTL	Mr.M. SHAANMAADHURAN/ Mr.S.SURESH KUMAR	MSM SSK	MECH	6
ME3381	Computer Aided Machine Drawing	CAMDL	Dr.N. MATHAN KUMAR/ MR. U. SURIYA KUMAR	NMK USK	MECH	6
GE3361	Professional Development	PD	Dr.R. RAGUPATHI	RRP	ENG	2
LIB	Library		Dr.N. MATHAN KUMAR	NMK	MECH	1

Time Table In-charge

HOD
NPR College of Engineering & Technology
Natham, Dindigul (DT) - 624 401

Dr. J.SUNDARARAJAN,
B.E., M.Tech, Ph.D.,
Principal
NPR College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

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Reach the Star

DEPARTMENT OF MECHANICAL ENGINEERING- CLASS TIMETABLE

Department & Section	III MECH	Course	B.E
Batch	2020 – 2024	Academic year	2022-2023
Year & semester	III & V	Hall No.	RBLH - 105
Class In-charge	Mr. M.MATHAN RAJ	With effect from	16.09.2022

Period	1		2	3	4		5	6	7
Hour →	9.10 a.m to 10.05 a.m	10.05a.m to 10.30a.m	10.30 a.m to 11.20 a.m	11.20 a.m to 12.05 p.m	12.05 p.m to 12.50	12.50pm to 1.35p.m	1.35 p.m to 2.25 p.m	2.25 p.m to 3.10 p.m	3.10 p.m to 4.00 p.m
MON	DOM MMR	BREAK	TE-II KAS		AS GSR	LUNCH	MM USK	TE LAB(BATCH 1) GSR / K&D LAB (BATCH 2) MMR	DME SPS
TUE	DME SPS		DOM MMR	AS GSR	TE-II KAS			AS GSR	
WED	TE-II KAS		DME SPS	DOM MMR	MM USK			MM LAB(BATCH 2) MPP / K&D LAB (BATCH 1) MMR	
THU	MM USK		DOM MMR	DME SPS	LIB MPP			TE LAB(BATCH 2) GSR / MM LAB (BATCH 1) MPP	
FRI	TE-II KAS		AS GSR	DME SPS	DME SPS		MM USK	TE-II KAS	DOM MMR
SAT	AS GSR		DME SPS	AS GSR	TE-II KAS		MM USK	DOM MMR	

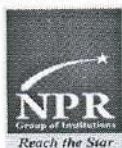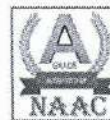| Sub. code	Subject Name		Handled by	Dept.	Hours
ME8595	Thermal Engineering- II	TE-II	Mr. K.ARUNA SENTHIL KUMAR KAS	MECH	7
ME8593	Design of Machine Elements	DME	Dr. S.PAUL SINGARAYAR SPS	MECH	7
ME8501	Metrology and Measurements	MM	Mr. U. SURIYA KUMAR USK	MECH	5
ME8594	Dynamics of Machines	DOM	Mr. M.MATHAN RAJ MMR	MECH	7
OAT551	Automotive Systems	AS	Mr. G.SUNDARARAJAN GSR	MECH	6
ME8511	Kinematics and Dynamics Laboratory	K&D L	Mr. M.MATHAN RAJ/ MMR Dr. S.PAUL SINGARAYAR SPS	MECH	6
ME8512	Thermal Engineering Laboratory	TE L	Mr. G.SUNDARARAJAN/ GSR Mr. S. LATSU KUMAR(MON)/ SLK Mr. R. DHEIVENDRAN(THU) RD	MECH	6
ME8513	Metrology and Measurements Laboratory	MM L	Dr. M.PALPANDI MPP Mrs. K. R. KAVITHA (WED)/ KRK Dr.T.SARAVANA KANNAN(THU) TSK	MECH	6
LIB	Library		Dr. M.PALPANDI MPP	MECH	1

B.S.
Time Table In-charge

Head of the Department
Department of Mechanical Engineering
NPR College of Engineering & Technology

Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401

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DEPARTMENT OF MECHANICAL ENGINEERING- CLASS TIMETABLE

Department & Section	IV MECH	Course	B.E
Batch	2019 – 2023	Academic year	2022-2023
Year & semester	IV & VII	Hall No.	RBLH - 104
Class In-charge	Mr. T.BALASUBRAMANI	With effect from	16.09.2022

Period	1	BREAK	2	3	4	LUNCH	5	6	7
Hour →	9.10 a.m to 10.05 a.m	10.05a.m to 10.30a.m	10.30 a.m to 11.20 a.m	11.20 a.m to 12.05 p.m	12.05 p.m to 12.50 p.m	12.50pm to 1.35p.m	1.35 p.m to 2.25 p.m	2.25 p.m to 3.10 p.m	3.10 p.m to 4.00 p.m
MON	PPCE GSR	BREAK	NDT SLK	ROB TBS	PPE MSK	LUNCH	MECHT KRK	LIB TBS	UCMP KSK
TUE	PPE MSK	BREAK	ROB TBS	MECHT KRK	NDT SLK	LUNCH	MECHT LAB(BATCH 1) / S&A LAB (BATCH 2)		
WED	MECHT KRK	BREAK	PPCE GSR	PPE MSK	ROB TBS	LUNCH	NDT SLK	PPCE GSR	ROB TBS
THU	UCMP KSK	BREAK	PPCE GSR	UCMP KSK	PPE MSK	LUNCH	MECHT LAB(BATCH 2) / S&A LAB (BATCH 1)		ROB TBS
FRI	NDT SLK	BREAK	MECHT KRK	UCMP KSK	NDT SLK	LUNCH	PPCE GSR	TS RD	TS RD
SAT	ROB TBS	BREAK	PPE MSK	MECHT KRK	NDT SLK	LUNCH	PPCE GSR	PPE MSK	MECHT KRK

Sub. code	Subject Name		Handled by	Dept.	Hours
ME8792	Power Plant Engineering	PPE	Mr.M. SHAANMAADHURAN	MSM · MECH	6
ME8791	Mechatronics	MECHT	Mrs. K. R. KAVITHA	KRK · MECH	6
ME8793	Process Planning and Cost Estimation	PPCE	Mr. G.SUNDARARAJAN	GSR · MECH	7
OEI751	Robotics	ROB	Mr. T.BALASUBRAMANI	TBS · MECH	5
ME8097	Non Destructive Testing and Materials	NDT	Mr. S. LATSU KUMAR	SLK · MECH	5
ME8073	Unconventional Machining Process	UCMP	Mr.K.SATHISHKUMAR	KSK · MECH	4
ME8711	Simulation and Analysis Laboratory	SAL	Mr. T.BALASUBRAMANI/ Mr.K.SATHISHKUMAR	TBS/KSK · MECH	6
ME8781	Mechatronics Laboratory	MECHTL	Mr. B.GOPI/ Mr.M. SHAANMAADHURAN	BG/MSM · MECH	6
ME8712	Technical Seminar	TS	Mr. R. DHEIVENDRAN/ Mrs. K. R. KAVITHA	RD/KRK · MECH	2
LIB	Library		Mr. T.BALASUBRAMANI	TBS	

Time Table In-charge

Head of the Department
HOD
Department of Mechanical Engineering

Principal
M.P.R. College of Engineering & Technology
Natham, Dindigul Dist.

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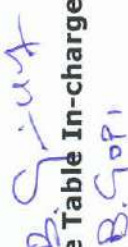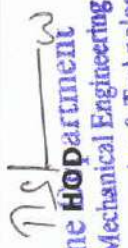Nathom, Dindigul - 624 401. Web: www.nprcet.org

Department of Mechanical Engineering
Master Time Table
Academic Year (2022 -2023) / ODD Semester

Period		1	10.05a.m to 10.30a.m	2	3	4	12.50pm to 1.35p.m	5	6	7
Hour →	YEAR	9.10 a.m to 10.05 a.m		10.30 a.m to 11.20 a.m	11.20 a.m to 12.05 p.m	12.05 p.m to 12.50 p.m		1.35 p.m to 2.25 p.m	2.25 p.m to 3.10 p.m	3.10 p.m to 4.00 p.m
MON	II	MT MSM	BREAK	MAT UV	ETD TSK	EMM NMK	LUNCH	ETD TSK	CAD LAB(BATCH 1) NMK/ MT LAB (BATCH 2) MSM	
MON	III	DOM MMR		TE-II KAS	AS GSR	MM BD		TE-II KAS	TE LAB(BATCH 1) GSR / K&D LAB (BATCH 2) MMR	
MON	IV	PPCE GSR		NDT SPS	ROB TBS	PPE MSM		MECHT BD	LIB	UCMP TSK
TUE	II	ETD TSK		FM KAS	MT MSM	EM TBS		MT MSM	MAT UV	ETD TSK
TUE	III	DME SPS		DOM MMR	AS GSR	TE-II KAS		MM BD	TE-II KAS	DME SPS
TUE	IV	PPE MSM		ROB TBS	MECHT BD	UCMP TSK		PPCE GSR	MECHT LAB(BATCH 1) / S&A LAB (BATCH 2)	
WED	II	EMM NMK		EM TBS	MAT UV	EMM NMK		MT MSM	FM KAS	FM KAS
WED	III	TE-II KAS		DME SPS	DOM MMR	MM BD		AS GSR	MM LAB(BATCH 2) BD / K&D LAB (BATCH 1) MMR	
WED	IV	MECHT BD		PPCE GSR	PPE MSM	ROB TBS		NDT SPS	ROB TBS	PPCE GSR
THU	II	MAT UV		FM KAS	MAT UV	ETD TSK		EMM NMK	FM KAS	MAT UV
THU	III	MM BD		DOM MMR	DME SPS	LIB		MM BD	AS GSR	DOM MMR
THU	IV	UCMP TSK		ROB TBS	PPCE GSR	PPE MSM		NDT SPS	MECHT LAB(BATCH 2) / S&A LAB (BATCH 1)	
FRI	II	EM TBS		MT MSM	LIB	EM TBS		EMM NMK	CAD LAB(BATCH 2) NMK/ MT LAB (BATCH 1) MSM)	
FRI	III	TE-II KAS		AS GSR	DME SPS	MM BD·		DME SPS	TE LAB(BATCH 2) GSR / MM LAB (BATCH 1) BD	
FRI	IV	NDT SPS		MECHT BD	UCMP TSK	PPCE GSR		UCMP TSK	TS SPS	
SAT	II	FM KAS		EM TBS	ETD TSK	EMM NMK		MAT UV	EM TBS	MT MSM
SAT	III	AS GSR		DME SPS	AS GSR	TE-II KAS		MM BD	DOM MMR	DOM MMR
SAT	IV	ROB TBS		PPE MSM	MECHT BD	PPE MSM		PPCE GSR	NDT SPS	MECHT BD

B. Gopi
Time Table Coordinator

HoD/Mech

Principal

Dr. J. ... ... RAJAN.
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology,
Natham, Dindigul - 624 401.

Department of Mechanical Engineering
Master Time Table
Academic Year (2022 -2023) / ODD Semester

			II Year / Mech			
Sub. code	Subject Name		Handled by	Dept.		Hours
MA3351	Transforms & Partial Differential Equations	MAT	Mr. U. VIJAYANARAYANAN	UV	MATHS	7
ME3351	Engineering Mechanics	EM	Mr. T.BALASUBRAMANI	TBS	MECH	6
ME3391	Engineering Thermodynamics	ETD	Dr.T.SARAVANA KANNAN	TSK	MECH	6
CE3391	Fluid Mechanics and Machinery	FM	Mr. K.ARUNA SENTHIL KUMAR	KAS	MECH	6
ME3392	Engineering Materials and Metallurgy	EMM	Dr.N. MATHAN KUMAR	NMK	MECH	6
ME3393	Manufacturing Process	MT	Mr.M. SHAANMAADHURAN	MSM	MECH	6
ME3382	Manufacturing Technology Laboratory	MTL	Mr.M. SHAANMAADHURAN/ Mr. B.GOPI	MSM BG	MECH	4
ME3381	Computer Aided Machine Drawing	CAMDL	Dr.N. MATHAN KUMAR/ Mr. T.BALASUBRAMANI	NMK TBS	MECH	4
LIB	Library		Dr.N. MATHAN KUMAR	NMK	MECH	1
			III Year / Mech			
ME8595	Thermal Engineering- II	TE-II	Mr. K.ARUNA SENTHIL KUMAR	KAS	MECH	7
ME8593	Design of Machine Elements	DME	Dr. S.PAUL SINGARAYAR	SPS	MECH	7
ME8501	Metrology and Measurements	MM	Mr. B.DEEPAN	BD	MECH	7
ME8594	Dynamics of Machines	DOM	Mr. M.MATHAN RAJ	MMR	MECH	7
OAT551	Automotive Systems	AS	Mr. G.SUNDARARAJAN	GSR	MECH	7
ME8511	Kinematics and Dynamics Laboratory	K&DL	Mr. M.MATHAN RAJ/ Dr. S.PAUL SINGARAYAR	MMR SPS	MECH	4
ME8512	Thermal Engineering Laboratory	TEL	Mr. G.SUNDARARAJAN/ Mr. B.DEEPAN(MON)/ Mr. M.MATHAN RAJ(FRI)	GSR BD MMR	MECH	4
ME8513	Metrology and Measurements Laboratory	MML	Mr. B.DEEPAN/ Mr. B.GOPI(WED)/ Dr.T.SARAVANA KANNAN(FRI)	BD BG TSK	MECH	4
LIB	Library		Mr. B.DEEPAN	BD	MECH	1
			IV Year Mech			
ME8792	Power Plant Engineering	PPE	Mr.M. SHAANMAADHURAN	MSM	MECH	6
ME8791	Mechatronics	MECHT	Mr. B.DEEPAN	BD	MECH	6
ME8793	Process Planning and Cost Estimation	PPCE	Mr. G.SUNDARARAJAN	GSR	MECH	7
OEI751	Robotics	ROB	Mr. T.BALASUBRAMANI	TBS	MECH	6
ME8097	Non Destructive Testing and Materials	NDT	Dr. S.PAUL SINGARAYAR	SPS	MECH	5
ME8073	Unconventional Machining Process	UCMP	Dr.T.SARAVANA KANNAN	TSK	MECH	5
ME8711	Simulation and Analysis Laboratory	SAL	Mr. T.BALASUBRAMANI/ Dr.N. MATHAN KUMAR	TBS NMK	MECH	4
ME8781	Mechatronics Laboratory	MECHTL	Mr. B.GOPI/ Mr.M. SHAANMAADHURAN	BG MSM	MECH	4
ME8712	Technical Seminar	TS	Dr. S.PAUL SINGARAYAR	SPS	MECH	2
LIB	Library		Mr. T.BALASUBRAMANI	TBS	MECH	1

Time Table Coordinator

HoD/Mech

Principal

Dr. ~~LOGANATHARAJAN~~
B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul - 624 401.

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DEPARTMENT OF MECHANICAL ENGINEERING- CLASS TIMETABLE

Department & Section	II MECH	Course	B.E
Batch	2021 – 2025	Academic year	2022-2023(EVEN)
Year & semester	II & IV	Hall No.	RBLH - 103
Class In-charge	Mr. R. Dhievendran	With effect from	01.02.2023

Period	1	10.05a.m to 10.30a.m	2	3	4	12.50pm to 1.35p.m	5	6	7
Hour →	9.10 a.m to 10.05 a.m		10.30 a.m to 11.20 a.m	11.20 a.m to 12.05 p.m	12.05 p.m to 12.50 p.m		1.35 p.m to 2.25 p.m	2.25 p.m to 3.10 p.m	3.10 p.m to 4.00 p.m
MON	TOM MPP	BREAK	SOM GSR	EVS MMR	HP BG	LUNCH	SOM & FM LAB(BATCH 1) GSR/ TE LAB (BATCH 2) MMR		
TUE	SOM GSR		TOM MPP	TE KAS	TOM MPP		SOM GSR	EVS MMR	TE KAS
WED	HP BG		MT RD	TE KAS			SOM & FM LAB(BATCH 2) GSR/ TE LAB (BATCH 1) MMR		
THU	MT RD		SOM GSR	TOM MPP	TE KAS		HP BG	SOM GSR	TOM MPP
FRI	EVS MMR		MT RD	HP BG	TOM MPP		SOM GSR	TE KAS	MT RD
SAT	SOM GSR		HP BG	TOM MPP	TE KAS		MT RD	LIB	EVS MMR

Sub. code	Subject Name		Handled by	Dept.	Hours
ME3491	Theory of Machines	TOM	Dr. M. PALPANDI	MPP	MECH	7
ME3451	Thermal Engineering	TE	Mr. K.ARUNA SENTHIL KUMAR	KAS	MECH	7
ME3492	Hydraulics and Pneumatics	HP	Mr. B. GOPI	BG	MECH	5
ME3493	Manufacturing Technology	MT	Mr. R. DHIEVENDRAN	RD	MECH	5
CE3491	Strength of Materials	SOM	Mr. K.SATHISH KUMAR	KSK	MECH	7
GE3451	Environmental Sciences and Sustainability	EVS	Mr. M.MATHAN RAJ	MMR	MECH	4
CE3481	Strength of Materials and Fluid Machinery Laboratory	SOM & FM L	Mr. G.SUNDARARAJAN Mr. S.LATSUKUMAR Mr. K.SATHISH KUMAR	GSR SLK KSK	MECH	6
ME3461	Thermal Engineering Laboratory	TE L	Mr. M.MATHAN RAJ Mr. R. DHIEVENDRAN	MMR RD	MECH	6
LIB	Library		Mr. R. DHIEVENDRAN	RD	MECH	1

B.G.GOPI
Time Table In-charge

Head of the Department
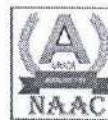Department of Mechanical Engineering
NPR College of Engineering & Technology

Dr. J.SUNDARARAJAN, B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul (Dt), 624 401.

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DEPARTMENT OF MECHANICAL ENGINEERING- CLASS TIMETABLE

Department & Section	III MECH	Course	B.E
Batch	2020 – 2024	Academic year	2022-2023(EVEN)
Year & semester	III & VI	Hall No.	RBLH – 105
Class In-charge	Mr. M.MATHAN RAJ	With effect from	01.02.2023

Period	1	BREAK	2	3	4	LUNCH	5	6	7
Hour →	9.10 a.m to 10.05 a.m	10.05a.m to 10.30a.m	10.30 a.m to 11.20 a.m	11.20 a.m to 12.05 p.m	12.05 p.m to 12.50 p.m	12.50pm to 1.35p.m	1.35 p.m to 2.25 p.m	2.25 p.m to 3.10 p.m	3.10 p.m to 4.00 p.m
MON	HP MMR	BREAK	FEA TBS	DTS SPS	DTS SPS	LUNCH	FEA TBS	CAD NMK	LIB
TUE	DTS SPS		FEA TBS	HMT TSK	HMT TSK		D & F PROJECT(BATCH 2) TBS/ CAD LAB (BATCH 1) NMK		
WED	FEA TBS		HP MMR	HP MMR	PC PSP		CAD NMK	HMT TSK	DTS SPS
THU	CAD NMK		DTS SPS	DTS SPS	FEA TBS		HP MMR	DTS SPS	HMT TSK
FRI	HMT TSK		DTS SPS	FEA TBS	HMT TSK		D&F PROJECT(BATCH 1) TBS/ CAD LAB (BATCH 2) NMK		
SAT	CAD NMK		HMT TSK	DTS SPS	HP MMR		FEA TBS	HP MMR	CAD NMK

Sub. code	Subject Name		Handled by		Dept.	Hours
ME8651	Design of Transmission Systems	DTS	Dr. S. PAUL SINGARAYAR	SPS	MECH	8
ME8691	Computer Aided Design and Manufacturing	CAD	Dr.N. MATHAN KUMAR	NMK	MECH	5
ME8693	Heat and Mass Transfer	HMT	Dr.T. SARAVANA KANNAN	TSK	MECH	7
ME8692	Finite Element Analysis	FEA	Mr. T. BALASUBRAMANI	TBS	MECH	8
ME8694	Hydraulics and Pneumatics	HP	Mr. S.SURESH KUMAR	SSK	MECH	5
ME8681	CAD / CAM Laboratory	CC L	Dr.N. MATHAN KUMAR / Mrs. K.R. KAVITHA / Mr. S.LATSUKUMAR	NMK / KRK / SLK	MECH	6
ME8682	Design and Fabrication Project	D&F	Mr. T. BALASUBRAMANI / Mr. S.SURESH KUMAR	TBS / SSK	MECH	6
HS8581	Professional Communication	PC	Dr. P.SHANMUGAPRIYA	PSP	ENGLISH	2
LIB	Library		Mr. K.SATHISH KUMAR			

Time Table In-charge

HOD
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DEPARTMENT OF MECHANICAL ENGINEERING- CLASS TIMETABLE

Department & Section	IV MECH	Course	B.E
Batch	2019 – 2023	Academic year	2022-2023(EVEN)
Year & semester	IV & VIII	Hall No.	RBLH - 104
Class In-charge	Mr. T.BALASUBRAMANI	With effect from	01.02.2023

Period	1		2	3	4		5	6	7
Hour →	9.10 a.m to 10.05 a.m	10.05a.m to 10.30a.m	10.30 a.m to 11.20 a.m	11.20 a.m to 12.05 p.m	12.05 p.m to 12.50 p.m	12.50pm to 1.35p.m	1.35 p.m to 2.25 p.m	2.25 p.m to 3.10 p.m	3.10 p.m to 4.00 p.m
MON	PPC GSR	BREAK	POM KRK	POM KRK	PPC GSR	LUNCH	PROJECT WORK MPP	PROJECT WORK MPP	
TUE	POM KRK		PPC GSR	PPC GSR	POM KRK		PROJECT WORK MPP		
WED	POM KRK		PPC GSR	POM KRK	PPC GSR		LIB	PROJECT WORK MPP	
THU	PPC GSR		POM KRK	POM KRK	PPC GSR			PROJECT WORK MPP	
FRI	PPC GSR		POM KRK	PPC GSR	PPC GSR			PROJECT WORK MPP	
SAT	PW MP		PROJECT WORK MPP	PROJECT WORK MPP				PROJECT WORK MPP	

Sub. code	Subject Name		Handled by	Dept.	Hours
MG8591	Principles of Management	POM	Mrs. K.R. KAVITHA	KRK	MECH	10
IE8693	Production Planning and Control	PPC	Mr. G.SUNDARARAJAN	GSR	MECH	10
ME8811	Project Work	PW	Dr. M. PALPANDI	MPP	MECH	21
LIB	Library		Mr. S.SURESH KUMAR	SSK	MECH	1

B.Srul
B.ĢOPI
Time Table In-charge

HOD
Head of the Department
Department of Mechanical Engineering
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Dr. J.SUNDARARAJAN,
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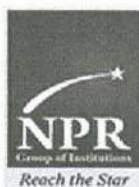Approved by AICTE, Affiliated to Anna University,
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Department of Mechanical Engineering
Master Time Table
Academic Year (2022 -2023) / Even Semester

II Year / Mech						
Sub. code	Subject Name		Handled by	Dept.		Hours
ME3491	Theory of Machines	TOM	Dr. M. PALPANDI	MPP	MECH	7
ME3451	Thermal Engineering	TE	Mr. K.ARUNA SENTHIL KUMAR	KAS	MECH	7
ME3492	Hydraulics and Pneumatics	HP	Mr. B. GOPI	BG	MECH	5
ME3493	Manufacturing Technology	MT	Mr. R. DHIEVENDRAN	RD	MECH	5
CE3491	Strength of Materials	SOM	Mr. G.SUNDARARAJAN	GSR	MECH	7
GE3451	Environmental Sciences and Sustainability	EVS	Mr. M.MATHAN RAJ	MMR	MECH	4
CE3481	Strength of Materials and Fluid Machinery Laboratory	SOM & FM L	Mr. G.SUNDARARAJAN Mr. S.LATSUKUMAR	GSR SLK	MECH	6
ME3461	Thermal Engineering Laboratory	TE L	Mr. M.MATHAN RAJ Mr. R. DHIEVENDRAN	MMR RD	MECH	6
LIB	Library		Mr. R. DHIEVENDRAN	RD	MECH	1
III Year / Mech						
ME8651	Design of Transmission Systems	DTS	Dr. S. PAUL SINGARAYAR	SPS	MECH	8
ME8691	Computer Aided Design and Manufacturing	CAD	Dr.N. MATHAN KUMAR	NMK	MECH	5
ME8693	Heat and Mass Transfer	HMT	Dr.T. SARAVANA KANNAN	TSK	MECH	7
ME8692	Finite Element Analysis	FEA	Mr. T. BALASUBRAMANI	TBS	MECH	8
ME8694	Hydraulics and Pneumatics	HP	Mr. M.MATHAN RAJ	MMR	MECH	5
ME8681	CAD / CAM Laboratory	CC L	Dr.N. MATHAN KUMAR Mrs. K.R. KAVITHA Mr. S.LATSUKUMAR	NMK KRK SLK	MECH	6
ME8682	Design and Fabrication Project	D&F	Mr. T. BALASUBRAMANI Mr. B. GOPI (TUE) Mr. M.MATHAN RAJ(FRI)	TBS BG MMR	MECH	6
HS8581	Professional Communication	PC	Dr. P.SHANMUGAPRIYA	PSP	ENGLISH	2
LIB	Library		Mr. B. GOPI	BG	MECH	1
IV Year Mech						
MG8591	Principles of Management	POM	Mrs. K.R. KAVITHA	KRK	MECH	10
IE8693	Production Planning and Control	PPC	Mr. G.SUNDARARAJAN	GSR	MECH	10
ME8811	Project Work	PW	Dr. M. PALPANDI	MPP	MECH	21
LIB	Library		Dr. M. PALPANDI	MPP	MECH	1

Time Table Coordinator

HoD/Mech

Principal

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Department of Mechanical Engineering
Master Time Table
Academic Year (2022 -2023) / Even Semester

Period	YEAR	1 — 9.10 a.m to 10.05 a.m	10.05a.m to 10.30a.m	2 — 10.30 a.m to 11.20 a.m	3 — 11.20 a.m to 12.05 p.m	4 — 12.05 p.m to 12.50 p.m	12.50pm to 1.35p.m	5 — 1.35 p.m to 2.25 p.m	6 — 2.25 p.m to 3.10 p.m	7 — 3.10 p.m to 4.00 p.m
MON	II	TOM MPP		SOM GSR	EVS MMR	HP BG		SOM & FM LAB(BATCH 1) GSR/ TE LAB (BATCH 2) MMR		
MON	III	HP MMR		FEA TBS	DTS SPS			FEA TBS	CAD NMK	LIB
MON	IV	PPC GSR		POM KRK		PPC GSR		PROJECT WORK MPP		
TUE	II	SOM GSR		TOM MPP	TE KAS	TOM MPP		SOM GSR	EVS MMR	TE KAS
TUE	III	DTS SPS		FEA TBS	HMT TSK			D & F PROJECT(BATCH 2) TBS/ CAD LAB (BATCH 1) NMK		
TUE	IV	POM KRK		PPC GSR	POM KRK			LIB	PROJECT WORK MPP	
WED	II	HP BG		MT RD	TE KAS			SOM & FM LAB(BATCH 2) GSR/ TE LAB (BATCH 1) MMR		
WED	III	FEA TBS	BREAK	HP MMR	PC PSP		LUNCH	CAD NMK	HMT TSK	DTS SPS
WED	IV	POM KRK		PPC GSR	POM KRK	PPC GSR		PROJECT WORK MPP		
THU	II	MT RD		SOM GSR	TOM MPP	TE KAS		HP BG	SOM GSR	TOM MPP
THU	III	CAD NMK		DTS SPS	FEA TBS			HP MMR	DTS SPS	HMT TSK
THU	IV	PPC GSR		POM KRK		PPC GSR		PROJECT WORK MPP		
FRI	II	EVS MMR		MT RD	HP BG	TOM MPP		SOM GSR	TE KAS	MT RD
FRI	III	HMT TSK		DTS SPS	FEA TBS	HMT TSK		D&F PROJECT(BATCH 1) TBS/ CAD LAB (BATCH 2) NMK		
FRI	IV	PPC GSR		POM KRK	PPC GSR			PROJECT WORK MPP		
SAT	II	SOM GSR		HP BG	TOM MPP	TE KAS		MT RD	LIB	EVS MMR
SAT	III	CAD NMK		HMT TSK	DTS SPS	HP MMR		FEA TBS	HP MMR	CAD NMK
SAT	IV	PW MPP		PROJECT WORK MPP				PROJECT WORK MPP		

Time Table Coordinator

HoD/Mech

Principal

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Overview of Course file

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COURSE FILE-CONTENT

1. Preface of the subject

2. Institute - Vision and Mission

3. Department - Vision, Mission, PSO, PEO & PO statements

4. Course information sheet

5. Time table

6. Name list of students

7. Lesson plan and execution.

8. Lecture notes

9. Weblinks / PPT / subject CDs

10. Curriculum gap and content delivery.

11. Content beyond syllabus and execution details.

12. Assignment topics

13. Sample Assignments.

14. Tutorial sheets (if needed)

15. Continuous Internal Assessment question papers with answer keys.

16. Categorization of advanced learners and slow learners

17. Remedial class plan and continuous evaluation records for slow learners.

18. Course handouts

19. Sample answer sheets.

20. University question paper with answer key.

21. CO attainment

Faculty In-charge

HoD
Head of the Department
Department of Mechanical Engineering
NPR College of Engineering & Technology
Natham, Dindigul (DT) - 624 401

IQAC Coordinator

Principal
Dr. J.SUNDARARAJAN,
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N.P.R. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

Course Information Sheet

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE INFORMATION SHEET

PROGRAMME: Mechanical Engineering	**DEGREE:** B.E
COURSE: Computer-Aided Design And Manufacturing	**SEMESTER: 6 CREDITS:** 3
COURSE CODE: ME 8691 / C.310	**COURSE TYPE:** CORE
COURSE AREA/STREAM: Computer-Aided Design And Manufacturing	**CONTACT HOURS**: 5+1 hours/Week.
CORRESPONDING LAB COURSE CODE (IF ANY): ME 8681 / C.315	**LAB COURSE NAME:** CAD/CAM LAB
COURSE COORDINATOR NAME: Dr.N.Mathan Kumar	

SYLLABUS:

MODULE	DETAILS	HOURS
I	Product cycle- Design process- sequential and concurrent engineering- Computer aided design – CAD system architecture- Computer graphics – co-ordinate systems- 2D and 3D transformations- homogeneous coordinates - Line drawing -Clipping- viewing transformation-Brief introduction to CAD and CAM – Manufacturing Planning, Manufacturing control- Introduction to CAD/CAM –CAD/CAM concepts —Types of production - Manufacturing models and Metrics – Mathematical models of Production Performance	9
II	Representation of curves- Hermite curve- Bezier curve- B-spline curves- rational curves- Techniques for surface modeling – surface patch- Coons and bicubic patches- Bezier and B-spline surfaces. Solid modeling techniques- CSG and B-rep.	9
III	Standards for computer graphics- Graphical Kernel System (GKS) - standards for exchange images- Open Graphics Library (OpenGL) - Data exchange standards - IGES, STEP, CALS etc. - communication standards..	9
IV	Introduction to NC systems and CNC - Machine axis and Co-ordinate system- CNC machine tools- Principle of operation CNC- Construction features including structure- Drives and CNC controllers- 2D and 3D machining on CNC- Introduction of Part Programming, types - Detailed Manual part programming on Lathe & Milling machines using G codes and M codes- Cutting Cycles, Loops, Sub program and Macros- Introduction of CAM package	9

V	Group Technology(GT),Part Families–Parts Classification and coding–Simple Problems in Opitz Part Coding system–Production flow Analysis–Cellular Manufacturing–Composite part concept–Types of Flexibility - FMS – FMS Components – FMS Application & Benefits – FMS Planning and Control– Quantitative analysis in FMS	9
	TOTAL HOURS	**45**

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T1	Ibrahim Zeid "Mastering CAD CAM" Tata McGraw-Hill PublishingCo.2007
R1	Mikell.P.Groover "Automation, Production Systems and Computer Integrated Manufacturing", Prentice Hall of India, 2008.
R2	Radhakrishnan P, SubramanyanS.andRaju V., "CAD/CAM/CIM", 2nd Edition, New Age International (P) Ltd, New Delhi,2000.
R3	Chris McMahon and Jimmie Browne "CAD/CAM Principles", "Practice and Manufacturing management " Second Edition, Pearson Education, 1999.
R4	Donald Hearn and M. Pauline Baker "Computer Graphics". Prentice Hall, Inc,1992.
R5	Foley, Wan Dam, Feiner and Hughes - "Computer graphics principles & practice" Pearson Education -2003

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
GE6152	Engineering Graphics	Introduces manual and computer-aided drafting including hand sketching, drafting standards, pictorial drawings, and dimensioning. Includes creation of 2-D drawings and 3-D solid models with AutoCAD.	1

COURSE OBJECTIVES:

1	To understand the basic concept of measurements.
2	To provide knowledge on various metrological equipments available to measure the dimension of the components.
3	To provide knowledge on Co-ordinate Measuring Machine to measure the dimension of the components.
4	To provide knowledge on Surface measurement methodology
5.	To provide knowledge on Force Measurement and Temperature Measurement.

COURSE OUTCOMES:

SNO	DESCRIPTION	Level in Bloom's Taxonomy
C310.1	Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics	K2
C310.2	Explain the fundamentals of parametric curves, surfaces and Solids	K2
C310.3	Summarize the different types of Standard systems used in CAD	K2
C310.4	Apply NC & CNC programming concepts to develop part program for Lathe & Milling Machines	K2
C310.5	Summarize the different types of techniques used in Cellular Manufacturing and FMS	K4

CORELATION BETWEEN COURSE OUTCOMES AND PROGRAMME OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C310.1	3	2	2	-	3	-	-	-	-	3	1	2
C310.2	3	3	2	-	3	-	-	-	-	2	-	1
C310.3	3	-	2	-	3	-	-	-	-	1	-	-
C310.4	3	-	-	-	3	-	-	-	-	3	-	-
C310.5	3	2	3	-	3	-	-	-	1	3	-	2
C310	3.00	1.40	1.80	0.00	3.00	0.00	0.00	0.00	0.20	2.40	0.20	1.00

CORELATION BETWEEN COURSE OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

CO	PSO 1	PSO 2
C310.1	3	2
C310.2	3	-
C310.3	3	1
C310.4	2	-
C310.5	3	3
C310	2.80	1.20

GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:

SNO	DESCRIPTION	Mapping to PO	PROPOSED ACTIONS
1	Video Display Systems	PO3,PO4	Introduction Provided

2	Interactive Picture-Construction Technique	PO7	Conduct an hour section.
3	Color Reduction Methods	PO2,PO4	Given the assignment for the working diagram. Conduct an hour section for teaching.

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

Sl.No	Topic	Mapping to P O
1	Data base management system (DBMS)	PO3, PO4,PO5
2.	Programming Languages	PO4,PO5

WEB SOURCE REFERENCES:

1	https://nptel.ac.in/courses/112/102/112102101/
2	https://nptel.ac.in/courses/112/102/112102101/
3	https://www.iare.ac.in/sites/default/files/A%20CAD%20ppt%2025-10-19.pdf
4	https://www.youtube.com/watch?v=yoDuGMrMmoA
5	https://www.youtube.com/watch?v=Y2nAp0aEoL4

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

✓ CHALK & TALK	✓ STUD. ASSIGNMENT	✓ WEB RESOURCES	✓ TUTORIAL
✓ LCD/SMART BOARDS	✓ STUD. SEMINARS		

DELIVERY METHODS USED FOR EACH COURSE OUT COME

SNO	DELIVERY METHODS
C303.1	CHALK & TALK, STUD. ASSIGNMENT, TUTORIAL
C303.2	CHALK & TALK, STUD. ASSIGNMENT, TUTORIAL
C303.3	CHALK & TALK , STUD.ASSIGNMENT, WEB RESOURCES
C303.4	CHALK & TALK, LCD/SMART BOARDS, WEB RESOURCES, TUTORIAL
C303.5	CHALK & TALK, STUD. ASSIGNMENT, LCD/SMART BOARDS, WEB RESOURCES

ASSESSMENT METHODOLOGIES-DIRECT.

✓ ASSIGNMENTS	✓ STUD. SEMINA RS	✓ TESTS/MODEL EXAMS	✓ UNIV. EXAMINAT ION

ASSESSMENT METHODOLOGIES-INDIRECT.

STUDENT FEEDBACK ON FACULTY (ONCE)	

ASSESSMENT METHODOLOGIES USED FOR EACH COURSE OUT COME

SNO	ASSESSMENT METHODOLOGIES-DIRECT	ASSESSMENT METHODOLOGIES-INDIRECT
C303.1	ASSIGNMENTS, UNIV. EXAMINATION, STUD. SEMINARS, TESTS/MODEL EXAMS	STUDENT FEEDBACK ON FACULTY
C303.2	UNIV. EXAMINATION, TESTS/MODEL EXAMS,	STUDENT FEEDBACK ON FACULTY
C303.3	UNIV. EXAMINATION, TESTS/MODEL EXAMS, ASSIGNMENTS	STUDENT FEEDBACK ON FACULTY
C303.4	UNIV. EXAMINATION, TESTS/MODEL EXAMS	STUDENT FEEDBACK ON FACULTY
C303.5	ASSIGNMENTS, UNIV. EXAMINATION, TESTS/MODEL EXAMS	STUDENT FEEDBACK ON FACULTY

Prepared by
(Course Coordinator)

Dr.N.Mathan Kumar
Name and Signature

Approved by
**(Programme Coordinator)**

Dr. T.Saravana Kannan
Name and Signature

Head of the Department
Department of Mechanical Engineering
NFR College of Engineering & Technology
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Lesson Plan

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DEPARTMENT OF MECHANICAL ENGINEERING

TENTATIVE LESSON PLAN

Subject Name: Computer Aided Design and Manufacturing   **Branch:** Mechanical Engineering

Subject Code: ME8691   **Year/Semester:** III MECH / VI

Name of the faculty: Dr.N.Mathan Kumar- ASP/MECH

Theory Class : 6 Hrs/week			Target Hours : 45
		Module I	
Date	**Period No.**	**Topics to be Covered**	**Reference**
01.02.2023	5	Introduction about Design & CAD – Syllabus overview.	T1/ R1
02.02.2023	1	Product cycle, Design process	T1/ R4
06.02.2023	6	Sequential and concurrent engineering, CAD system architecture	T1/ R4
08.02.2023	5	Computer graphics – co-ordinate systems	T1/ R4
09.02.2023	1	2D transformations - Problem solving on 2D transformations	T1/ R2
11.02.2023	1	3D transformations - Problem solving on 3D transformations	T1/ R4
11.02.2023	7	Transformations using homogeneous coordinates	T1/ R4
13.02.2023	6	Problem solving on Transformations using homogeneous coordinates	T1/ R2
15.02.2023	5	Line drawing – DDA algorithm - Problem solving on DDA algorithm	R4
16.02.2023	1	Line drawing – Bresenhams algorithm - Problem solving on Bresenhams algorithm	R4
20.02.2023	6	Clipping - viewing transformation	R4
22.02.2023	5	**CONTENT BEYOND THE SYLLABUS ON DATA BASE MANAGEMENT SYSTEM**	**PPT**
Total Hrs.	**12**		
			Target Hours : 9

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Module II

Date	Period	Topics to be Covered	Reference
23.02.2023	1	Introduction to Geometric modeling - Representation of curves -Types of curves	T1/ R4
25.02.2023	1	Hermite curve	T1/ R4
25.02.2023	7	Bezier curve, Cubic Bezier curve	T1/ R3
27.02.2023	6	B-spline curves	T1/ R4
01.03.2023	5	Rational curves	T1/ R4
02.03.2023	1	Solid modeling techniques – Constructive Solid Geometry (CSG).	T1/ R1
06.03.2023	6	Boundary Representation (B-Rep).	T1/ R4
08.03.2023	5	Case studies in CSG & B-Rep	T1/ R4
09.03.2023	1	Techniques for surface modeling, Surface patch	T1/ R4
11.03.2023	7	Coons and bicubic patches	T1/ R4
11.03.2023	1	Bezier surfaces & B-spline surfaces	T1/ R4
13.03.2023	6	**CONTENT BEYOND THE SYLLABUS ON PROGRAMMING LANGUAGES**	**PPT**
Total Hrs.	**12**		

Target Hours : 9

Module III

Date	Period No.	Topics to be Covered	Reference
15.03.2023	5	Introduction to Visual realism – model cleanup – Hidden line, surface & solid removal	T1/ R4
16.03.2023	1	Visibility techniques	T1/ R4
20.03.2023	6	Hidden Line Removal by Priority algorithm	T1/ R3
22.03.2023	5	Hidden Line Removal by Area oriented algorithm	T1/ R4
23.03.2023	1	Hidden Surface removal by Z buffer algorithm	T1/ R4
25.03.2023	1	Hidden Surface removal by Warnock's and Watkin's algorithm	T1/ R4
25.03.2023	7	Hidden Solid Removal by Ray tracing Algorithm	T1/ R3
27.03.2023	6	Shading – Algorithms for shadings	T1/ R4
29.03.2023	5	Colouring – Colour models	T1/ R4
30.03.2023	1	Computer Animation – animation types & techniques	T1/ R4
03.04.2023	6	Revision on hidden line, surfaces and solid removal algorithms	T1/ R4
05.04.2023	5	**GAP IN THE SYLLABUS ON VIDEO**	**PPT**

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		DISPLAY SYSTEMS	
TOTAL	**12**		

Target Hours : 9

Module IV

Date	Period No.	Topics to be Covered	Reference
06.04.2023	1	Assembly modeling – approaches - Assembly tree	T1
08.04.2023	1	Mating conditions	T1/R1
08.04.2023	7	Interferences Of Positions And Orientation	T1
10.04.2023	6	Introduction to tolerance analysis – Terms used – Geometric Tolerances – Tolerance Accumulation.	T1
12.04.2023	5	Tolerance Analysis – Worst-Case Arithmetic & Worst-Case Statistical	T1
13.04.2023	1	Tolerance Analysis – Monte Carlo Simulation	T1
17.04.2023	6	Mass Property Calculations	T1
19.04.2023	5	Mechanism Simulation – Mapping mating constraints to Kinematic joints.	T1
20.04.2023	1	Mechanism Simulation – Denavit-Hartenberg(D-H) Representation.	T1
22.04.2023	1	Case study – Assembly modeling and mating conditions & Mechanism simulation	T1
22.04.2023	7	Revision on Tolerance analysis, mass property calculation and interference	T1
24.04.2023	6	**GAP IN THE SYLLABUS ON INTERACTIVE PICTURE-CONSTRUCTION TECHNIQUE**	**PPT**
Total	**12**		

Target Hours : 9

Module V

Date	Period No.	Topics to be Covered	Reference
26.04.2023	5	Standards for Computer Graphics - Data exchange standards	T1/R1
27.04.2023	1	Graphical Kernel System (GKS)	T1/R1
29.04.2023	1	Standards for exchange of Image – Open Graphics Library (OpenGL) & BIT Map	T1
29.04.2023	7	Standards for exchange of Image – Open Graphics Library (OpenGL) & BIT Map	T1
01.05.2023	6	Data Exchange standards – Requirement – Methods	T1

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		– Approaches - Classifications	
03.05.2023	5	IGES – Entities	T1
04.05.2023	1	IGES – File structure and format	T1
08.05.2023	6	STEP – Architecture & Implementation	T1/R1
10.05.2023	5	ACIS, CALS & DXF Format	T1
10.05.2023	5	Communication standards	T1
11.05.2023	1	Revision on GKS, OpenGL, IGES & STEP format	T1
11.05.2023	1	**GAP IN THE SYLLABUS ON COLOR REDUCTION METHODS**	**PPT**
Total	**12**		
			Target Hours : 9

TEXT BOOK:

1. Ibrahim Zeid "Mastering CAD CAM" Tata McGraw-Hill Publishing

REFERENCES:

1. Chris McMahon and Jimmie Browne "CAD/CAM Principles", "Practice and Manufacturing management " Second Edition, Pearson Education, 1999.

2. Donald Hearn and M. Pauline Baker "Computer Graphics"'. Prentice Hall, Inc, 1992.*

3. Foley, Wan Dam, Feiner and Hughes - "Computer graphics principles & practice" Pearson Education - 2003.*

4. Rao P N "CAD CAM Principles and Applications" Tata McGraw-Hill Publishing Co.2010.

Staff In-charge

HOD / MECH

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Department of Mechanical Engineering
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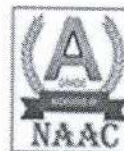
DEPARTMENT OF MECHANICAL ENGINEERING
LESSON PLAN - EXECUTION

Subject Name: Computer Aided Design and Manufacturing **Branch:** Mechanical Engineering
Subject Code: ME8691 **Year/Semester:** III MECH / V
Name of the faculty: Dr.N.Mathan Kumar - ASP/MECH

Theory Class : 6 Hrs/week		Module I	Target Hours : 45
Date	**Period No.**	**Topics to be Covered**	**Reference**
01.02.2023	5	Introduction about Design & CAD – Syllabus overview.	T1/ R1
02.02.2023	1	Product cycle, Design process	T1/ R4
06.02.2023	6	Sequential and concurrent engineering, CAD system architecture	T1/ R4
08.02.2023	5	Computer graphics – co-ordinate systems	T1/ R4
09.02.2023	1	2D transformations - Problem solving on 2D transformations	T1/ R2
11.02.2023	1	3D transformations - Problem solving on 3D transformations	T1/ R4
11.02.2023	7	Transformations using homogeneous coordinates	T1/ R4
13.02.2023	6	Problem solving on Transformations using homogeneous coordinates	T1/ R2
15.02.2023	5	Line drawing – DDA algorithm - Problem solving on DDA algorithm	R4
16.02.2023	1	Line drawing – Bresenhams algorithm - Problem solving on Bresenhams algorithm	R4
20.02.2023	6	Clipping - viewing transformation	R4
22.02.2023	5	**CONTENT BEYOND THE SYLLABUS ON DATA BASE MANAGEMENT SYSTEM**	PPT
Total Hrs.	**12**		

Target Hours : 9

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Module II

Date	Period	Topics to be Covered	Reference
23.02.2023	1	Introduction to Geometric modeling - Representation of curves -Types of curves	T1/ R4
25.02.2023	1	Hermite curve	T1/ R4
25.02.2023	7	Bezier curve, Cubic Bezier curve	T1/ R3
27.02.2023	6	B-spline curves	T1/ R4
01.03.2023	5	Rational curves	T1/ R4
02.03.2023	1	Solid modeling techniques – Constructive Solid Geometry (CSG).	T1/ R1
06.03.2023	6	Boundary Representation (B-Rep).	T1/ R4
08.03.2023	5	Case studies in CSG & B-Rep	T1/ R4
09.03.2023	1	Techniques for surface modeling, Surface patch	T1/ R4
11.03.2023	7	Coons and bicubic patches	T1/ R4
11.03.2023	1	Bezier surfaces & B-spline surfaces	T1/ R4
13.03.2023	6	**CONTENT BEYOND THE SYLLABUS ON PROGRAMMING LANGUAGES**	PPT
Total Hrs.	**12**		

Target Hours : 9

Module III

Date	Period No.	Topics to be Covered	Reference
15.03.2023	5	Introduction to Visual realism – model cleanup – Hidden line, surface & solid removal	T1/ R4
16.03.2023	1	Visibility techniques	T1/ R4
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03.04.2023	6	Revision on hidden line, surfaces and solid removal	T1/ R4

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Date	Period No.	Topics to be Covered	Reference
		algorithms	
05.04.2023	5	**GAP IN THE SYLLABUS ON VIDEO DISPLAY SYSTEMS**	**PPT**
TOTAL	**12**		

Target Hours : 9

Module IV

Date	Period No.	Topics to be Covered	Reference
06.04.2023	1	Assembly modeling – approaches - Assembly tree	T1
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Total	**12**		

Target Hours : 9

Module V

Date	Period No.	Topics to be Covered	Reference
26.04.2023	5	Standards for Computer Graphics - Data exchange standards	T1/R1
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29.04.2023	7	Standards for exchange of Image – Open Graphics Library (OpenGL) & BIT Map	T1
01.05.2023	6	Data Exchange standards – Requirement – Methods – Approaches - Classifications	T1
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Total	**12**		
			Target Hours : 9

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4. Rao P N "CAD CAM Principles and Applications" Tata McGraw-Hill Publishing Co.2010.

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Internal Assessment Test
Question Paper

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INTERNAL TEST I

ME8691 COMPUTER-AIDED DESIGN AND MANUFACTURING

Year & Semester: III & 6th Semester

Duration: 90 Minutes   **Date:** 28.02.2023   **Maximum marks: 50**

Course Outcomes , Question Number, Marks:

COs	CO1	CO2
Ques. No.	1,2,3,6&7	4,5&8
Max. Marks	30	20

COs & K-Level:

CO1: Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics.[K2]

CO2: Explain the fundamentals of parametric curves, surfaces and Solids.[K2]

K-Levels	K1: Remember	K2: Understand	K3:Apply	K4:Analyse	K5:Evaluate	K6:Create

Q.No	Answer All Questions		Bloom's Taxonomy K-level
	PART – A (5 x 2 = 10 Marks)		
1.	Why should we go for CAD?		K2
2.	List the types of 2D geometric transformation?		K1
3.	Define Concurrent Engineering		K2
4.	What are the limitations of Hermite curves?		K1
5.	What are the advantage and disadvantage of wire frame model?		K1
	PART – B (1 x 8 = 8 Marks)		
6.	Discuss about Sequential Engineering and Concurrent Engineering	(8)	K2
	PART – C (2 x16 = 32 Marks)		
7.	Discuss about 2D and 3D transformation	(16)	K2
8.	Briefly explain the different scheme used to generate a solid model?	(16)	K2

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Note: In Part C, questions can be set for 16 marks if the answer is very lengthy otherwise two or more sub-divisions can be included in each full question with break-up of marks indicated in brackets.

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Department of Mechanical Engineering
INTERNAL TEST I (ANSWER KEY)
ME8691 COMPUTER AIDED DESIGN AND MANUFACTURING

PART – A (5 x 2 = 10 marks)

1. Why should we go for CAD?

There are four fundamental reasons for implementing CAD system which are as follows

- To increase the Productivity of the designer
- To improve the qualities of the design
- To improve Communications
- To create a database for engineering

2. List the types of 2D geometric transformation?

Windowing and viewing transformation, Zooming transformation, Clipping transformation, Reflection transformation

3. Define Concurrent Engineering

Concurrent Engineering is also known as Simultaneous Engineering. Here while the product is designed the design and manufacturing process are carried out simultaneously this technique facilitates the design engineer to improve the efficiency of product design and process.

4. What are the limitations of Hermite curves?

- It is difficult to select the magnitude as well as angle of the tangent vector at the two end points of the curve segment
- Curves are difficult to control because of global shape control characteristics.
- The cubic curve never reduces exactly to a conical section and poorly approximate asymptotic curve

5. What are the advantage and disadvantage of wire frame model?

Advantage

- Wire frame models are more clear than 2D representation
- It is widely used method

Disadvantage

- Representation of model in wire frame models is lack in clarity
- During surface definition there might be confusion by eliminating hidden lines

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PART – B (1 x 8 = 8 marks)

6. **Discuss about Sequential Engineering and Concurrent Engineering**

S.No	Sequential Engineering	Concurrent Engineering
1	Sequential engineering is the term used to explain the method of production in a linear system. The various steps are done one after another, with all attention and resources focused on that single task	In concurrent engineering, various tasks are handled at the same time, and notes sentially in the standard order. This means that info found out later in the course can be added to earlier parts, improving them, and also saving time.
2	Sequential engineering is a system by which a group within an organization works sequentially to create new products and services.	Concurrent engineering is a method by which work several groups within an organization simultaneously to create new products and services.
3	The sequential engineering is a linear productdesign process during which all stages of manufacturing operate in serial.	The concurrent engineering is a non linear Product design process during which all stages of manufacturing operate at the same time.
4	Both process and product design run in serial and take place in the different time.	Both process and product design run in serial and take place in the different time
5	Process and Product are not matched to attainoptimal matching	Process and Product are co ordinated to Attainoptimal matching of requirements for effective quality and delivery.

Sequential Engineering

Requirement → Product Development → Process Development → Prototype →

Concurrent Engineering

Requirement →

Product Development →

Process Development →

Prototype →
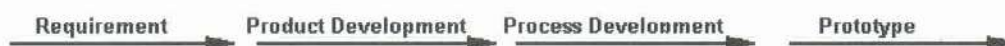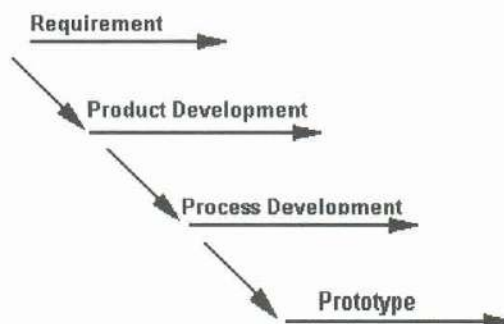
2-D TRANSFORMATION

1. Translation
2. Scaling
3. Rotation

T.Translation :-

It is the most common and easily understood transformation in CAD. This moves a geometric entity space in such a way that the new entity is parallel at all points to the old entity.

$$P' = \begin{bmatrix} x' & y' \end{bmatrix} \rightarrow ①$$

$$x' = x \times dx \rightarrow ②$$

$$y' = y + dy \rightarrow ③$$

Putting equ (3) back into equ ①

$$P' = \begin{bmatrix} x' \\ y' \end{bmatrix} = \begin{bmatrix} x+dx \\ y+dy \end{bmatrix} \rightarrow ④$$

This can also be written in matrix form as follows

$$P' = \begin{bmatrix} x' \\ y' \end{bmatrix} = \begin{bmatrix} x+dx \\ y+dy \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix} + \begin{bmatrix} dx \\ dy \end{bmatrix} \rightarrow ⑤$$

This is normally the operation used in the CAD system as MOVE command

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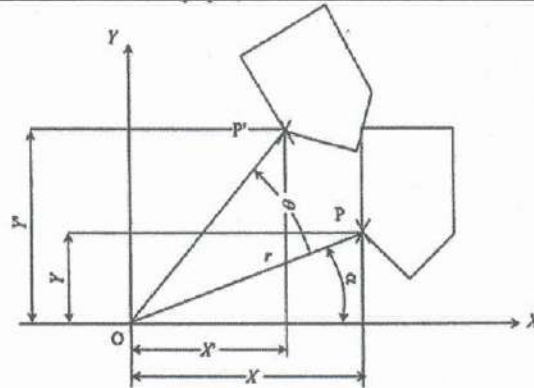
2 Scaling :

It is the transformation applied to change the scale of an entity. As shown in following figure this alter the size of the entity by the scaling factor applied

$$[P'] = [x' \; y'] = [S_x \times x_v , S_y \times dy] \rightarrow ⑥$$

This equ also written as

$$[P'] = \begin{bmatrix} S_x & 0 \\ 0 & S_y \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} \rightarrow ⑦$$

$$[P'] = [T] \cdot [P] \rightarrow ⑧$$

where
$$[T] = \begin{bmatrix} S_x & 0 \\ 0 & S_y \end{bmatrix} \rightarrow ⑨$$

3 Rotation :

It is another important geometric transformation. The final position and orientation of a geometric entity is decided by the angle of rotation (θ) and the base point about which the rotation

To develop the transformation matrix for transformation
Consider a point P location in xy plane being rotated
in ccw to the new position p' by an angle θ

$$[P'] = [x', y']$$

From figure

$$x = r \cos \alpha$$
$$y = r \sin \alpha$$

The new position p' is

$$x' = r \cos(\alpha + \theta)$$
$$= r \cos\theta \cos\alpha - r\sin\theta \sin\alpha$$
$$= x \cos\theta - y\sin\theta$$

$$y' = r \sin(\alpha + \theta)$$
$$= r \sin\theta \cos\alpha + r \cos\theta \sin\alpha$$
$$= x \sin\theta + y \cos\theta$$

This can be written as

$$[P'] = \begin{bmatrix} x' \\ y' \end{bmatrix} = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix}$$

$$[P'] = [T_R] \cdot [P]$$

$$[T_R] = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$$

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3-D TRNSFORMATION :

1. Translation

$$\begin{bmatrix} x' \\ y' \\ z' \\ 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & dx \\ 0 & 1 & 0 & dy \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \\ 1 \end{bmatrix}$$

2. Scaling

$$\begin{bmatrix} x' \\ y' \\ z' \\ 1 \end{bmatrix} = \begin{bmatrix} S_x & 0 & 0 & 0 \\ 0 & S_y & 0 & 0 \\ 0 & 0 & S_z & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

3. Reflection

$$\begin{bmatrix} x' \\ y' \\ z' \\ 1 \end{bmatrix} = \begin{bmatrix} \pm 1 & 0 & 0 & 0 \\ 0 & \pm 1 & 0 & 0 \\ 0 & 0 & \pm 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \\ 1 \end{bmatrix}$$

4. Rotation about z axis

$$\begin{bmatrix} x' \\ y' \\ z' \\ 1 \end{bmatrix} = \begin{bmatrix} \cos\theta & -\sin\theta & 0 & 0 \\ \sin\theta & \cos\theta & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \\ 1 \end{bmatrix}$$

5. Rotation about y axis

$$\begin{bmatrix} x' \\ y' \\ z' \\ 1 \end{bmatrix} = \begin{bmatrix} \cos\theta & 0 & \sin\theta & 0 \\ 0 & 1 & 0 & 0 \\ -\sin\theta & 0 & \cos\theta & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \\ 1 \end{bmatrix}$$

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Rotation about x axis

$$\begin{bmatrix} x' \\ y' \\ z' \\ 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & \cos\theta & -\sin\theta & 0 \\ 0 & \sin\theta & \cos\theta & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \\ 1 \end{bmatrix}$$

8. **Briefly explain the different scheme used to generate a solid model?**

TECHNIQUES IN SURFACE MODELLING
- Constructive solid geometry (CSG and C-rep)
- Boundary representation method (B-rep)

CONSTRUCTIVE SOLID GEOMETRY (CSG and C-rep)
- Constructive solid geometry (CSG) (formerly called computational binary solid geometry) is a technique used in solid modeling.
- Constructive solid geometry allows a modeler to create a complex surface or object by using Boolean operators to combine objects.
- Often CSG presents a model or surface that appears visually complex, but is actually little more than cleverly combined or de-combined objects
- The simplest solid objects used for the representation are called primitives. Typically they are the objects of simple shape.
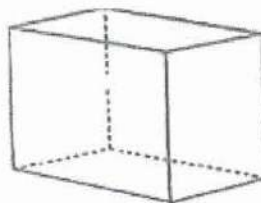
BLOCKS
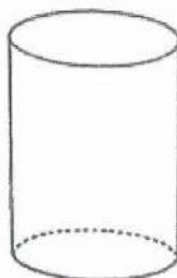
CYLINDER
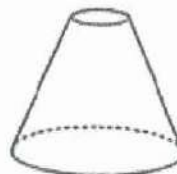
CONE
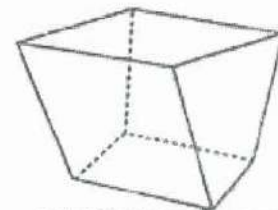
HEXAHEDRON

SPHERE

QUADRILATERAL

TUBE

Solid primitives.

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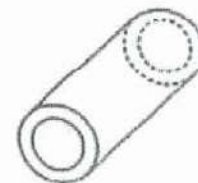
The set of allowable primitives is limited by each software package. Some software packages allow CSG on curved objects while other packages do not.

- It is said that an object is constructed from primitives by means of allow able operations, which are typically Boolean operations on sets :Union, intersection and difference as well as geometric transformations of those sets

Boolean Operations

The CSG is constructed by the following Boolean operation

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Register Number:

Department of Mechanical Engineering

INTERNAL TEST II

ME8691 COMPUTER AIDED DESIGN AND MANUFACTURING

Year & Semester: III & 6th Semester

Duration: 90 Minutes   **Date:** 28.03.2023   **Maximum marks: 50**

Course Outcomes ,Question Number, Marks:

COs	CO3	CO4
Ques. No.	1,2&7	3,4,5,6&8
Max. Marks	20	30

COs & K-Level:

CO3: Summarize the different types of Standard systems used in CAD[K2]

CO4: Apply NC & CNC programming concepts to develop part program for Lathe & Milling Machines[K4]

K-Levels	K1: Remember	K2: Understand	K3:Apply	K4:Analyse	K5:Evaluate	K6:Create

Q.No	Answer All Questions		Bloom's Taxonomy K-level
	PART – A (5 x 2 = 10 Marks)		
1.	Write any three CAD standards for exchange of modelling data.		K1
2.	What is the importance of standards in CAD?		K1
3.	What is MCU?		K2
4.	Define CNC?		K2
5.	Write any four application of NC system?		K1
	PART – B (1 x 8 = 8 Marks)		
6.	Write brief notes on NC procedure	(8)	K2
	PART – C (2 x16 = 32 Marks)		
7.	Explain the Graphics Kernel System (GKS)?	(16)	K2
8.	Explain what are the steps involved in NC procedure.	(16)	K2

FACULTY IN-CHARGE

HoD-MECH
Head of the Department
Department of Mechanical Engineering
NPR College of Engineering & Technology
Natham Dindigul (DT) - 624 401

Note: In Part C, questions can be set for 16 marks if the answer is very lengthy otherwise two or more sub-divisions can be included in each full question with break-up of marks indicated in brackets.

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Department of Mechanical Engineering
INTERNAL TEST II (ANSWER KEY)
ME8691 COMPUTER AIDED DESIGN AND MANUFACTURING

PART – A (5 x 2 = 10 marks)

1. **Write any three CAD standards for exchange of modelling data..**
   - IGES (Initial Graphics Exchange Specification)
   - DXF (Drawing / Data Exchange Format)
   - STEP (Standard for the Exchange of Product model data)
   -

2. **What is the importance of standards in CAD?**
   - To save the time of drafting.
   - To make training easier.
   - To make outsourcing more efficient

3. **What is MCU?**

   MCU is a hardware system which reads, interprets and translates the program of instructions into mechanical action of machine tool.

4. **Define CNC?**

   CNC is defined as a NC system that utilizes a dedicated, stored computer program to perform some or the entire basic NC functions

5. **Write any four application of NC system?**

   Application are in aero equipment; printed circuit boards; coil winding; automobile parts; and blue print of complex shapes.

PART – B (1 x 8 = 8 marks)

6. **Write brief notes on NC procedure**

   To utilize numerical control in manufacturing, the following steps must be accomplished.

   Process Planning: The engineering drawing of the work part must be interpreted in terms of the manufacturing processes to be used. this step is referred to as process planning and it is concerned with the preparation of a route sheet. The route sheet is a listing of the sequence of operations which must be performed on the work part. It is called a route sheet because it also lists the machines through which the part must be routed in order to accomplish the sequence of operations. We assume that some of the operations will be performed on one or more NC machines.

![NPR College of Engineering & Technology logo]

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Part programming: A part programmer plans the process for the portions of the job to be accomplished by NC. Part programmers are knowledgeable about the machining process and they have been trained to program for numerical control. They are responsible for planning the sequence of machining steps to be performed by NC and to document these in a special format. There are two ways to program for NC.

Manual part programming

In manual programming, the machining instructions are prepared on a form called a part program manuscript. The manuscript is a listing of the relative cutter/work piece positions which must be followed to machine the part. In computer-assisted part programming, much of the tedious computational work required in manual part programming is transferred to the computer. This is especially appropriate for complex work piece geometries and jobs with many machining steps. Use of the computer in these situations results in significant savings in part programming time.

<center>

PART – C (2 x16 = 32 marks)

</center>

7. **Explain the Graphics Kernel System (GKS)?**

Graphics Kernal System is the first proposed standard for computer graphics by ISO and ANSI. GKS was developed in to need for a standardized method of developing graphics program.

The main objective Graphical Kernel System, GKS, is the production and manipulation of pictures (in a way that does not depend on the computer or graphical device being used).

Such pictures vary from simple line graphs (to illustrate experimental results, for example), to engineering drawings, to integrated circuit layouts (using colour to differentiate between layers), to images representing medical data (from computerised tomography (CT)scanners) or astronomical data (from telescopes) in grey scale or colour. Each of these various pictures must be described to GKS, so that they may be drawn.
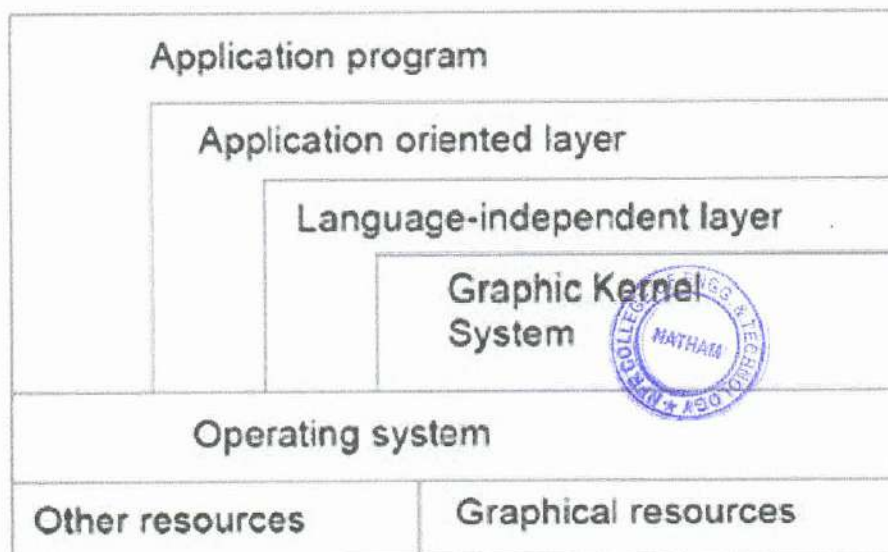
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In GKS, pictures are considered to be constructed from a number of basic building blocks. These basic building blocks, or primitives as they are called, are of a number of types each of which can be used to describe a different component of a picture. The five main primitives in GKS are:

1. Polyline: which draws a sequence of connected line segments.

2. Poly Marker: which marks a sequence of points with the same symbol.

3. Fill Area: which displays a specified area.

4. Text: which draws a string of characters.

5. Cell Array: which displays an image composed of a variety of colours or grey scales. Basic set of primitives

POLYLINE POLYMARKER FILLAREA

Example:

X= (2, 5, 3.5, 2) Y= (2, 2, 5, 2)

8. What are the steps involved in NC procedure. NC procedure.

To utilize numerical control in manufacturing, the following steps must be accomplished.

l. Process Planning. The engineering drawing of the work part must be interpreted in terms of the manufacturing processes to be used. This step is referred to as process planning and it is concerned with the preparation of a route sheet. The route sheet is a listing of the sequence of operations which must be performed on the work part. It is called a route sheet because it also lists the machines through which the part must be routed in order to accomplish the sequence of operations. We assume that some of the operations will be performed on one or more NC machines.

2. Part programming. A part programmer plans the process for the portions of the job to be accomplished by NC. Part programmers are knowledgeable about the machining process and they have been trained to program for numerical control. They are responsible for planning the sequence of machining steps to be performed by NC and to document these in a special format.

There are two ways to program for NC:

- Computer-assisted part programming

- Manual part programming

In manual programming, the machining instructions are prepared on a form called a part program manuscript. The manuscript is a listing of the relative cutter/work piece positions which must be followed to machine the part. In computer-assisted part

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programming, much of the tedious computational work required in manual part programming is transferred to the computer. This is especially appropriate for complex work piece geometries and jobs with many machining steps. Use of the computer in these situations results in significant savings in part programming time.

Tape preparation: A punched tape is prepared from the part programming NC process plan in manual part programming, the punched tape is prepared directly from the part program manuscript on a type writer like device equipped with tape punching capability. In computer-assisted part programming, the computer interprets the list of part programming instructions, performs the necessary calculations to convert this into a detailed set of machine tool motion commands, and then controls a tape punch device to prepare the tape for the specific NC machine.

Tape verification. After the punched tape has been prepared, a method is usually provided for checking the accuracy of the tape. Sometimes the tape is checked by running it through a computer program which plots the various tool movements (or table movements) on paper. In this way, major errors in the tape can be discovered. The "acid test" of the tape involves trying it out on the machine tool to make the part. A foam or plastic material is sometimes used for this try out. Programming errors are not uncommon, and it may require about three attempts before the tape is correct and ready to use.

Production. The final step in the NC procedure to use the NC tape in production. This involves ordering the raw work parts specifying and preparing the tooling and any special fix turning that may be required, and setting up The NC machine tool for the job. The machine tool operator's function during production is to load the raw work part in the machine and establish the starting position of the cutting tool relative to the work piece. The NC system then takes over and machines the part according to the instructions on tape. When the part is completed, the operator removes it from the machine and loads the next part.

****

Assignment Question Paper

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DEPARTMENT OF MECHANICAL ENGINEERING

Assignment-I Questions (set-1)

Course	:	B.E. (MECH)	Academic Year :	2022-2023
Subject Name	:	Computer-Aided Design and Manufacturing	Semester :	VI
Subject code	:	ME8691	Class :	III Mech.

Course Outcomes ,Question Number, Marks:

COs	CO1	CO2
Ques.	1,2	3,4
Max.	10	10

COs & K-Level:

CO1: Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics.[K2]

CO2: Explain the fundamentals of parametric curves, surfaces and Solids.[K2]

K-Levels	K1: Remember	K2: Understand	K3:Apply	K4:Analyse	K5:Evaluate	K6:Create

Q. No.	Answer All Questions	Bloom's Taxonomy K-level
	PART – A (5 x 4 = 20 Marks)	
1.	What is the design process? Mention the steps involved in shigley's model for the design process?	K2
2.	Explain the various stages in the life cycle of a product?	K2
3.	Discuss in detail about approximate synthetic curve representation?	K2
4.	Write short notes on Bezier and B-spline curve?	K2

Subject Incharge

HoD-Mech

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DEPARTMENT OF MECHANICAL ENGINEERING

Assignment-I Questions (set-2)

Course	:	B.E. (MECH)	Academic Year :	2022-2023
Subject Name	:	Computer Aided Design and Manufacturing	Semester :	VI
Subject code	:	ME8691	Class :	III Mech.

Course Outcomes ,Question Number, Marks:

COs	CO1	CO2
Ques.	1,2	3,4
Max.	10	10

COs & K-Level:

CO1: Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics.[K2]

CO2: Explain the fundamentals of parametric curves, surfaces and Solids.[K2]

K-Levels	K1: Remember	K2: Understand	K3:Apply	K4:Analyse	K5:Evaluate	K6:Create

Q. No.	Answer All Questions	Bloom's Taxonomy K-level
	PART – A (5 x 4 = 20 Marks)	
1.	Briefly explain the different schemes used to generate a solid model.	K2
2.	What do you understand by boundary representation technique in solid modeling, explain briefly the structure of the B-rep technique	K2
3.	Rotate the rectangle 300 counter clockwise about the line EF and find new coordinates of the rectangle.	K2
4.	Rotate the rectangle (0,0), (2,0), (2,2), (0,2) as shown,300counter clockwise about the centroid and the new co ordinates of the rectangle.	K2

Subject Incharge

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HoD-Mech

Question Bank

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Department of Mechanical Engineering
Question Bank

Subject Code: ME8691   **Year/Semester: III /06**

Subject Name: Computer Aided Design and Manufacturing

UNIT-I INTRODUCTION
PART - A

1. Define computer-aided design?

Computer-aided design (CAD) is the use of computer systems to assist in the creation, modification, analysis, or optimization of a design. CAD software is used to increase the productivity of the designer, improve the quality of design, improve communications through documentation, and create a database for manufacturing. The digitized product details created using mechanical software packages like CATIA, Unigraphics, Pro-E, etc, have rationalized the design phase, which earlier was tedious and cumbersome.

2. Define product design & what is the design process and steps involved in Shigley's model of the design process? (May 2016)

Product design is the process of creating a new product meeting the functional requirement and is readily available to its customers. It is essentially the efficient and effective generation and development of ideas through a process that leads to new products. NPD-New Product Design considers concurrent engineering concepts and allows flexibility in change management and accommodates proven practices like Lean and Six Sigma in the design stage.

Shigley's Model: Market study – Conceptualization – Design – Analyze – Process Planning – Production Planning – Quality control – Dispatch - Feedback

3. What is sequential Engineering?

Sequential engineering is the term used to describe the method of production in a linear format. This is referred to as the "across the wall approach". The different steps are done one after another, with all attention and resources focused on that one task. After it is completed it is left alone and everything is concentrated on the next task. The time consumed in this approach is high when compared to the concurrent or parallel approach of engineering.

4. What are concurrent engineering and the benefits of concurrent engineering? (April 2017, Nov 2017)

In concurrent engineering, different tasks are tackled at the same time, and not necessarily in the usual order. This means that information found out later in the process can be added to earlier parts, improving them, and also save a lot of time. Effective coordination between functional departments will prevent the cost of mistakes which can be eradicated at the early stage of product design.

5. What are the Advantages and Disadvantages of Sequential Engineering?

Advantages: 1. It is a simple, well-defined method and allows everyone to remain on the same page. 2. It is an enforced-discipline approach.

Disadvantages: 1. There is always some uncertainty at the beginning of a project. Changes that occur later in the project are difficult and often expensive. 2. Customer does not see a working product until the end, and if any changes need to be made at that point it can be costly and time-consuming

6. List the various stages of the life cycle of a product? (May 2016) (Nov / Dec-2018) (April/May 2021)

The stages are Introduction stage, Growth stage, Maturity stage, and Decline stage. All the products become obsolete during the decline stage. For example, Ordinary mobile phones face rapid growth and are now reaching the decline stage due to the development of smart phones.

7. Name the list of coordinate systems used in computer graphics systems?

1. Working Coordinate System (WCS) 2. Model (Part) Coordinate System (PCS) 3. Screen coordinate system (SCS) 4. Machine Coordinate System (MCS)

8. Define a working coordinate system?

It is a convenient **user-defined system** that facilitates geometric construction of the part. It can be established at any position and orientation in space that the user desires. For NC part programming and 3D model creation the WCS are used both low end (AutoCAD) and high end (CATIA, CREO, and UNIGRAPHICS) CAD/CAM software.

9. Define model coordinate system?

It is defined as the reference space of the model w.r.to all the model geometrical data is stored. A Cartesian coordinate system is widely used to define WCS represented in X-Y-Z axes where the sketching plane is also defined with respect to WCS

10. Define screen coordinate system?

SCS is defined as a 2-dimensional device-dependent coordinate system whose origin is usually located at the lower-left corner of the graphics display. It is used in view-related digitizes such as definitions of view origin and window or digitizing a view to select it for graphics operations. All other coordinate system is referenced from Screen Co-ordinate System.

11. State any two benefits of CAD. (April 2017)

1. Highly complicated drawings can be easily done in CAD which saves a lot of time.

2. Analysis and simulation can be done using CAD in the design stage itself so that design flaws can be identified before the manufacturing of the process.

12. What is Viewport and windowing? (Nov 2017)
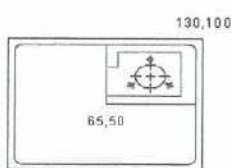
It may be sometimes desirable to display different portions or views of the drawing in different regions of the screen. A portion of the screen where the contents of the window are displayed is called a viewport.

Let the screen size be X = 0 to 200 and Y = 0 to 130. A view port can be defined by the co-ordinates say X1 = 65, X2 = 130, Y1 = 50 and Y2 = 100.

If we use the same window as below, the definition of this viewport will display the image in the right-hand top quarter of the screen

13. Define Scaling.

Used for changing the dimensions of the window and viewport, it is possible to alter the size of drawings. This technique is not satisfactory in all cases. A drawing can be

$$\begin{bmatrix} S_x & 0 \\ 0 & S_y \end{bmatrix}$$

made bigger by increasing the distance between the points of the drawing. In general, this can be done by multiplying the coordinates of the drawing by an enlargement or reduction factor called scaling factor and the operation is called scaling. In general, the scaling matrix is presented below. Where S_x and S_y are scaling factors in X and Y directions.

14. Distinguish between reflection and scaling transformation.

Reflection	Scaling
a) Shading is an important element in 3-D computer graphics, as it gives the necessary realism to the representation of the object	a) It may be necessary to fit a large-sized drawing within a smaller drawing sheet size. The dimensions can be automatically scaled for this purpose.
b) In computer graphics designer can model reflected light and transmitted light	b) Changing the dimensions of the window and viewport, it is possible to alter the size of drawings.

15. What is shearing transformation?
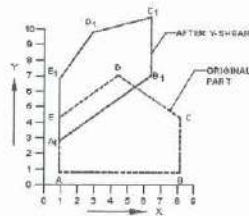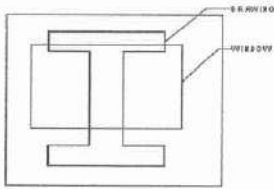
A shearing transformation produces a distortion of an object or an entire image. There are two types of shears: X-shear and Y-shear. A Y-shear transforms the point (X, Y) to the point (X1, Y1) by a factor Sh1, where,

$X1 = X$ and $Y1 = Sh1. X + Y$. An X-shear transforms the point (X, Y) to (X1, Y1), Where, $X1 = X + Sh2.Y$ and $Y1 = Y$, Sh2 is the shear factor.

16. Define Clipping. (April/May 2021)

Clipping is the process of determining the visible portions of a drawing lying within a window. In clipping, each graphic element of the display is examined to determine whether it is completely inside the window, completely outside the window, or crosses a window boundary. Portions outside the boundary are not drawn. If the element of a drawing crosses the boundary, the point of intersection is determined and only portions, which lie inside, are drawn.

17. What do you mean by synthesis of design? (Nov 2016)

The process of CAD and the analysis process is included in the synthesis of the design. It includes

1. CAD Part: (i) Design Conceptualization (ii) Design modeling & simulation

2. Analysis part : (i) Design Analysis (ii) Design Optimization (iii) Design Evaluation (iv) Design documentation and communication.

18. What is meant by concatenation? (Nov / Dec-2018)

In practice, a series of transformations may be applied to a geometric model. Thus combining or concatenating transformations (for example combination of scaling and rotation) are quite useful. They are simply obtained by multiplying the [T] matrices of the corresponding individual transformations.

$$P^* = [T_n] [T_{n-1}] \dots [T_2][T_1]P$$

19. Define Translation.

Moving drawing or model across the screen is called translation. This is accomplished by adding to the coordinates of each corner point the distance through which the drawing is to be moved (translated). In general, to translate drawing by (TX, TY) every point X, Y will be replaced by a point X1, Y1 where $X1 = X + TX$ and $Y = Y + TY$
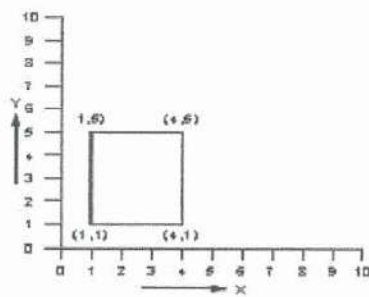
Original Rectangle   **Rectangle after Translation**
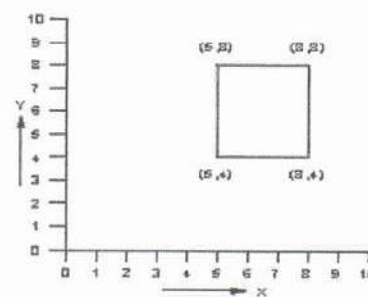
20. Mention any four applications of computer-aided design in mechanical engineering. (Nov 2015)

Two Dimensional Drafting; Report generating; 3D modeling; Finite element analysis; CAM which contains CAD software as one of the components.

21. What is a 2D and 3D transformation?

Transformations are used to position objects, to shape objects, to change viewing positions, and even to change how something is viewed. 2D transformations, which use 3x3 matrices, 3D transformations use 4X4 matrices (X, Y, Z, and W).

$$\tilde{A} = \begin{bmatrix} 1 & 0 & t_x \\ 0 & 1 & t_y \\ 0 & 0 & 1 \end{bmatrix} \quad \text{For 2D} \qquad \tilde{A} = \begin{bmatrix} 1 & 0 & 0 & t_x \\ 0 & 1 & 0 & t_y \\ 0 & 0 & 1 & t_z \\ 0 & 0 & 0 & 1 \end{bmatrix} \quad \text{For 3D}$$

22. What does Mapping mean?

Mapping means changing the description of a point (or set of a point) belonging to an object from one coordinate system to the second one without altering the position and orientation in space w.r.to origins. This is typically opposite to rigid body transformation where transformations are defined within the same coordinate system, which stands unaltered in space. Transforming a point called P to P*, where P and P* are position vectors of point P in XYZ and P* in X*Y*Z* systems respectively and represented as

$$P* = f (P, \text{Mapping parameters})$$

23. What are homogenous coordinates? (Nov 2016)

Homogenous coordinates are representing the points by effective way to unify the description of geometric transformations as matrix multiplications. It removes many anomalous situations encountered in Cartesian geometry such as representing points at infinity and no intersection of parallel lines. Also, they greatly simplify the expressions defining rational parametric curves and surfaces.

24. Define clipping?

Clipping algorithms are designed to efficiently identify the portions of a scene (in viewing coordinates) that lie inside a given viewport. They are useful because they:

1) Excludes unwanted graphics from the screen. 2) Improves efficiency, as the computation dedicated to objects that appear off-screen can be significantly reduced 3) Can be used in other ways (modeling of rectangular apertures, for example).

25. List and differentiate the types of 2D geometric transformations. (Nov 2015)

Modeling transformation: this transformation alters the coordinate values of the object. Basic operations are scaling, translation, rotation, and combination of one or more of these basic transformations.

A visual transformation: In this transformation, there is no change in either the geometry or the coordinates of the object. A copy of the object is placed at the desired sight, without changing the coordinate values of the object.

26. What is the reason for using a CAD system?

There are several good reasons for using a CAD system to support the engineering design function.

- To increase the productivity
- To improve the quality of the design
- To uniform design standards
- To create a manufacturing database.
- To eliminate accuracies caused by hand copying of drawing and inconsistency between drawings.

27. What is lean production?

Lean production can be defined as an adaptation of mass production in which workers and work cells are made more flexible and efficient by adopting methods that reduce waste in all forms.

28. What are the differences between lean production and mass production?

Mass Production	Lean Production
Standardized Products	Customized Products
Produce to Forecast	Produce to order
Pricing by production cost	Pricing by customer value
Inventory Buffers	Minimum Inventory

29. What is JIT?

A management philosophy that strives to eliminate sources of manufacturing waste by producing the right part in the right place at the right time. With the increasing trend toward a Just-In-Time (JIT) manufacturing environment, and its emphasis on a reduction of inventory and a more even flow of parts from suppliers, the purchasing component should also accommodate this increased frequency of inventory receipt.

30. List the four principles of lean production.

a) Minimize waste b) Perfect first-time quality c) Flexible production lines d) Continuous improvement.

31. Mention the 8 types of lean wastes.

Transport, Inventory, Movement, Waiting, Over Processing, Over-Production, Defects, Skill.

32. What are the functions of manufacturing support systems?

The design system includes the departments of the firm that are organized to accomplish product design might include research and development, design engineering, drafting, and perhaps a prototype shop. Manufacturing planning includes logistics issues, commonly known as production planning. The authorization to produce the product must be translated into the master production schedule. Manufacturing control is concerned with managing and controlling the physical operations in the factory to implement the manufacturing plans.

33. Why mathematical models are developed?

Mathematical models can be developed to analyze certain performance aspects of production and inspection.

- Effect of defect rate on production quantities in a series of production operations.
- Final inspection versus distributed inspection.
- When to inspect and when not to inspect.

34. Write the different types of production.

- Low production (Job shop production)- Quantities in the range of 1 to 100 units per year
- Medium production (Batch production) - Quantities in the range of 100 to 10,000 units annually.
- High production (Mass production) - Production quantities are 10,000 to millions of units.

35. Write the different types of plant layouts.

- If the product is large and heavy, and therefore difficult to move in the factory, it typically remains in a single location, at least during its final assembly. Workers and

processing equipment are brought to the product, rather than moving the product to the equipment. This type of layout is referred to as a Fixed-position layout.

- The individual parts that comprise these large products are often made in factories that have a process layout, in which the equipment is arranged according to function or type called process layout.

- In cellular manufacturing each cell is designed to produce a limited variety of part configurations: that is. The cell specializes in the production of a given set of similar parts or products, according to the principles of group technology.

- In product layout, the work is usually moved between stations by a powered conveyor. At each station. A small amount of the total work is completed on each unit of product.

36. What are the components of the manufacturing system?

A manufacturing system consists of the following components:

- Production machines (plus tools, fixtures, and other related hardware)
- A material handling system
- A computer system to coordinate and/or control the preceding components
- Human workers to operate and manage the system.

PART B – C310.1

1. Write Short notes on (i) Design Process and (ii) CAD System architecture **(May 2016)**

2. What is meant by concurrent engineering? Describe the various schemes for concurrent engineering **(May 2016)**

3. (i) Describe various stages of the design process with an example.

(ii) Explain a line drawing algorithm. **(Nov 2016) (April/May 2021)**

4. (i) Define clipping. Also, explain the working principle of a simple line clipping algorithm

(ii) Deduce windowing and viewing transformation matrix parametrically. **(Nov 2016)**

5. Compare and contrast Sequential and concurrent engineering with suitable examples. **(April 2017)**

6. Explain with a block diagram, the CAD process with a suitable example. **(April 2017)**

7. Explain the different types of 2D transformations with examples. **(Nov 2017)**

8. Explain the Cohen-Sutherland line clipping approach with proper sketches **(Nov 2017)**

9. i) Rotate the rectangle (0,0), (2,0), (2,2),(0,2) shown in Fig., 30° counterclockwise about its centroid and find the new coordinates of the rectangle. **(Nov 2015)**

(0, 2) (2, 2)

(0, 0) (2, 0)
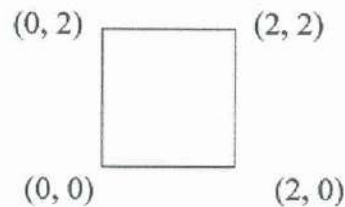
ii) Given the triangle described by the homogeneous point's matrix below, scale it by a factor ¾, keeping the centroid in the same location. Use (1) separate matrix operation and (2) condensed matrix for transformation

$$\left\{ \begin{array}{cccc} 2 & 2 & 0 & 1 \\ 2 & 5 & 0 & 1 \\ 5 & 5 & 0 & 1 \end{array} \right\}$$

10. Rotate the rectangle shown in Fig, 30° counterclockwise about the line EF and find the new coordinates of the rectangle

F(1,4,6)

y

E(0,2,2)

2

2

(0,0,0)

x

z
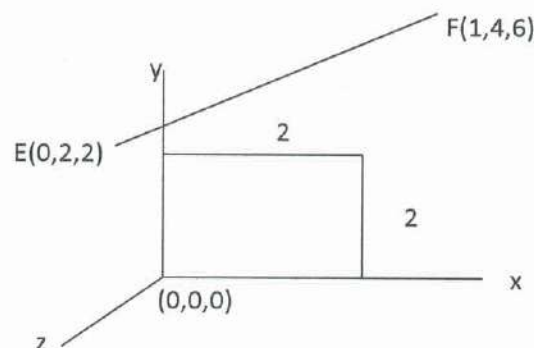
11. What are the steps involved in designing and manufacturing a product. **(Nov / Dec-2017)**

12. Write in detail about production performance matrices. **(Nov / Dec-2016)**

13. Discuss job shop production and mass production. **(April / May 2017)**

14. Discuss the stages in the product life cycle and the importance of each stage **(Nov / Dec-2018)**

15. Discuss the significance of the concurrent engineering approach in limiting design changes **(Nov / Dec-2018).**

16. What is Design Process? Explain briefly the steps involved in the design process. **(April/May 2021)**

PART C - C310.1

1. A firm is going to manufacture a new gearbox for a two-wheeler. Explain the steps involved in the design and manufacturing process with the role of CAD, CAM, and CAE using concurrent engineering. Also, discuss how it is superior to sequential engineering.

2. A rectangle with co-ordinate A(2,3), B(2,5), C(6,5), and D(6,3) is reflected along the line whose equation is y =2x + 4, and sheared by 2 units in the x-direction and 2 units in the y-direction. Find the new coordinates of the object. **(April/May 2021)**

UNIT-II GEOMETRIC MODELING

PART A – C310.2

1. What is Bezier's surface?

A tensor product Bezier surface is an extension of the Bezier curve in two parametric directions u and v. Bezier surface allows only global control of the surface. Bezier's surface is formed as the Cartesian product of the blending functions of two orthogonal Bezier curves and is defined by a set of control points. A two-dimensional Bezier surface can be defined as a parametric surface where the position of a point is a function of the parametric coordinates u, v.

2. What are the characteristics of the B-spline surface? (April/May 2021)

A rectangular set of data or control points creates the surface. It is the general surface as Bezier's surface but with the advantage of permitting local control of the surface. This set forms the vertices of the characteristic polyhedron that approximates and controls the shape of the resulting surface. The degree of the surface is independent of the number of control points and continuity is automatically maintained throughout the surface by virtue of the form of blending functions.

3. What are the limitations of the Hermite Curve? (May 2016)

The curve follows the cubic polynomial and hence the number of control points is only three. With three control points, complicated shapes cannot be produced. Hence it has its limitations in construction.

4. State the advantages of the Bezier curve. (Nov 2016)

- It is easy to calculate points of the Bezier curve using the equation.
- The numerical algorithm is stable. (i.e. given reasonable input, the algorithm won't blow up)
- Control of intermediate points is easy in a Bezier curve so that desired shape can be obtained.

5. What do you mean by a projection of the surface?

Projecting an entity onto a plane or a surface is useful in applications such as determining shadows or finding the position of the entity relative to the plane or the surface. These surface extensions are employed in 3D surface design typically in BIW (Body in White) automotive frame design.

6. What are Boolean operations? List the Boolean operations.

Boolean operation is the process of getting a required part from two or more primary parts. The process are 1) Addition (+) 2) Subtraction (-) 3) Union (u) 4) Intersection (n). This method is typically followed in low-end CAD/CAM software like AutoCAD for the 3D modeling of components.

7. What are the advantages and disadvantages of wireframe modeling? (May 2016) (Nov 2017)

Advantages: 1. A hidden line can be visible with the dotted line in wireframe modeling. 2. Interior parts can be visible. Disadvantages: 1. The subsequent process of assembly or features cannot be done in wireframe modeling. 2. Visibility of the edges with transparency makes selecting the entity more complicated.

8. List a few commonly used solid primitives.

The most commonly used solid primitives are a) Block b) Cylinder c) Cone d) Sphere e) Wedge f) Torus

9. Differentiate Geometry and topology.

GEOMETRY	TOPOLOGY
It is the actual dimensions that define the entities of the object	It is the connectivity and associability of the object entities
It is the visible geometry and graphical information from the user point of view	It is the non-graphical relational information stored in the solid model database from in user point of view
It is also called metric information	It is also called a combinatorial structure

10. Define Quadratic Bezier curve. (April 2017)

A Bezier curve is defined by a set of control points P0 through Pn, where n is called its order (If n = 1 it is linear Bezier curve, and If n = 2, it is quadratic bezier curve.). The first and last control points are always the endpoints of the curve; however, the intermediate control points (if any) generally do not lie on the curve. Quadratic bezier curve has 3 control points P0, P1 and P2.

11. What is the significance of CSG? (April 2017)

Constructive solid geometry has several practical uses and is greatly significant. It is used in cases where simple geometric objects are desired or where mathematical accuracy is important. Nearly all engineering CAD packages use CSG (where it may be useful for representing tool cuts and features where parts must fit together).

12. Write the equation of a circle in parametric form. (Nov 2017)

The Parametric form of a circle is x = r cos θ

y = r sin θ. $0 \le \theta \le 360$ and r - radius of the circle.

13. Enumerate the various polyhedral objects.

a) Simple polyhedral b) polyhedral with faces of inner loops c) polyhedral with not through holes

d) polyhedral with handles (through holes)

14. What are the open polyhedral objects?

a) Wire polyhedral b) Shell polyhedral c) Lamina polyhedral d) Open three-dimensional polyhedral

15. What are rational curves importances?

A rational curve is defined by the algebraic ratio of two polynomials. A parametric curve inhomogeneous form is referred to as a *rational curve*. They draw their theories from projective geometry. Importance is under projective transformation that is the perspective image of a rational curve is a rational curve.

Space curve: $F(u) = (x(u), y(u), z(u), w(u))$
Plane curve : $F(u) = (x(u), y(u), w(u))$

Where u is a parameter in some closed interval $[a, b]$

16. What do you mean by Sculptured surface?

Sculptured surfaces are used in geometric modeling to describe all sorts of bendy things like aero plane wings, car bodies, gas-turbine blades, ship's hulls and so on that can't be described by simple curved surfaces such as cylinders and cones. These complex surfaces are known as sculptured or free-form surfaces.

17. Distinguish Analytic and Synthetic curve. (Nov / Dec-2018)

Analytic Curves	Synthetic Curves
The Analytic curves are defined by analytic equations.	The Synthetic curves are defined by the set of data points or control points
Analytic curves are easy in computation but not flexible for designers, Lines, conics are analytic curves	Synthetic curves are hard in computation but very flexible to designers in making new models
	Splines, Bezier curves are synthetic curves

UNIT-III CAD STANDARDS

PART A – C310.3

1. What are the basic elements associated with a CAD system?

i) Operator (user) ii) Graphics support system iii) Other user interface support system iv) Application functions v) Database

2. What are the reasons for evolving graphic standards?

i) Need for exchanging graphic data between different computer systems

ii) Need for a clear distinction between modeling and review aspects

3. Define Graphics Kernel system and brief the purposes of the Graphical Kernel System (GKS)? (April 2017)

GKS (the Graphical Kernel System) is an ANSI and ISO standard. GKS standardizes two-dimensional graphics functionality at a relatively low level. The purpose of GKS are:

(i) To provide for portability of graphics application programs

(ii) To aid in the understanding of graphics method by application programs

(iii) Provide the guidelines for manufacturers in describing useful graphics capabilities.

4. Define Open Graphics Library? (April 2017) (Nov 2017)

OpenGL (Open Graphics Library)is a cross-language, multi-platform application programming interface (application program interface-API) for rendering 2D and 3D vector graphics. The API is typically used to interact with a graphics processing unit (GPU), to achieve hardware-accelerated rendering.

5. What is the importance of standards in CAD? (May 2016) (Nov / Dec-2018)

The CAD standards are important for easy exchange of data between the different users and retrieving the data of different CAD package users. Also, it enables the importing of the complicated cad data for analysis in an analysis package like ANSYS, where complicated cad can't be constructed.

6. Name the basic methods of transferring data?

There are three methods of transferring data from one CAD system to another.
1. Direct CAD system export/import 2. Direct 3rd party translators.3.Intermediate data exchange formats.

7. What is the IGES system and mention its uses? (Nov 2017) (April/May 2021)

The Initial Graphics Exchange Specification (IGES) (pronounced *eye-jess*) is a file format that defines a vendor-neutral data format that allows the digital exchange of information among Computer-aided design (CAD) systems. It is used for storing cad data in a common standard file format.

8. Write any three CAD standards for the exchange of modeling data? (May 2016)

i) IGES (Initial Graphics Exchange specifications), (ii) STEP (Standard for Exchange of Product model data) (iii) CALS (Continuous Acquisition and Lifecycle Support)

9. Mention the different file sections in IGES?

i) Flag section(optional) ii) Start section(S) iii) Global section(G) iv) Directory entry(D) section v) Parameter Data section vi) Terminal section

10. What is the use of STEP data exchange format?

STEP(Standard for the Exchange of Product model data) can be used to exchange data between CAD, computer-aided manufacturing, computer-aided engineering, product data management/enterprise data modeling, and other CAx systems. STEP is addressing product data from mechanical and electrical design, geometric dimensioning and tolerancing, analysis, and manufacturing, with additional information specific to various industries such as automotive, aerospace, building construction, ship, oil and gas, process plants, and others

11. What is GKS Cell Array? (Nov 2016)

The GKS cell array function displays raster-like images in a device-independent manner. The cell array function takes the two corner points of a rectangle that you specify a number of divisions (M) in the X direction and a number of divisions (N) in the Y direction. It then partitions the rectangle into M x N sub-rectangles called cells.

12. Mention the requirements of a conformant STEP application?

i) Implementation of either a preprocessor or a postprocessor or both, ii) using one of the STEP implementation methods STEP-File, STEP-XML, or SDAI for the AIM/MIM data model, and iii) supporting one or several conformance classes of an AP.

13. What is the need for CALS (Continuous Acquisition and Lifecycle Support)?

To establish an integrated system in which any information obtained at each stage (survey, designing, construction, and maintenance) of public works should be digitalized so that every person of each section both in public and private sectors could share and re-use the information.

14. What are the three layers of architecture?

i) Application layer ii) Logical layer iii) Physical layer

15. What is Graphic Communication?

Graphic communication as the name suggests is about communicating through graphics. It is the process of creating and producing drawings or images that get a message across. For example, a poster advertises an event, a drawing showing the plans for a building, or a 3D computer model showing what a new product will look like.

16. Compare the shape-based and the product data-based exchange standards. (Nov 2015)

IGES: exchanges primarily shape (both geometric and topological) and non-data, which is referred to as CAD to CAD exchange. STEP: The goal of the standard is to enable the exchange of a computerized model with all of its supporting types of data in a neutral format.

17. Define communication protocol?

Communicating systems use well-defined formats (protocol) for exchanging messages. Each message has an exact meaning intended to elicit a response from a range of possible responses pre-determined for that particular situation. Thus, a protocol must define the syntax, semantics, and synchronization of communication; the specified behavior is typically independent of how it is to be implemented.

18. What is the model communication policy?

1. Openness, accessibility availability, and willingness to respond. 2. Truthfulness, unconditional honesty is the only policy.3. Responsiveness, recognition that any constituent concern is by definition legitimate and must be addressed.4. No secrets, our behavior, our attitudes, our plans, even our strategic discussions must be unchallengeable, unassailable, and positive

19. What is meant by CAD data exchange? Mention its importance & need. (Nov 2015) (Nov 2016) (April/May 2021)

CAD data exchange involves a number of software technologies and methods to translate data from one computer-aided design system to another CAD file format. This PLM technology is required to facilitate collaborative work (CPD) between OEM's and their suppliers.

NC programming typically requires that the geometry be received from a CAD system.

20. How does PHIGS differ from IGES?

PHIGS is an improved version of GKS and CORE. It offers an extended set of primitives for graphical elements from which the models may be generated. It is mainly used in high functional systems. It has additional features such as hidden lines, surface manipulation and graphics animation, etc. It is known as Programmers Hierarchical Interactive Graphics system

21. Define annotation? (Nov / Dec-2018)

Annotation is defined as a note by way of explanation or comment added to a text or diagram.

PART B – C310.3

1. Explain in detail about GKS and features of the Graphics Kernel System?

   (Nov 2016- 8 marks, Nov 2017 - 7 marks) (April/May 2021)

2. Write short notes on (i) Open GL (ii) Standards for computer graphics. **(Nov 2015) (Nov / Dec-2018)**

3. Write short notes on the Drawing exchange format (DXF) standard **(May 2016) (April/May 2021)**

4. Write short notes on Data Exchange standards. **(April 2017 - 8 marks)**

5. Explain the IGES methodology? **(Nov 2015) (Nov 2016 - 8 marks) (April 2017) (Nov / Dec-2018)**

6. State the need & requirement of product data exchange between dissimilar CAD/CAM systems. Describe the STEP methodology? **(Nov 2016- 8 marks) (Nov 2017)**

7. Explain the procedure in the CALS format? **(Nov 2017 - 6 marks)**

8. Explain the principles for communication standards? **(Nov 2016 - 8 marks) (April 2017 - 8 marks)**

9. Briefly explain any one of the known graphics standards. **(May 2016)**

10. Explain PHIGS and write short notes on database management.

PART C - C310.3

1. Discuss the requirement of product data exchange between dissimilar CAD/CAM systems.

2. Explain the procedure for constructing an assembled component in CAD package and importing it in Analysis package for analyzing with suitable example.

3. Discuss the advantages and limitations of various Data Exchange standards and justify the best data exchange standard in the CAD system and explain why?

UNIT-IV FUNDAMENTALS OF CNC AND PART PROGRAMMING

PART A – C310.4

1. List down the two ways to program modern CNC Machines.

a) Conversational Programming-this is a macro programming language used to instruct the machine to perform pre-programmed cycles and **b) CAM Programming**-Using this method, you import your part model into a CAM (computer-aided manufacturing) program and define the parameters associated with each and every machined feature on part c) **Offline Programming** linked to CAD programs d) **MDI**-Manual Data Input e) **Word-address** coding using G and M-codes

2. What is CNC?

CNC (Computer Numerical Control) is the general term used for a system that controls the functions of a machine tool using coded instructions (G and M codes) processed by a computer. Modern CNC machines have embedded controllers like FANUC and SIEMENS controllers used for integrating CNC machines with program codes.

3. List down the advantages of CNC Manufacturing.

CNC manufacturing offers advantages on two types of parts: **(1)** simple parts that are mass-produced and/or **(2)** complex parts with features requiring multiple axes of simultaneous motion. For simple parts in low quantity, it is often quicker to produce the parts on manual machines. Modern CNC machines offer increased productivity due to stiffer machine and spindle designs, more powerful motors, high-pressure coolant (up to 1000 psi) that floods the cutting zone, automatic tool changers, digital workpiece, tool probing, and/or horizontally mounted spindles.

4. Define the NC system and list the components used in the NC manufacturing system.
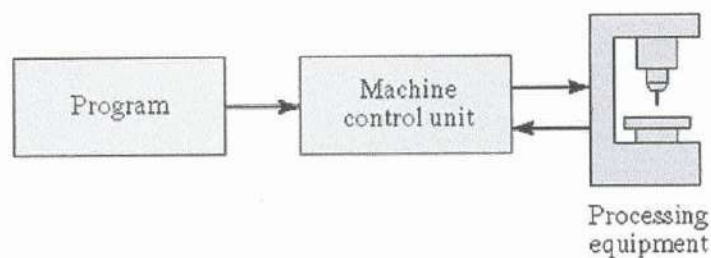
5. Define the CNC machine and list the components used in the CNC manufacturing system.

In CNC machining, movement is usually directed across X and Y axes. The tool, in turn, is positioned and guided via stepper or servo motors, which replicate exact movements as determined by the G-code. If the force and speed are minimal, the process can be run via

open-loop control. For everything else, closed-loop control is necessary to ensure the speed, consistency, and accuracy required for industrial applications, such as metalwork. The program input device is the mechanism for part programs to be entered into the CNC control. The most commonly used program input devices are keyboards, punched tape readers, diskette drivers, through RS 232 serial ports and networks.

6. List the two types of programming modes in the CNC part program
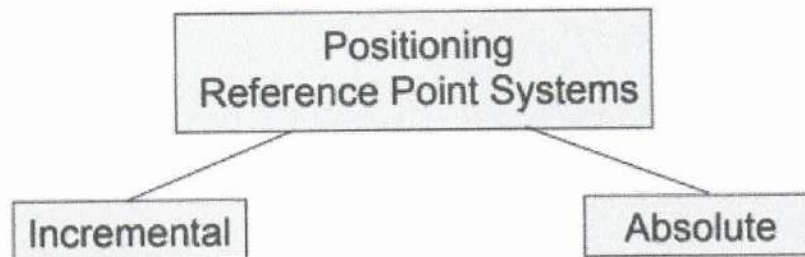
Incremental program locations are always given as the distance and direction from the immediately preceding point. Absolute program locations are always given from a single fixed zero or origin point.

7. Define Computer Aided Part Programming Schematically.
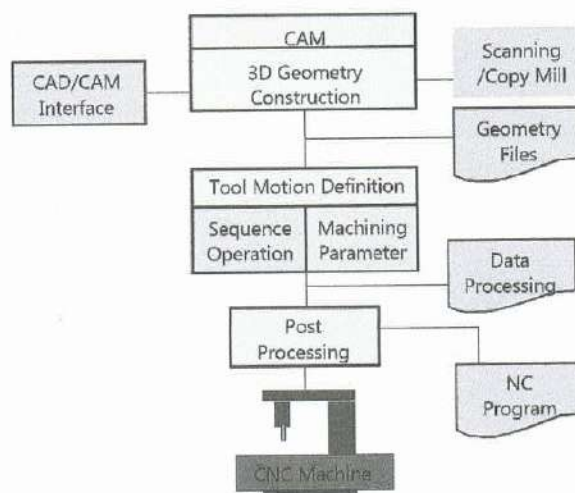
8. What is VFD?

VFD stands for Variable Frequency Drive. Spindle heads work in conjunction with spindle drives, called VFD, It has added a spindle speed controller card, allowing the operator to turn ON or OFF the spindle, forward or reverse the spindle rotation direction.

9. Define machining centers and list down the types based on machining centers.

A machining center is the face or surface of the material that will be normal to the axis of the tool. The face can be a flat face machined in a single setup (VMC-Vertical Machining Center) or more than one face in a single setup (HMC-Horizontal Machining Center) and primarily for one operation (HBC-Horizontal Boring Centers).

10. List down the types of controller systems.

The MCU (Machine Control Unit) of a CNC system is of two types as listed below

a) Point to Point: When making an axes move all affected drive motors run at the same speed

b) Continuous Path Machine: Can move the drive motors at varying rates of speed while positioning the machine

11. List down the types of CNC machines based on feedback systems.

Loop systems are electronic feedback systems that send and receive electronic information from the drive motors. Typical categorization includes; a) Open Loop: use stepper motors b) Closed Loop: Usually hydraulic, AC and DC Servomotors

12. Draw the block diagram of a CNC machine.
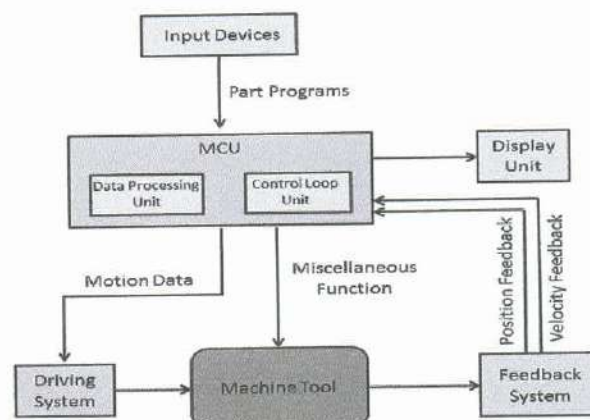
13. List the positioning systems of a CNC machine. (April/May 2021)

a) Absolute Positioning: Absolute coordinates refer to a Cartesian System that uses an x-axis, y-axis, and sometimes z-axis to establish a point some distance from a common origin. All machine positions are taken from one fixed zero point (origin-home position).

b) Incremental Positioning: Each machine position is specified by the previous one.

14. Explain the coordinate system used in the CNC machine?

The basic of machine movement is the Cartesian coordinate system. The points in the Cartesian coordinates are defined by X/Y or X/Y/Z coordinates. In 6 axis CNC machine, the U/V/W are referred to as rotation about X-axis, rotation about Y-axis, and rotation about Z-axis respectively. In a VMC, the z-axis is always the spindle axis.

15. List down the elements of a CNC Machine.

Anti-friction slideways; Lead screws; Machine guarding and swarf control; Machine spindle; work or servo-controlled machine table, drive motors with VFD-variable frequency drive card; ATC (Automatic Tool Changer), MDI-Manual Data Input handle; MCU-machine control unit like FANUC, SINUMERIC, etc.

16. List down the advantages of CNC machines / Programming.

Easier to program; Easy storage of existing programs; Easy to change a program; Avoids human errors; NC machines are safer to operate; Complex geometry is produced as cheaply as simple ones; Usually generates closer tolerances than manual machines

17. What is the DNC manufacturing system?

Direct Numerical Control is a manufacturing system in which a number of machines (NC machines) are controlled by a computer through direct connection and in real-time, with a provision for on-demand distribution of data to machines. The following are the components of a DNC machine: a) Central Computer; b) Bulk Memory Storage; C) Telecommunication Lines and d) Machine Tool-NC Machines and e) Satellite Minicomputers
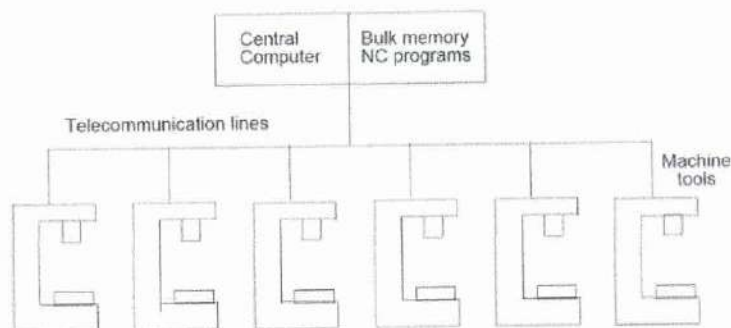
18. List down the CNC controller components.

Data Processing Unit (DPU): a) Input device [RS-232 port/ Tape Reader/ Punched Tape Reader]; b) Data Reading Circuits and Parity Checking Circuits; c) Decoders to distribute data to the axes controllers

Control Loops Unit (CLU): a) Interpolator to supply machine-motion commands between data points; b) Position control loop hardware for each axis of motion.

19. List some of the CNC controllers used worldwide.

- Sinumerik
- Fanuc.
- Heidenhain.
- Mitsubishi
- Haas.
- Mazak.
- Hurco.
- Cincinati

20. Differentiate NC with CNC machine tools.

NC Machine	CNC Machine
NC stands for Numerical Control	CNC stands for Computer Numerical Control.
It is defined as a machine that is controlled by a set of instructions in the form of numbers, letters, and symbols. The set of instructions is called a program.	It is defined as the machine which is used to control the motions of the workpiece and tool with the help of a prepared program in a computer. The program is written in alphanumeric data.
In NC machine the programs are fed into the punch cards.	In a CNC machine, the programs are fed directly into the computer by a small keyboard similar to our traditional keyboard.
Modification in the program is difficult.	Modification in the program is very easy.
A high skilled operator is required.	A less skilled operator is required.
The cost of the machine is less.	The cost of the CNC machine is high.
The maintenance cost is less	The maintenance cost is high.
The programs in the NC machine cannot be stored.	In CNC machines, the programs can be stored in the computer and can be used again and again.
It offers less flexibility and computational capability.	It offers additional flexibility and computational capability.
The accuracy is less as compared with the CNC.	It has high accuracy.
It requires more time for the execution of the job.	It takes very less time, in the execution of the job.

21. List the CNC codes and their purpose.

G-code: Preparatory codes are used for linear and circular interpolation machining codes

M-code: Miscellaneous or machine codes relate to drive controls, door controls, etc.

Functional Parameter codes: F-Feed/min; S-Spindle Speed/min; H-Tool length offset; T-Tool Selection

22. Draw the schematic diagram for open loop and closed loop CNC machines

(a)

(b)
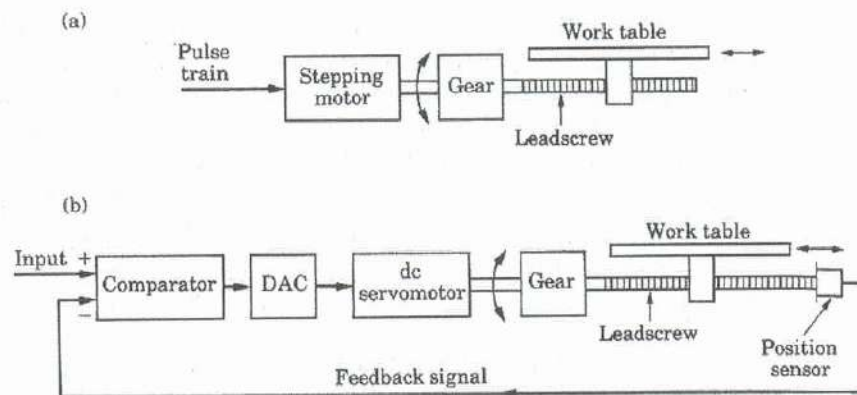
23. List down the components of Servo-motor controlled CNC machine.
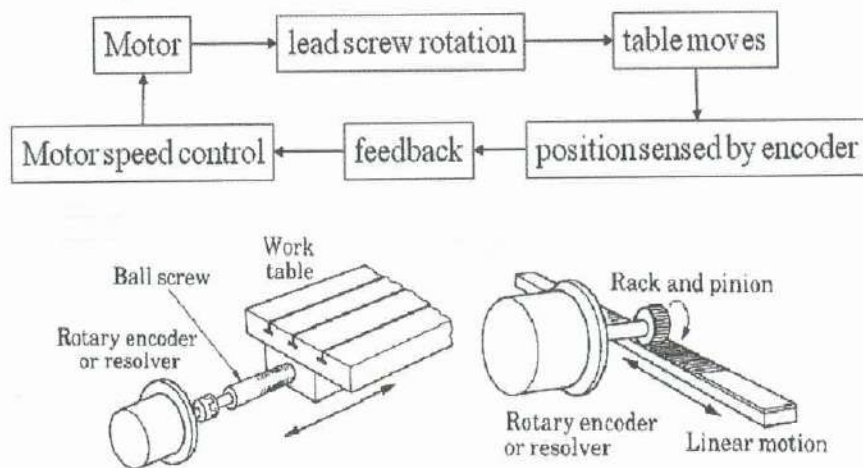
24. Define CNC Part Program?

A part program contains all the information for machining a component which is given as input to the control unit. The control unit provides the control signals at the correct time and in the correct sequence to the various drive units of the machine. The input information required is a series of blocks; one operation requires one block. Within each block, there may be different types of data.

Standard Part programming language: RS 274-D (Gerber, GN-code)
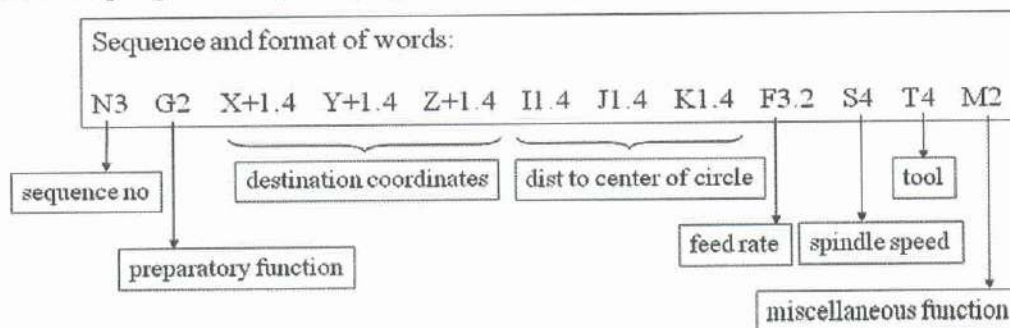
25. List the functions of MCU of a CNC system.

- Read coded instructions (CNC Programs)
- Decode coded instructions
- Implement interpolations (linear, circular, and helical) to generate axis motion commands
- Feed axis motion commands to the amplifier circuits for driving the axis mechanisms
- Receive the feedback signals of position and speed for each drive axis
- Implement auxiliary control functions such as coolant or spindle on/off, and tool change

26. What is a canned cycle in CNC machine means?

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... Some of the canned cycle macros are listed below

G73	Peck drilling	G83	Peck drilling cycle	G88	Boring cycle
G74	Left-hand tapping	G84	Right-hand tapping	G89	Boring cycle
G76	Precision boring	G85	Boring cycle		
G80	Cancel any fixed	G86	Boring cycle		
G81	Drilling cycle	G87	Back boring cycle		

27. What is subprogram in CNC machine means?

A subprogram is essentially a smaller program within the main program, more often than not a subprogram is used for repeat processes such as bolt hole circles. Sub-programming can also be used to make file sizes smaller, in the instance of your CNC only being able to load a few hundred kilobytes worth of code it becomes a very valuable skill. Subprograms are normal CNC programs that are called from a program (normally called main-program) to add some kind of repeatable machining operation. Subprograms end with M99 while the Main program ends with M30.

28. What is meant by G00, M30 in CNC part programming? (April/May 2021)

G00 – Rapid Travel

M30 - Program End

29. Define CAM and list some of the widely used CAM packages in industries.

Computer-aided manufacturing (CAM) commonly refers to the use of numerical control (NC) computer software applications to create detailed instructions (G-code) that drive computer

numerical control (CNC) machine tools for manufacturing parts. Manufacturers in a variety of industries depend on the capabilities of CAM to produce high-quality parts.

CAMWorks	Powermill	SprutCAM
EdgeCAM	Siemens NX CAM	
hyperMill	SolidCAM	
Mastercam	SolidWorks CAM	

PART B – C310.4

1. Explain CNC Machine Structural Design with elements in detail.
2. Differentiate NC CNC and DNC systems functionally and list the pros and cons concisely.
3. Explain in detail a typical VMC with specifications.
4. Explain in detail a typical HMC with specifications.
5. Explain in detail the role of NC and CNC machines in modern manufacturing systems
6. List down the CNC coding structure for a Lathe machine with a typical illustration.
7. Explain in detail sub-programming for pattern rotating; multiple operations on a specific set of hole locations.
8. What is a canned cycle? Explain any two drilling canned cycles with their syntax. **(April/May 2021)**
9. Explain in detail macro programming with the illustration.
10. Write a program for the multi-pass thread cutting cycle with an explanation.
11. Write a program for deep hole peck drilling operation using the canned cycle concept.
12. Explain the working and construction features of CNC with a neat sketch. **(April/May 2021)**

PART C – C310.4

1. Explain in detail the application of CNC manufacturing systems for Industry 4.0.

2. Interpret the following NC Program block by block. Plot the complete tool center path with the corresponding coordinates. Mark the corresponding NC block on the tool patch segment.

```
%
O0001 (Chamfering)
N1 G50 S1500
N2 G00 T101 G97 S500 M03
N3 G00 X0 Z0.25
N4 G01 Z0 F0.005
N5 G01 X0.50 K-0.050
N6 G01 Z-0.50
N7 G01 X0.75 K-0.050
N8 G01 Z-1.0 I0.050
N9 G01 X1.25 K-0.050
N10 G01 Z-1.5
N11 G00 X1.5 Z0.25
M30
%
```

UNIT-V CELLULAR MANUFACTURING AND FLEXIBLE MANUFACTURING SYSTEM
PART A – C310.5

1. Define Group Technology (GT). (Nov/Dec-2013)

Group Technology (GT) is a manufacturing methodology in which identical or similar components are grouped processed together during design, process planning, and manufacturing so that a wide variety of components can be manufactured, at the least expense of time, inventory, person-hours, and material handling. Group technology is an operations management philosophy based on the recognition that similarities occur in the design and manufacture of discrete parts.

2. List out the stages in Group Technology.

a) Production planners to set up the GT database; b) Grouping the parts or components into part-families with some similar characteristics; c) Re-design the shop-floor arrangement according to common shape, function or manufacturing process and tooling.

3. List out the techniques available for the formation of cells in GT. (May/June-2012)

Cell Formation Techniques can be broadly classified as a) Descriptive Procedures, b) Cluster Analysis, c) Graph Partitioning, d) Artificial Intelligence, and e) Mathematical Programming

4. State the role of GT in CAD/CAM Integration. (Nov/Dec-2011)(Nov/Dec 2015)

a) Using coding and classification schemes of group technology (GT), models developed for part family formation and plan retrieval and stored as manufacturing data in CAD/CAM systems used to develop standard process plan. b) The process of acquisition and documentation of manufacturing knowledge is a recurring dynamic phenomenon.

5. What are the three basic code structures used in GT applications.

a) Hierarchical codes (or monocodes or tree structure); b) Attribute codes (or poly code or chain type structure) c) Decision-tree codes (or hybrid codes or mixed codes).

6. Provide examples for the classical grouping of parts.

In the machine tool manufacturing industry, large part families can be grouped as a) Heavy parts - beds, columns, etc; b) Shafts, characterized by large L/D ratios; c) Spindles (long shafts, screw rods included); d) Non-rounds (small prismatic parts); e) Gears, disc type parts (whose L/D ratios are small).

7. Explain the two categories of attributes of parts.

Design attributes (Basic-External/Internal shape; Axisymmetric/Prismatic/sheet metal; Length/diameter ratio; Material; Major dimensions; Minor dimensions; Tolerances; Surface, Manufacturing attributes (Major process of manufacture; Surface treatments/coatings; Machine

tool/processing equipment; Cutting tools; Operation sequence; Production time; Batch quantity Production rate; Fixtures needed) which consider the sequence of processing steps required to make a part.

8. What is part family (Nov/Dec-2010), (Nov/Dec 2017)

Part-family is defined as a" collection of parts which are similar in terms of geometric shape, size, and similar processing steps required in manufacturing, so the flow of materials through the plant improves". A part family is a collection of parts that are similar either because of geometry and size or because similar processing steps are required in their manufacture. The parts within a family are different, but their similarities are close enough to merit their identification as members of the part family.

9. List out the premises for the development of the DCLASS code.

a) A part may be best-characterized bytes basic shape, usually is most apartment attribute; b) Each basic shape may have several features, such as holes, slots, threads, and grooves; c) A part can be completely characterized by basic shape; size; precision and material type, form, and condition; d) Several short code segments can be linked to from classification code that is human recognizable and adequate for human monitoring; e) Each of these code segments can point to more detailed information.

10. What is the main difference between hierarchical codes and attribute codes? (May/June-2013)

Hierarchical Codes	Attribute Codes
With the hierarchical structure, the interpretation of each succeeding symbol depends on the value of the preceding symbols.	Part classification and coding are concerned with identifying the similarities and using these similarities to evolve a classification code. Similarities are of two types: design attributes (such as geometric shape and size), and manufacturing attributes (the sequence of processing steps required to make the part).

11. What is PFA?

Production flow analysis (PFA) is a technique for pre-planning the division of the whole factory into groups or departmental groups. When the knowledge of division is available, then it is possible to plan the layout and optimize the manufacturing cell to enhance productivity.

12. What are the applications of GT?

Design: In a firm, many components have a similar shape. They can be grouped into design families and a design can be created by simply modifying an existing component design from the

same family. **Manufacturing**: For this purpose, GT gives great importance than simply a design philosophy. Parts that are not similar in shape may still need similar manufacturing processes. Parts of this type are called the production family. (All parts may need the same operation like drilling, milling thread cutting, etc.). **Process Planning:** Process-planning work can be facilitated, as similar processes are needed for all components of a particular family. This helps production planning and control much easier because only similar parts are considered for each cell. Such a cell-oriented layout is called a group technology layout or cellular layout.

13. What are the benefits of Computer-Aided Process Planning? (Nov/Dec-2010)(Nov/Dec 2015)

a) Process rationalization: Computer-automated preparation of operation routings is more likely to be consistent, logical, and optimal than its manual counterpart. b) Increased productivity of process planners: With computer-aided process planning, there is reduced clerical effort, fewer errors are made and the planners have immediate access to the process planning database. c) Reduced turnaround time: This leads to an overall reduction in manufacturing lead time. d) Improved legibility: The computer-prepared document is neater and easier to read than manually written route sheets. f) Incorporation of other application programs.

14. List down the factors to be considered for selecting a coding system for components.

When selecting a coding system for a component's representation, there are several factors to be considered. They include a) The geometry of components (i.e., rotational, prismatic, deep drawn, sheet metal, etc.); b) The code structure; c) The digital representation (i.e., binary, octal, hexadecimal, etc.); e) Material of manufacture - ferrous, non - ferrous, plastics, composites, etc.

15. What is the main difference between hierarchical codes and attribute code structures?

In a hierarchical structure, the interpretation of each symbol in the sequence depends on the value of preceding symbols. Whereas in attribute/poly code structure, the interpretation of each symbol in the sequence does not depend on the value of preceding symbols.

16. List any six coding systems that are widely recognized in industries.

OPITZ classification system, b) MICLASS system, c) DCLASS system, d) CODE system, e) KK-3 system, f) CUTPLAN system, g) COFORM –coding for machining.

17. Explain OPITZ coding system. (Nov/Dec-2013)

The OPITZ coding system uses the following digit sequence: 12345 6789 ABCD. The basic code consists of nine digits, which can be extended by adding four more digits. The first nine digits are intended to convey both design and manufacturing data. The first five digits, 12345, are called the "form code" and describe the primary design attributes of the part. The next four digits, 6789,

constitute the "supplementary code". It indicates some of the attributes that would be of use to manufacturing (work material, raw work piece shape, and accuracy). The extra four digits, "ABCD", are referred to as the "secondary code".

18. What is cellular manufacturing? (Nov/Dec 2016)

Cellular manufacturing (CM) is an application of group technology in which similar machines have been aggregated into cells, each of which is dedicated to the production of a part family.

19. List any four-design considerations guiding the cell-formation.

Parts/products to be fully completed in the cell; higher operator utilization; fewer operations than equipment; Balanced equipment utilization in the cell.

20. Explain the Composite part concept. (Nov/Dec 2016)

The part family which comprises all the attributes like design and manufacturing comes under a composite part concept. Most of the model comes under a composite part concept.

21. How machine cells are classified? (Nov/Dec 2017)

- ✓ Single machine cell
- ✓ group machine cell with manual handling
- ✓ group machine cell with semi-integrated handling FMC and FMS

22. How the part families are identified? (Apr/May 2017)

- Design attributes
- Manufacturing attributes

23. Define FMS.

A Flexible Manufacturing System is an integrated approach to automating a production system to accommodate fast response to product changes. It is designed to be flexible so that it can manufacture a variety of products at relatively low volumes, with minimum lead-time between product changes.

24. Define FMC. (Nov/ Dec 2015)

The simplest, hence most flexible type of FMS is a flexible manufacturing cell. It consists of one or more CNC machine tools, general-purpose or special design interfaced with automated material handling and tool changers. FMC's are capable of automatically machining a wide range of different workpieces. They are usually employed in one-off and small batch production as independent machining centers but are frequently the starting point for FMS.

25. List the benefits of FMS. (Nov/ Dec 2015) (Nov/Dec 2016)

Reduced cycle times; Lower work-in-process (WIP) inventory; Low direct labor costs; Ability to change over to different parts quickly; Improved quality of the product (due to consistency);

Higher utilization of equipment and resources (Utilization better than standalone CNC machines); Quicker response to market changes; Reduced space requirements; Ability to optimize loading and throughput of machines.

26. List down the major elements of FMS

Production systems, Support systems; materials handling systems; automated storage and retrieval systems, buffer storing of parts; chip removal and washing systems; computer control systems.

27. List the function of the FMS computer control system.

Workstation control, Material Handling system control, Workpiece Monitoring, Tool Control, Failure Diagnosis & Safety Monitoring, Production control, Reporting, etc.,

28. List the types of data associated with the FMC

A typical FMC system handles four different types of data: Master data, control data, status data, and general management data. These data are generated from CAD, CAP, and CAM functions.

29. Write any two applications of FMS.

Gantry (Robot) for Loading and Unloading (Automatic Part Changing); Automatic Tool Change Systems; automated storage and retrieval systems; Tool Condition Monitoring System

30. List the typical FMS layout subsystems.

a) Automatic storage and retrieval system; b) CNC machines; c) Workpiece carriers (AGV's); d) Palletizing station; e) Washing station; f) Tool presetting station; g) Computer control system.

31. What are the types of FMS layouts?

In-line layout; Loop layout; Ladder layout; Open field layout; Robot centered layout

32. List some Material handling systems.

Material handling includes parts transfer from conveyors and palletization. Robots perform well in these applications as well as handling fragile components and heavy ones and parts that are very hot or very cold. The tasks can be simple or complex involving tracking in one or two axes or a moving conveyor. Some robots equipped with multiple tooling can handle more than one part at a time. A variety of end effectors has been used including mechanical grippers, magnets, vacuum cups, conveyors, cranes, industrial trucks, monorails automated guided vehicles, and industrial robots.

33. State the purpose of the primary and secondary material handling system.

Primary handling system - establishes the basic layout of the FMS and is responsible for moving work parts between stations in the system. Secondary handling system - consists of transfer

devices, automatic pallet changers, and similar mechanisms located at the workstations in the FMS.

34. Differentiate between FMS and FMC.

a) A FMC has two or three machines, while an FMS has four or more machines. b) FMS generally includes non-processing workstations. However, FMC does not have any non-processing workstations. c) The computer control systems of an FMS are generally larger and more sophisticated than that of an FMC.

35. What are the different types of flexibility?

a) Machine flexibility, b) Production flexibility, c) Mix flexibility, d) Volume flexibility, e) Expansion flexibility, f) Routing flexibility, g) Product flexibility.

36. Write the different components of FMS?

(1) Workstations, (2) material handling and storage system, and (3) computer control system. In addition, even though an FMS is highly automated, (4) people are required to manage and operate the system.

37. What are the FMS planning issues?

Part family considerations, Processing requirements, Physical characteristics of the work parts, Production volume are the FMS issues.

38. How FMS quantitative analysis techniques are classified?

FMS analysis techniques can be classified as follows: (1) deterministic models, (2) queuing models, (3) discrete event simulation, and (4) other approaches, including heuristics.

39. What is AGV?

AGVs are battery-powered, automatically steered vehicles that follow defined pathways on the floor. The pathways are unobtrusive. AGVs are used to move unit loads between loads and unload stations in the facility.

40. Write the advantages of AGVS in FMS.

(i) Flexibility: The route of the AGV's can be easily altered, expanded, and modified, simply by changing the guide path of the vehicles. This is more cost-effective than modifying fixed conveyor lines or rail-guided vehicles.

(ii) Real-time monitoring and control: Because of computer control, AGV's can be monitored in real-time. If the FMS control system decides to change the schedule, the vehicles can be re-routed and urgent requests can be served. AGV's are usually controlled through wires implanted on the factory floor.

(iii) Safety: AGV's can travel at a slow speed but typically operate in the range of 10 to 70 m/min. They have on-board microprocessor control to communicate with local zone controllers which direct the traffic and prevent collisions between vehicles as well as the vehicle and other objects

41. List out the types of AGV's (Nov/Dec 2016), (Apr/May 2017)

Towing vehicles, unit load carriers, pallet trucks, forklift trucks, light load transporters, assembly line vehicles.

42. What is the weakness of PFA? (April/May 2021)

The weakness of production flow analysis is that the data used in the technique are derived from existing production route sheets. In all likelihood, these route sheets have been prepared by different process planners, and the routings may contain operations that are non-optimal, illogical, or unnecessary.

43. How does FMS classified based on the number of machines? (April/May 2021)

Flexible manufacturing systems can be distinguished according to the number of machines in the system. The following are typical categories:

• Single machine cell

• Flexible manufacturing cell

• Flexible manufacturing system

PART B – C310.5

1. Explain parts classification and coding. (May/June 2012)

2. Explain about OPITZ CODING system. (Nov/Dec 2016) (April/May 2021)

3. Explain the composite part concept in cellular manufacturing. (May/June 2013)

4. Explain the methods of part family formation with a suitable illustration and discuss with examples the coding system structure. (May/June 2013), (Nov/Dec 2015)

5. Explain the MCLASS system? (Nov/Dec 2015)

6. Discuss how group technology is used in designing manufacturing cells.

7. Discuss the parts classification and coding structure employed in-group technology.

8. Give the form code for the part family using any one coding system.

9. Discuss the principle and advantages of group technology coding.

10. Classify a component using either OPITZ or MICLASS system.

11. Explain the component of FMS and FMS layout configuration. (Nov/Dec 2016, 2017)

12. Write notes on various materials handling equipment that is commonly used in an FMS. (Nov/Dec 2017)

13. Explain about FMS workstation. List the applications of FMS. (Nov/ Dec 2015)

14. Explain the functions of the FMS Computer control system.

15. Discuss the application, advantages, and disadvantages of an FMS. **(Nov/Dec 2017)**

16. Write quantitative analysis issues in FMS.

17. Write the factors influencing FMS planning issues.

18. Explain the different flexibilities in FMS. **(April/May 2021)**

PART C – C310.5

1. An analysis of 50 parts processed on four machines has been summarized in the from-to chart of the following table. Additional information is that 50 parts enter the machining grouping machine 3, 20 parts leave after processing at machine 1, 30 parts leave after machine 4. Determine a logical machine arrangement using the Hollier method.

	TO	1	2	3	4
FROM	**1**	0	5	0	25
	2	30	0	0	15
	3	10	40	0	0
	4	10	0	0	0

2. Develop the form code in the Opitz system for the part design of Fig.
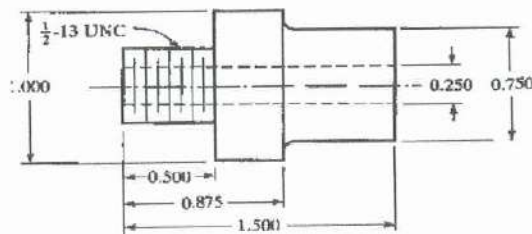
3. Explain the following with its advantages (a) Line Layout (b) Functional layout

4. Explain the bar code Printer with its application.

5. Explain the various types of automatic storage and retrieval system that is classified.

Internal Test – Sample Test Paper

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INTERNAL TEST – I / II ✓

a) Register Number : | 9 | 2 | 0 | 8 | 1 | 9 | 1 | 1 | 4 | 0 | 3 | 9 |

b) Year & Department : III rd year Mechanical

c) Subject code & Title : ME8691– Computer Aided Design and Manufacturing

d) Date & Session (FN/AN): 28.03.2023

e) Number of pages used : 06

G. ෴ 28/3/23
Name and Signature of the Hall Superintendent with Date

Students has to put a tick (✓) mark for the questions attended in tick mark column

PART-A

Question No.	✓	CO.3. Marks	CO.4. Marks
1.	✓	2	
2.	✓	2	
3.	✓		2
4.	✓		2
5.	✓		1
TOTAL		04	05
TOTAL MARKS		09	

Students has to put a tick (✓) mark for the questions attended in tick mark column

PART-B & C

Question No.		(i) ✓	i CO.3. Marks	i CO.4 Marks	(ii) ✓	ii CO..... Marks	ii CO..... Marks	Total Marks
6.		✓		7				07
7.	a)	✓	15					15
	b)							
8.	a)	✓		15				15
	b)							
TOTAL								37

CO. No.	Total Marks	Attained Marks
CO 3...	20	19
CO. 4...	30	27

Grand Total	46
	50

Name and Signature of the Faculty
Dr. N. Mathan kumer.

Name and Signature of the HoD

INTERNAL TEST II

ME8691 COMPUTER AIDED DESIGN AND

MANUFACTURING

PART-A

①

1) IGES (Initial Graphics Exchange Specification)

2. DXS (Drawing/Data Exchange Format)

3. STEP (Standard for the Exchange of Product
                                           model data)

②

1. To save the time of drafting

2. To make training easier

3. To make outsourcing more efficient

③

MUC is a hardware system which reads,
interupts and translates the program of
instructions into mechanical action of machine
tool.

④

CNC is defined as a NC system that
utilizes a dedicated, stored computer
program to perform some or the entire
basic NC functions

① ... Application are in aero equipment; ... printed circuit boards: coil winding automobile parts and blue print of complex shapes.

Part - B

⑥

To utilize numerical control in manufacturing, the following steps must be accomplished.

Process planning

The engineering drawing of the work part must be interpreted in terms of the manufacturing process to be used. This step is refered to as process planning and it is concened with the preparation of a route sheet.

Part Programming

A part programmer plans the process for the portions of the job to be accomplished by NC. Part programmers are knowledgeable about the machining process and they have been traind to program for numerical control

Manual Part Programming

In manual Programming, the machine instructions are proposed on a form called a part program manuscript is a listing of the relative cutter/work piece positions which must be followed to machine the part. Use of the computer in these situations results in significant savings in part programming time.

Part-c

(1)

Graphics kernal system is the first proposed standard for computer graphis by ISO and ANSI. GTKS was developed in to need for a standardized method of developing graphics program.

The main objective Graphical kernal System, GTKS is the production and manipulation of pictures (in a way that does not depend on the computer or graphical device being used.

Application program
Application Oriented layer
Language-independent layer
Graphic kernel System
operating system

other resource	Graphical resource

In GKS pictures are considered to be constructed from a number of basic building blocks. The five main primitives in GKS are.

1. **Poly line:** which draw a sequence of connected line segments

2. **Poly Marker:** which marks a sequence of points with the same symbol

3. **Fill Area:** which displays a specified area

4. **Text:** which draws a string of characters

5. **Cell Array:** which displays an image composed of variety of colours or grey scales. Basic set of primitives.

POLY LINE   POLY MARKER   FILL AREA

$x = (2, 5, 3, 5, 2)$ $y = (2, 2, 5, 2)$

To utilize numerical control in manufac-turing, the following steps must be accomplished.

1. Process Planning:

The engineering drawing of the work part must be interrupted in terms of the manufacturing processes to be used. This steps is refereed to as process planning and it is concerned with the preparation of a route sheet. The route sheet is a listing of the sequence of operations which must be performed on the work part.

2. Part programming:

A part programmer plans the process for the portions of the job to be accomplish by NC. Part programmers are knowledgea-ble about the machining process and they have been trained to programme for numerical control.

There are two ways to program for NC
1. computer-assisted part programming
2. Manual Part Programming

Tape Preparation

A punched tape is prepared from the part programming we process planning manual part programming. the punched tape is prepared directly from the part programming program manuscript on a type writer like device equipped with tape punching capability.

Tape verification:

After the punched tape has been prepared, a method is usually provided for checking the accuracy of the tape. Some times the tape is checked by running it through a computer program which plots the various tool moments on paper.

Production

The final step in the NC procedure is to use the NC tape in production This involves ordering the raw works parts specifying and preparing the tooling and any special fix turning that may required. when the part is completed, the operator removes it from the machine and loads the next part

Class Committee Meeting
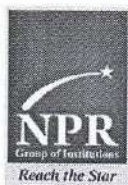
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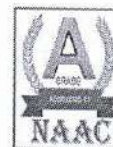
DEPARTMENT OF MECHANICAL ENGINEERING

Date: 10.08.2022

CIRCULAR

The first class committee meeting of the Third year Mechanical Engineering has been planned to conduct on 12.08.2022 at 12.55 p.m. in III MECH class room. The subject handling faculties and student representatives are informed to attend the meeting without fail.
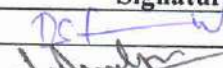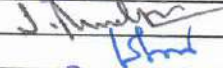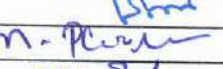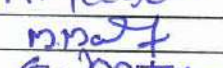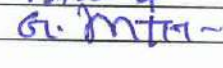
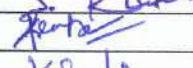| S.No	Agenda
1.	Course Information
2.	Attendance
3.	Academic Schedule , Assessments details & Internal mark distributions
4.	Course Material & Books
5.	Instruction about the Slow learners. and Advanced learners
6.	Value added course
7.	Department Functions
8.	General Discipline& Other Activities
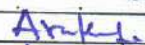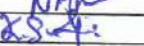
Chair Person

(Mr. N. Karthic, AP/CIVIL)

HoD-Mech

(Dr.T.saravana kannan)

Name	Designation	Signature
Dr.T.Saravana kannan	HoD/MECH	
Dr. S. Paul Singarayar	ASP/MECH	
Mr. K.Aruna Senthil Kumar	AP/MECH	
Dr. M. Palpandi	AP/MECH	
Mr. M.Mathan Raj	AP/MECH	
Mr. G.Sundararajan	AP/MECH	

| Name of the student	Year and Section	Signature
Mr. R. Arun Kumar	III Mech	
Mr. V. Kamaleswaran	III Mech	
Mr. M. Nithesh	III Mech	
Mr. K. Sanjay Kumar	III Mech	

NPRCET-MECH

Class Committee Meeting-I
2022-2023(ODD)

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DEPARTMENT OF MECHANICAL ENGINEERING

Date: 12.08.2022

Minutes of the first meeting for the odd semester of the academic year 2022-2023

The first class committee meeting for third year was conducted on 12.08.2022 in III -Mech class room at 12.55 p.m. and the following points were discussed in the meeting

- The student's representatives, faculty members and chairperson were given a warm welcome by head of the department.

Course Information:

- A student has to earn the total number of credits specified in the curriculum of the respective Programme of study in order to be eligible to obtain the degree.

Attendance Calculation:

- The University Examination will ordinarily follow immediately after the last working day of the semester commencing from I semester as per the academic schedule prescribed from time to time.

- Ideally every student is expected to attend all classes of all the courses and secure 100% attendance. However, in order to give provision for certain unavoidable reasons such as Medical / participation in sports, the student is expected to attend at least 75% of the classes.

- A candidate who secures overall attendance between 65% and 74% in the current semester due to medical reasons /Participation in Sports events may be permitted to appear for the current semester examinations subject to the condition that the candidate shall submit the medical certificate / sports participation certificate attested by the Head of the Institution. The same shall be forwarded to the Controller of Examinations for record purposes.

- Candidates who secure less than 65% overall attendance shall not be permitted to write the University examination. They are required to repeat the incomplete semester in the next academic year.

- Student cumulative attendance will be displayed in department notice-board.

- Students have been informed to participate in the co-curricular and extra-curricular activities conducted by the institution.

FEEDBACK FROM STUDENTS:

S. No	Subject Code	Subject Name	Name of the Faculty	Desg /Dept	Syllabus Completion	Feedback from Students	Remedial measures to be taken by the Faculty	Signature of the Faculty
1	ME8595	Thermal Engineering- II	Mr. K.Aruna Senthil Kumar	AP/ Mech	1st Unit in progress	No issues	-	
2	ME8593	Design of Machine Elements	Dr. S.Paul Singarayar	ASP/ Mech	1st Unit in progress	No issues	-	
3	ME8501	Metrology and Measurements	Dr. M. Palpandi	ASP/ Mech	1st Unit in progress	Good	-	
4	ME8594	Dynamics of Machines	Mr. M.Mathan Raj	AP/ Mech	1st Unit in progress	Good	-	
5	OAT551	Automotive Systems	Mr. G.Sundararajan	AP/ Mech	1st Unit in progress	No issues	-	
6	ME8511	Kinematics and Dynamics Laboratory	Mr. M.Mathan Raj	AP/ Mech	1st Unit in progress	No issues	-	
7	ME8512	Thermal Engineering Laboratory	Mr. G.Sundararajan	AP/ Mech	Introduction classes over	No issues	-	
8	ME8513	Metrology and Measurements Laboratory	Dr. M. Palpandi	ASP/ Mech	2 Experiments completed	No issues	-	

GRIEVANCES/SUGGESTIONS FROM STUDENTS:

1. Need library books/Photocopy for all subjects as per regulation
2. Need programming classes as well as training required to attend the interview specifically for Mechanical core companies in the placement training classes.
3. Value added courses required in the field of software like AutoCAD, Solid works and some advance software's
4. Need to go for Industrial visit

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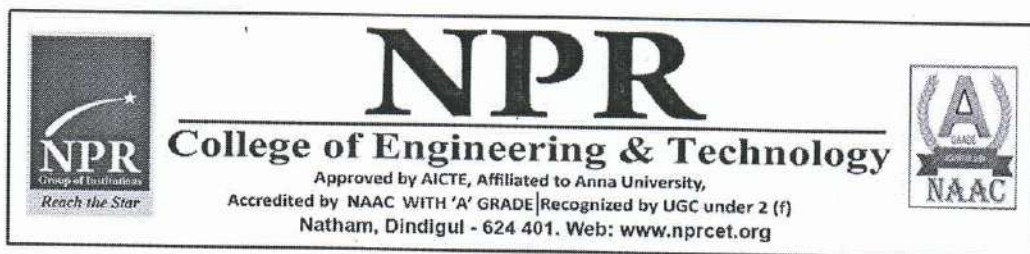
DEPARTMENT OF MECHANICAL ENGINEERING

Date: 13.08.2022

ACTION TAKEN REPORT: CLASS COMMITTEE MEETING-I

CLASS COMMITTEE MEETING-I		ACADEMIC YEAR-2022-2023	
Class: III MECH	Date: 12.08.2022	Time: 12.55 PM	Venue : III MECH Class Room

S.No	SUGGESTIONS	CORRECTIVE ACTION
1	Need library books/Photocopy for all subjects as per regulation	Requisition given to the Principal
2	training required to attend the interview in the Mechanical core companies	Information given to the placement department placement training programme will be arranged
3	Value added courses required in the field of software like AutoCAD, Solid works and some advance software's	Consulted with resource person
4	Need to go for Industrial visit	HoD assured to arrange the Industrial Visit

Class Incharge

(Mr. M.Mathan Raj, AP/Mech)

HoD/MECH

(Dr.T.Saravana kannan)

NPRCET-MECH

Class Committee Meeting-2022-2023(ODD)

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NAAC

DEPARTMENT OF MECHANICAL ENGINEERING

Date: 03.02.2023

CIRCULAR

The First class committee meeting of the third year Mechanical Engineering has been planned to conduct on 06.02.2023 at 12.55 p.m. in III MECH class room. The subject handling faculties and student representatives are informed to attend the meeting without fail.
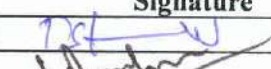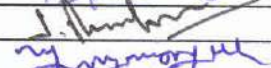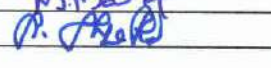
S. No	Agenda
1	Course Information
2	Attendance
3	Academic Schedule , Assessments details & Internal mark distributions
4	Course Materials & Books
5	Slow learners and Advanced learners
6	Subject Feedback
7	Department Functions
8	General Discipline & amp; Other Activities
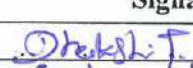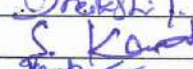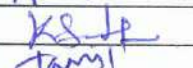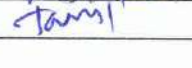
Chair Person

(Mr. N. Karthic, AP/CIVIL)

HoD-Mech

(Dr. T. saravana kannan)

Name	Designation	Signature
Dr.T.Saravana kannan	HoD/MECH	
Dr. S. Paul Singarayar	ASP/MECH	
Dr.N. Mathan Kumar	AP/MECH	
Mr. T. Balasubramani	AP/MECH	
Mr. M.Mathan Raj	AP/MECH	
Dr. P.Shanmugapriya	ASP/ENGLISH	

Name of the student	Year and Section	Signature
Mr. T. Dhakshinamoorthi	III MECH	
Mr. S. Karthick Raj	III MECH	
Mr. G. Prakash Kumar	III MECH	
Mr. K. Sanjay Kumar	III MECH	
Mr. R. N. Tamil Arasan	III MECH	
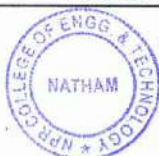
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Class Committee Meeting-I
2022-2023(Even)

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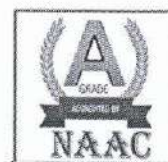
DEPARTMENT OF MECHANICAL ENGINEERING

Date: 06.02.2023

Minutes of the First meeting for the Even semester of the academic year 2022-2023

The first class committee meeting for third year was conducted on 06.02.2023 in III -Mech class room at 12.55 p.m. and the following points were discussed in the meeting

- The student's representatives, faculty members and chairperson were given a warm welcome by head of the department.

Course Information :

- A student is ordinarily expected to complete the B.E. Programme in 8 semesters (four academic years) but in any case not more than 14 Semesters for HSC (or equivalent) candidates and not more than 12 semesters for Lateral Entry Candidates.

- Break of Study shall be granted only once for valid reasons for a maximum of one year during the entire period of study of the degree programme. However, in extraordinary situation the candidate may apply for additional break of study not exceeding another one year by paying prescribed fee for break of study.

- If a candidate intends to temporarily discontinue the programme in the middle of the semester for valid reasons, and to rejoin the programme in a subsequent year, permission may be granted based on the merits of the case provided he / she applies to the Director, Student Affairs in advance, but not later than the last date for registering for the end semester examination of the semester through the Head of the Institution.

Attendance Calculation:

- The University Examination will ordinarily follow immediately after the last working day of the semester commencing from I semester as per the academic schedule prescribed from time to time.

- Ideally every student is expected to attend all classes of all the courses and secure 100% attendance. However, in order to give provision for certain unavoidable reasons such as Medical / participation in sports, the student is expected to attend atleast 75% of the classes.

Department Functions:

Academic calendar are informed to students.

General Discipline& Other Activities:

- Students are advised to attend the classes regularly without absentees and follow proper dress code.
- Students have been informed to participate in technical contest that will be conducted by other colleges and university.

FEEDBACK FROM STUDENTS:

S. No	Subject Code	Subject Name	Name of the Faculty	Desg /Dept	Syllabus Completion	Feedback from Students	Remedial measures to be taken by the Faculty	Signature of the Faculty
1	ME8651	Design of Transmission Systems	Dr. S. Paul Singarayar	ASP / Mech	1st Unit in progress	No issues	~	
2	ME8691	Computer Aided Design and Manufacturing	Dr. N. Mathan Kumar	ASP / Mech	1st Unit in progress	No issues	~	
3	ME8693	Heat and Mass Transfer	Dr. T. Saravana Kannan	HoD / Mech	1st Unit in progress	Good		
4	ME8692	Finite Element Analysis	Mr. T. Balasubramani	AP / Mech	1st Unit in progress	Good	—	
5	ME8694	Hydraulics and Pneumatics	Mr. M.Mathan Raj	AP / Mech	1st Unit in progress	No issues	~	
6	ME8681	CAD / CAM Laboratory	Dr. N. Mathan Kumar	ASP / Mech	Introduction classes over	No issues	~	
7	ME8682	Design and Fabrication Project	Mr. T. Balasubramani	AP / Mech	Introduction classes over	No issues	~	
8	HS8581	Professional Communication	Dr. P. Shanmugapriya	ASP / English	Introduction classes over	No issues		

GRIEVANCES/SUGGESTIONS FROM STUDENTS:

1. Need library books/Photocopy for all subjects as per regulation
2. Need programming classes as well as training required to attend the interview specifically for Mechanical core companies in the placement training classes.
3. Value added courses required in the field of software like AutoCAD, Solid works and some advance software's

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DEPARTMENT OF MECHANICAL ENGINEERING

Date: 07.02.2023

ACTION TAKEN REPORT: CLASS COMMITTEE MEETING-I

CLASS COMMITTEE MEETING-I		ACADEMIC YEAR-2022-2023	
Class: III MECH	Date: 06.02.2023	Time: 12.55 PM	Venue : III MECH Class Room

S.No	SUGGESTIONS	CORRECTIVE ACTION
1	Need library books/Photocopy for all subjects as per regulation	Requisition given to the Principal
2	training required to attend the interview in the Mechanical core companies	Information given to the placement department placement training programme will be arranged
3	Basic lab practice are required like Manufacturing Technology-I, Manufacturing Technology -II, Strength of Materials which was studied through virtual labs due to the COVID situations	Requisition given to the HoD, He assured to arrange after discuss with Principal
4	Need to go for Industrial visit	HoD assured to arrange the Industrial Visit

Class Incharge

(Mr. M.mathan Raj AP/Mech)

HoD/MECH

(Dr.T.Saravana kannan)

Final Year Projects & Project Review

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Department of Mechanical Engineering

The below table shows the project details of academic year 2022-23

| Batch No.	Students Name	Title of the Project	Specialization	Type of Project (Application, Product, Research, Review)	Relevance (Environment, safety, ethics, cost, standards)	Contribution / Achievements / Research Output	Mapping with stated Pos and PSOs PO	PSO
1.	Abilash A Manikandan N Ramakrishnan B Saravanakumar M Guide: Mr. T. Balasubramani	Design and Fabrication of Multipurpose Machine using CAM Operated Mechanism	Design Engineering	Application	cost	Students are able to acquire knowledge Design and Fabrication of Multipurpose Machine using CAM Operated Mechanism	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12	PSO1, PSO2
2.	Mahalakshmi G Rakesh S Shobana K Velpackiyaraj M Guide: Mr. M. Mathan Raj	Design and Fabrication of Mobile operated Medical Assistance Robot in Hospital	Production Engineering	Product	cost	Students are able to gain knowledge in Design and Fabrication of Mobile operated Medical Assistance Robot in Hospital Machine	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12	PSO1, PSO2

S.No	Names / Guide	Project Title	Department	Type	Category	Course Outcome	PO	PSO
3.	Anbarasan V Meenakshi Sundaram G Nagaraj S Raghulpandian B **Guide:** Mr.G.Sundarrajan	Self Rechargeable Electric Car	Production Engineering	Product	Environment	Students are able to gain knowledge in Self Rechargeable Electric vehicle	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12	PSO1, PSO2
4.	Ashwin S.J Manikandan R Mohana Ragul P Ramanan M **Guide:** Dr.M.Pal Pandi	Study of Mechanical Properties of Aluminium Graphene Composites	Production Engineering	Research	cost	Students are able to gain knowledge about Study of Mechanical Properties of Aluminium Graphene Composites	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12	PSO1, PSO2
5.	Gowthaman M Iman Mohammed T Rakesh M Ruban P **Guide:** Mr.T.Balasubramani	Design and Fabrication of Development of Humanoid Robot system for cleaning Sewage by 3D Printed Parts	Automobile Engineering	Application	Environment	Students are able to understood Humanoid about Robot system for cleaning Sewage by 3D Printed Parts	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12	PSO1, PSO2
6.	Ayyamperumal P Balakumaresan S Muthusamy P Naveenraj K **Guide:** Mr.P.Gopi	Retrofittings of normal Bicycle into Electrical Bicycle	Production Engineering	Product	Environment	Students are able to understood Retrofittings of normal Bicycle into Electrical Bicycle	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12	PSO1, PSO2,

S.No	Students / Guide	Project Title	Domain			Course Outcome	PO Mapping	PSO Mapping
7.	Dineshpandi B Mohamed Siddiq A Sangaran S Veeramanikandan M **Guide:** Mrs.K.R.Kavitha	Performance and Emission Characteristics of Bio Diesel from Orange Peel with Cashew Nut Shell Liquid	Automobile Engineering	Research	Environment	Students are able to acquire knowledge Performance and Emission Characteristics of Bio Diesel from Orange Peel with Cashew Nut Shell Liquid	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12	PSO1, PSO2
8.	Mugeshwaran N Nitheswar M Sai prasad P **Guide:** Dr.S.Paulsingarayar	Mechanical Properties of Alkali Treated Madar Hibiscus Cannabinus and Gongura Fiber Reinforced Polymer Composites	Automobile Engineering	Research	cost	Students are able to gain knowledge in Mechanical Properties of Alkali Treated Madar Hibiscus Cannabinus and Gongura Fiber Reinforced Polymer Composites	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12	PSO1, PSO2
9.	Ramkumar A Sankar G Shaarif Ahamed S Sivakumar S **Guide:** Dr.N.Mathan Kumar	An Investigation of corrosion Behaviour on Mg-Ag Alloy	Automobile Engineering	Research	Standards	Students are able to acquire knowledge in An Investigation of corrosion Behaviour on Mg-Ag Alloy	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12	PSO1, PSO2

M. P.
Project Coordinator

R. JSUNDARARAJAN.
E., M.Tech, P.
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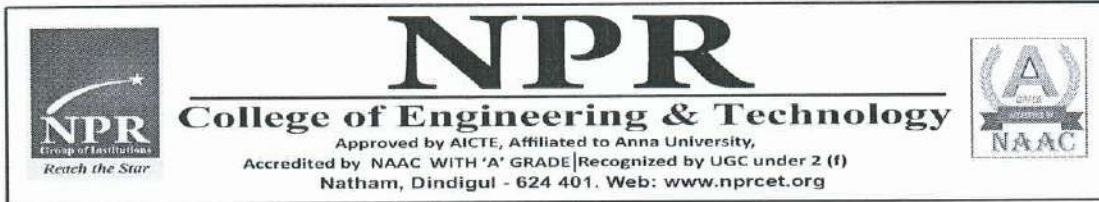
DEPARTMENT OF MECHANICAL ENGINEERING

Ref: NPRCET/MECH/ /2022-23 / PR-03   10.03.2023

CIRCULAR

The First Review has planned for ME8811- Project Work and ME8682 Design & Fabrication Project for final year and third year Mechanical Engineering Students on 23.03.2023 and 24.03.2023 Respectively. The students are informed to attend the Review at 01.40 p.m. in Smart Class room on respective days with their Guides without fail.

HoD-Mech

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Project Coordinators

Class In charges -III Mech & IV Mech

All Project Guides

Department File

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Department of Mechanical Engineering
ME8811 Project Work
First Review Mark

Academic Year 2022-23   **Date: 23.03.2023**

S. No.	Batch No.	Students Name	Presentation	Domain Explanation	Communication	Queries	Total Marks
1.	B1	Abilash A	23	23	24	23	93
		Manikandan N	22	24	23	22	91
		Ramakrishnan B	24	23	22	24	93
		Saravanakumar M	25	24	24	23	96
2.	B2	Mahalakshmi G	25	24	24	24	97
		Rakesh S	24	23	22	24	93
		Shobana K	24	21	23	24	92
		Velpackiyaraj M	21	22	23	24	90
3.	B3	Anbarasan V	24	23	22	24	93
		Meenakshi	23	22	24	23	92
		Nagaraj S	24	22	23	25	94
		Raghulpandian B	24	23	22	24	93
4.	B4	Ashwin S.J	22	23	24	24	93
		Manikandan R	24	23	24	22	93
		Mohana Ragul P	23	24	22	23	92
		Ramanan M	24	23	25	22	94
5.	B5	Gowthaman M	23	24	22	23	92
		Iman Mohammed T	24	23	22	23	92
		Rakesh M	23	24	23	22	92
		Ruban P	23	24	22	23	92
6.	B6	Ayyamperumal P	23	24	23	23	93
		Balakumaresan S	23	22	23	20	88
		Muthusamy P	24	23	24	22	93
		Naveenraj K	23	24	23	21	91
7.	B7	Dineshpandi B	23	24	23	21	91
		Mohamed Siddiq A	23	24	23	25	95
		Sangaran S	21	22	25	23	91
		Veeramanikandan	23	24	22	21	90
		Mugeshwaran N	23	24	23	22	92
		Nitheswar M	21	22	24	21	88

Mr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul - 624 401.

8.	B8	Sai prasad P	23	22	24	22	91
		Ramkumar A	24	21	23	24	92
		Sankar G	23	22	24	21	90
9.	B9	Shaarif Ahamed S	23	24	23	22	92
		Sivakumar S	23	22	21	20	86

Project Coordinator

HoD-Mech

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DEPARTMENT OF MECHANICAL ENGINEERING

Ref: NPRCET/MECH/ /2022-23 / PR-04   27.03.2023

CIRCULAR

The Second Review has planned for ME8811- Project Work and ME8682 Design & Fabrication Project for final year and third year Mechanical Engineering Students on 04.04.2023 and 05.04.2023 Respectively . The students are informed to attend the Review at 01.40 p.m. in Smart Class room on respective days with their Guides without fail.

HoD-Mech

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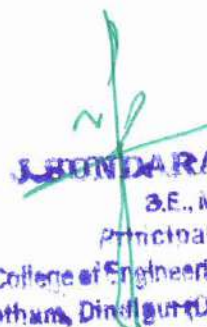
Project Coordinators

Class In charge -III mech

All Project Guides

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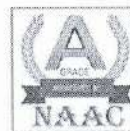
Department of Mechanical Engineering
ME8811 Project Work
Second Review Mark

Academic Year 2022-23   **Date: 04.04.2023**

S. No.	Batch No.	Students Name	Presentation	Domain Explanation	Communication	Queries	Total Marks
1.	B1	Abilash A	24	23	22	24	93
		Manikandan N	23	22	20	21	86
		Ramakrishnan B	22	21	20	22	85
		Saravanakumar M	23	22	21	22	88
2.	B2	Mahalakshmi G	25	25	25	20	95
		Rakesh S	23	22	23	24	92
		Shobana K	21	22	23	21	87
		Velpackiyaraj M	24	23	22	21	90
3.	B3	Anbarasan V	23	21	22	21	87
		Meenakshi	20	21	23	22	86
		Nagaraj S	21	23	22	21	87
		Raghulpandian B	21	22	23	21	87
4.	B4	Ashwin S.J	22	21	23	21	87
		Manikandan R	23	21	24	21	89
		Mohana Ragul P	22	21	23	21	87
		Ramanan M	22	21	23	21	87
5.	B5	Gowthaman M	21	22	23	24	90
		Iman Mohammed T	21	23	21	24	89
		Rakesh M	21	22	21	23	87
		Ruban P	21	23	21	22	87
6.	B6	Ayyamperumal P	21	22	23	21	87
		Balakumaresan S	22	21	23	21	87
		Muthusamy P	20	20	21	20	81
		Naveenraj K	21	22	21	20	84
7.	B7	Dineshpandi B	21	22	23	20	86
		Mohamed Siddiq A	21	22	21	24	88
		Sangaran S	22	23	24	21	90
		Veeramanikandan	21	21	23	24	89
		Mugeshwaran N	21	22	21	21	85

8.	B8	Nitheswar M	21	22	24	21	88
		Sai prasad P	23	22	24	22	91
9.	B9	Ramkumar A	24	21	23	24	92
		Sankar G	23	22	24	21	90
		Shaarif Ahamed S	23	24	23	22	92
		Sivakumar S	23	22	21	20	86

M. Pal

Project Coordinator

HoD-Mech

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DEPARTMENT OF MECHANICAL ENGINEERING

Ref: NPRCET/MECH/ /2022-23 / PR-05   07.04.2023

CIRCULAR

The Third Review has planned for ME8811- Project Work and ME8682 Design & Fabrication Project for Final year and third year Mechanical Engineering Students on 20.04.2023 and 21.04.2022 Respectively The students are informed to attend the Review at 01.40 p.m. in Smart Class room on respective days with their Guides without fail.

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Department of Mechanical Engineering
ME8811 Project Work
Third Review Mark

Academic Year 2022-23

Date: 20.04.2023

S. No.	Batch No.	Students Name	Presentation	Domain Explanation	Communication	Queries	Total Marks
1.	B1	Abilash A	22	21	23	21	87
		Manikandan N	22	21	22	23	88
		Ramakrishnan B	21	22	24	23	90
		Saravanakumar M	21	23	25	24	93
2.	B2	Mahalakshmi G	21	22	24	21	88
		Rakesh S	21	22	23	21	87
		Shobana K	23	25	25	25	98
		Velpackiyaraj M	24	20	23	22	89
3.	B3	Anbarasan V	24	22	23	24	93
		Meenakshi	23	25	24	22	94
		Nagaraj S	22	21	23	24	90
		Raghulpandian B	23	23	21	23	90
4.	B4	Ashwin S.J	23	24	22	23	92
		Manikandan R	21	24	21	23	89
		Mohana Ragul P	21	23	24	24	92
		Ramanan M	23	24	25	23	95
5.	B5	Gowthaman M	23	24	24	22	93
		Iman Mohammed T	23	24	22	23	92
		Rakesh M	23	24	25	23	95
		Ruban P	23	25	22	23	93
6.	B6	Ayyamperumal P	24	23	24	23	94
		Balakumaresan S	23	24	23	22	92
		Muthusamy P	23	24	23	23	93
		Naveenraj K	23	23	22	22	90
7.	B7	Dineshpandi B	20	23	21	21	85
		Mohamed Siddiq A	23	24	23	23	93
		Sangaran S	21	21	20	22	84
		Veeramanikandan	23	22	21	22	88
		Mugeshwaran N	23	24	23	25	95

8.	B8	Nitheswar M	23	22	23	24	92
		Sai prasad P	23	22	24	23	92
9.	B9	Ramkumar A	23	22	23	23	91
		Sankar G	24	22	22	23	91
		Shaarif Ahamed S	23	22	24	23	92
		Sivakumar S	23	22	24	23	92

M·pal

Project Coordinator

HoD-Mech.

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Department of Mechanical Engineering
ME8811 Project Work
Consolidated Review Mark

Academic Year 2022-23   **Date: 23.03.2023**

S.No.	Reg.No.	Students Name	First Review (100)	Second Review (100)	Third Review (100)	Final Marks (100)
1	920819114001	Abilash A	93	93	87	91
2	920819114003	Anbarasan V	93	87	93	91
3	920819114004	Ashwin S J	93	87	92	91
4	920819114005	Ayyam Perumal P	93	87	94	91
5	920819114006	Balakumaresan S	88	87	92	89
6	920819114008	Dineshpandi B	91	86	85	87
7	920819114010	Gowthaman M	92	90	93	92
8	920819114012	Iman Mohammed T	92	89	92	91
9	920819114013	Maha Lakshmi G	97	95	88	93
10	920819114014	Manikandan N	91	86	88	88
11	920819114015	Manikandan R	93	89	89	90
12	920819114016	Meenakshi Sundaram G	92	86	94	91
13	920819114018	Mohamed Siddiq A	95	88	93	92
14	920819114019	Mohana Ragul P	92	87	92	90
15	920819114020	Mugeshwaran N	92	85	95	91
16	920819114021	Muthusamy P	93	81	93	89
17	920819114022	Nagaraj S	94	87	90	90
18	920819114023	Naveen Raj K	91	84	90	88
19	920819114024	Nitheswar M	88	88	92	89
20	920819114025	Sai Prasad P	91	91	92	91
21	920819114026	Raghulpandian B	93	87	90	90
22	920819114027	Rakesh M	92	87	95	91
23	920819114028	Rakesh S	93	92	87	91
24	920819114029	Ramakrishnan B	93	85	90	89
25	920819114030	Ramanan M	94	87	95	92
26	920819114031	Ramkumar A	92	92	91	92
27	920819114032	Ruban P	92	87	93	91

28	920819114033	Sangaran S	91	90	84	88
29	920819114034	Sankar G	90	90	91	90
30	920819114035	Saravanakumar M	96	88	93	92
31	920819114036	Shaarif Ahamed S	92	92	92	92
32	920819114037	Shobana K	92	87	98	92
33	920819114038	Siva Kumar S	86	86	92	88
34	920819114039	Velpackiyaraj M	90	90	89	90
35	920819114701	Veeramanikandan M	90	89	88	89

M·pale

Project Coordinator

HoD-Mech

Value Added Courses – Sample Certificates

NPR

College of Engineering & Technology

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai.
Accredited by NAAC with 'A', Grade Recognized by UGC under 2(f), ISO 9001:2015 certified

NPR Nagar, Natham PIN: 624 401, Dindigul Dist, Tamilnadu. Ph:04544 246500,501,502.www.nprcet.org

Certificate Course

Certificate of Completion

This is to certify that Mr./ ~~Ms./~~ RAJMOHAN.R (III-Mech) has successfully completed the certificate course on "22MECC01- CREO 6.0 for Mechanical Engineers", organised by Department of Mechanical Engineering, NPR College of Engineering & Technology, Natham, for 35 hours duration from 19.09.2022 to 13.10.2022 during the academic year 2022-2023.

Mr.T. Balasubramani
Course Coordinator

Dr.T.Saravana Kannan
HoD – Mech

Dr.J.Sundararajan
Principal

NPR

College of Engineering & Technology

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai.
Accredited by NAAC with 'A', Grade Recognized by UGC under 2(f), ISO 9001:2015 certified

NPR Nagar, Natham PIN: 624 401, Dindigul Dist, Tamilnadu. Ph:04544 246500,501,502.www.nprcet.org

Add on Course

Certificate of Completion

This is to certify that Mr./ ~~Ms.~~ **KAMALEWARAN.V (III-Mech)** has successfully completed

the add-on course on **"22MEAO02-INDUSTRIAL CONTROLS"**, organised by the Department

of Mechanical Engineering, NPR College of Engineering & Technology, Natham, for 32

hours duration from **13.02.2023** to **03.03.2023** during the academic year 2022-2023.

Mr.B.Gopi
Course Coordinator

Dr.T.Saravana Kannan
HoD – Mech

Dr.J.Sundararajan
Principal

NPR

College of Engineering & Technology

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai.
Accredited by NAAC with 'A', Grade Recognized by UGC under 2(f), ISO 9001:2015 certified

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Certificate Course

Certificate of Completion

This is to certify that Mr./ ~~Ms./~~ SATHEESH.G (II-Mech) has successfully completed the

certificate course on "22MECC02- Assembly and Maintenance of Automobile", organised

by Department of Mechanical Engineering, NPR College of Engineering & Technology,

Natham, for 35 hours duration from 27.03.2023 to 19.04.2023 during the academic year

2022-2023.

Mr.G.Sundararajan
Course Coordinator

Dr.T.Saravana Kannan
HoD – Mech

Dr.J.Sundararajan
Principal

College of Engineering & Technology

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai.
Accredited by NAAC with 'A', Grade Recognized by UGC under 2(f), ISO 9001:2015 certified

NPR Nagar, Natham PIN: 624 401, Dindigul Dist, Tamilnadu. Ph:04544 246500,501,502.www.nprcet.org

Add on Course

Certificate of Completion

This is to certify that Mr./ Ms./ RUBAN .V (III-Mech) has successfully completed the add

on course on "22MEAO01-Advanced CNC Part Programming Techniques ", organised by

Department of Mechanical Engineering, NPR College of Engineering & Technology,

Natham, for 35 hours duration from 16.08.2022 to 08.09.2022 during the academic year

2022-2023.

Mr.M.Mathan Raj	Dr.T.Saravana Kannan	Dr.J.Sundararajan
Course Coordinator	*HoD – Mech*	*Principal*

Internship / In-Plant Training

Ayyanar Thunai

Date: 20.01.2023

TO WHOM IT MAY CONCERN

This to certify that **Mr.Ruban.V** a student of BE (Mechanical Engineering – Third Year) NPR College of Engineering and Technology, Natham, Dindigul, India has successfully completed Internship (02.01.2023 to 12.01.2023) at Osho Body builders, Madurai. During the period of his Internship with us, he was found punctual, Hardworking and inquisitive.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

For Osho Body Builders
R. Annaluxshmi
Partner

ELEGANCE IN SHAPE AND EXCELLENCE IN QUALITY IS OUR WATCH WORD

Web : oshobodybuilders.in
E.mail : osho.osho5@gmail.com
Ph : 0452 - 6562250

Cell : 98425 - 32220
          98430 - 83074

Body builders

ARAI ACCREDIATED &
ISO CERTIFIED COMPANY

TIN No : 33915023027

Plot No.32, (S.V.D.Nagar)
Rajappa Nagar,
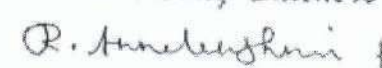Kovil Pappakudi (P o)
MADURAI - 625 018

Date: 20.01.2023

TO WHOM IT MAY CONCERN

This to certify that **Mr.Vishnu Bala .C** a student of BE (Mechanical Engineering – Third Year) NPR College of Engineering and Technology, Natham, Dindigul, India has successfully completed Internship (02.01.2023 to 12.01.2023) at Osho Body builders, Madurai. During the period of his Internship with us, he was found punctual, Hardworking and inquisitive.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

For Osho Body Builders
R. Annalakshmi
Partner

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Web : oshobodybuilders.in
E.mail : osho.osho5@gmail.com
Ph : 0452 - 6562250

Cell : 98425 - 32220
98430 - 83074

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ISO CERTIFIED COMPANY**

TIN No. 33915023027

Plot No.32, (S.V.D.Nagar)
Rajappa Nagar,
Kovil Pappakudi (P.o)
MADURAI - 625 018

Date: 20.01.2023

TO WHOM IT MAY CONCERN

This to certify that **Mr. Dhakshinamoorthi.T** a student of BE (Mechanical Engineering – Third Year) NPR College of Engineering and Technology, Natham, Dindigul, India has successfully completed Internship (02.01.2023 to 12.01.2023) at Osho Body builders, Madurai. During the period of his Internship with us, he was found punctual, Hardworking and inquisitive.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR College of Engineering & Technology
Natham, Dindigul - 624 401

For Osho Body Builders

R. Amuleyhni
Partner

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E.mail : osho.osho5@gmail.com
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TIN No. : 33915023027

Plot No.32, (S.V.D.Nagar)
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Kovil Pappakudi (P.o)
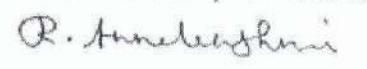MADURAI - 625 018

Date: 20.01.2023

TO WHOM IT MAY CONCERN

This to certify that **Mr.Seenivasan.A** a student of BE (Mechanical Engineering – Third Year) NPR College of Engineering and Technology, Natham, Dindigul, India has successfully completed Internship (02.01.2023 to 12.01.2023) at Osho Body builders, Madurai. During the period of his Internship with us, he was found punctual, Hardworking and inquisitive.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul (DN) - 624 401.

For Osho Body Builders
R. Annalakshmi
Partner

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ASCB(E)
UK

(An ISO 9001:2008 Certified Company)

CIN: U28131TZ2009PTC015549

Date:03.02.2023

TO WHOM IT MAY CONCERN

This is to certify that **Mr.Kabilan J** studying in Third year Mechanical Engineering of NPR College of Engineering & Technology, Natham has undergone Internship in our organization from **16.01.2023 to 31.01.2023.**

During the period, his conduct was found to be good.

With regards,

(For Thermo Solutions (INDIA) Pvt. Ltd)

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

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CONCEPT TO COMMISIONING

THERMO SOLUTIONS

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ASCB(E)
UK

(An ISO 9001:2008 Certified Company)

CIN: U28131TZ2009PTC015549

Date:03.02.2023

TO WHOM IT MAY CONCERN

This is to certify that **Mr.Karthick Raj S** studying in Third year Mechanical Engineering of NPR College of Engineering & Technology, Natham has undergone Internship in our organization from **16.01.2023 to 31.01.2023.**

During the period, his conduct was found to be good.

With regards,

(For Thermo Solutions (INDIA) Pvt. Ltd)

Mr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul - 624 401.

THERMO SOLUTIONS (INDIA) PRIVATE LIMITED

Corp. Office : #10/76, 2nd Cross St, Kumaran Nagar, Virugambakkam, Chennai - 600 092. Telefax : +91 44 2479 2151
Factory : #12A, Sidco Industrial Estate, Dindigul - 624 003. Telefax : +91 451 2470238 / 424
tsi@thermosolutions.net / www.thermosolutions.net

CIN: U28131TZ2009PTC015549

Date:03.02.2023

TO WHOM IT MAY CONCERN

This is to certify that **Mr.Prakash Kumar G** studying in Third year Mechanical Engineering of NPR College of Engineering & Technology, Natham has undergone Internship in our organization from **16.01.2023 to 31.01.2023.**

During the period, his conduct was found to be good.

With regards,

(For Thermo Solutions (INDIA) Pvt. Ltd)

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

Date: **20/01/2023**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Ilancheran A** studying III year BE Mechanical Engineering in NPR

College of Engineering & Technology, Natham, Dindigul, has successfully completed Twenty-One

days internship from **21/12/2023 to 12/01/2023** in our company. During the period the training

period he was has been extremely inquisitive and hard working. He summed to be writing to learn the

functions/process with kwon interest.

We wish him every success in life.

Dr. .LSUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul (Dt) - Pin 6x1.

JM Frictech India Pvt. Ltd,
G-27, SIPCOT Industrial Park,
Irrungattukottai,
Chennai-602 105.

Date: **20/01/2023**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Raj Mohan R** studying III year BE Mechanical Engineering in NPR

College of Engineering & Technology, Natham, Dindigul, has successfully completed Twenty-One

days internship from **21/12/2023 to 12/01/2023** in our company. During the period the training

period he was has been extremely inquisitive and hard working. He summed to be writing to learn the

functions/process with kwon interest.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

JM Frictech India Pvt. Ltd,
G-27, SIPCOT Industrial Park,
Irrungattukottai,
Chennai-602 105.

Date: **20/01/2023**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Sivakumar S** studying III year BE Mechanical Engineering in NPR

College of Engineering & Technology, Natham, Dindigul, has successfully completed Twenty-One

days internship from **21/12/2023 to 12/01/2023** in our company. During the period the training

period he was has been extremely inquisitive and hard working. He summed to be writing to learn the

functions/process with kwon interest.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

JM Frictech India Pvt. Ltd,
G-27, SIPCOT Industrial Park,
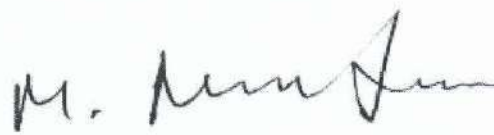**Irrungattukottai,**
Chennai-602 105.

Date: **20/01/2023**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Maheswaran S** studying III year BE Mechanical Engineering in NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed Twenty-One days internship from **21/12/2023 to 12/01/2023** in our company. During the period the training period he was has been extremely inquisitive and hard working. He summed to be writing to learn the functions/process with kwon interest.

We wish him every success in life.

Dr. J.SUNDARARAJAN.
B.E, M.Tech, Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul(Dt) - 624 401.

JM Frictech India Pvt. Ltd,
G-27, SIPCOT Industrial Park,
Irrungattukottai,
Chennai-602 105.

Ayyanai Thunai

Osho

Body builders

**ARAI ACCREDIATED &
ISO CERTIFIED COMPANY**

Date: 30.01.2023

TO WHOM IT MAY CONCERN

This to certify that **Mr.Gowthaman.M** a student of BE (Mechanical Engineering – Final Year) NPR College of Engineering and Technology, Natham, Dindigul, India has successfully completed In-Plant Training (**23.01.2023 to 28.01.2023**) at Osho Body builders, Madurai. During the period of his In-Plant Training with us, he was found punctual, Hardworking and inquisitive.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

For Osho Body Builders

Partner

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Ayyanar Thunai

Date: 30.01.2023

TO WHOM IT MAY CONCERN

This to certify that **Mr.Iman Mohammed.T** a student of BE (Mechanical Engineering – Final Year) NPR College of Engineering and Technology, Natham, Dindigul, India has successfully completed In-Plant Training **(23.01.2023 to 28.01.2023)** at Osho Body builders, Madurai. During the period of his In-Plant Training with us, he was found punctual, Hardworking and inquisitive.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

For Osho Body Builders
R. Annalakshmi
Partner

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Ayyanar Thunai

Web : oshobodybuilders.in
E.mail : osho.osho5@gmail.com
Ph : 0452 - 6562250

Cell : 98425 - 32220
       98430 - 83074

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Body builders

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TIN No. 33915023027

Plot No.32, (S.V.D Nagar)
Rajappa Nagar,
Kovil Pappakudi (P.o)
MADURAI - 625 018

Date: 30.01.2023

TO WHOM IT MAY CONCERN

This to certify that **Mr.Rakesh.M** a student of BE (Mechanical Engineering – Final Year) NPR College of Engineering and Technology, Natham, Dindigul, India has successfully completed In-Plant Training (**23.01.2023 to 28.01.2023**) at Osho Body builders, Madurai. During the period of his In-Plant Training with us, he was found punctual, Hardworking and inquisitive.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

For Osho Body Builders
R. Anneleuykini

Partner

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E.mail : osho.osho5@gmail.com
Ph : 0452 - 6562250

Cell : 98425 - 32220
        98430 - 83074

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TIN No. 33915023027

Plot No.32, (S.V.D.Nagar)
Rajappa Nagar,
Kovil Pappakudi (P.o)
MADURAI - 625 018

Date: 30.01.2023

TO WHOM IT MAY CONCERN

This to certify that **Mr.Ruban.P** a student of BE (Mechanical Engineering – Final Year) NPR
College of Engineering and Technology, Natham, Dindigul, India has successfully completed
In-Plant Training (**23.01.2023 to 28.01.2023**) at Osho Body builders, Madurai. During the period
of his In-Plant Training with us, he was found punctual, Hardworking and inquisitive.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

For Osho Body Builders
R. Annalakshmi
Partner

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Date: 04/02/2023

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms.Maha Lakshmi G** studying IV year BE Mechanical Engineering in NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed Fourteen days internship from **17/01/2023 to 31/01/2023** in our company. During the period the training period she was has been extremely inquisitive and hard working. She summed to be writing to learn the functions/process with kwon interest.

We wish her every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul(Dt) - 624 401.

JM Frictech India Pvt. Ltd,
G-27, SIPCOT Industrial Park,
Irrungattukottai,
Chennai-602 105.

Date: **04/02/2023**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Nagaraj S** studying IV year BE Mechanical Engineering in NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed Fourteen days internship from **17/01/2023 to 31/01/2023** in our company. During the period the training period he was has been extremely inquisitive and hard working. He summed to be writing to learn the functions/process with kwon interest.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.PR. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

JM Frictech India Pvt. Ltd,
G-27, SIPCOT Industrial Park,
Irrungattukottai,
Chennai-602 105.

Date: **04/02/2023**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Raghulpandian B** studying IV year BE Mechanical Engineering in

NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed Fourteen

days internship from **17/01/2023 to 31/01/2023** in our company. During the period the training

period he was has been extremely inquisitive and hard working. He summed to be writing to learn the

functions/process with kwon interest.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E.,M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

JM Frictech India Pvt. Ltd,
G-27, SIPCOT Industrial Park,
Irrungattukottai,
Chennai-602 105.

Date: **04/02/2023**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Rakesh S** studying IV year BE Mechanical Engineering in NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed Fourteen days internship from **17/01/2023 to 31/01/2023** in our company. During the period the training period he was has been extremely inquisitive and hard working. He summed to be writing to learn the functions/process with kwon interest.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E.,M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

JM Frictech India Pvt. Ltd,
G-27, SIPCOT Industrial Park,
Irrungattukottai,
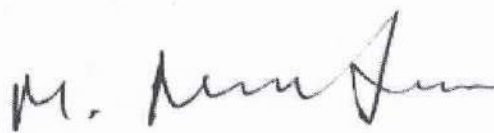**Chennai-602 105.**

Date: **04/02/2023**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms.Shobana K** studying IV year BE Mechanical Engineering in NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed Fourteen days internship from **17/01/2023 to 31/01/2023** in our company. During the period the training period she was has been extremely inquisitive and hard working. She summed to be writing to learn the functions/process with kwon interest.

We wish her every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul(Dt) - 624 401.

JM Frictech India Pvt. Ltd,
G-27, SIPCOT Industrial Park,
Irrungattukottai,
Chennai-602 105.

THERMO SOLUTIONS

CIN: U28131TZ2009PTC015549

Date:01.02.2023

TO WHOM IT MAY CONCERN

This is to certify that **Mr.Abilash A** studying in final year Mechanical Engineering of NPR College of Engineering & Technology, Natham has undergone In-Plant training in our organization from **23.01.2023 to 28.01.2023.**

During the period, his conduct was found to be good.

With regards,

(For Thermo Solutions (INDIA) Pvt. Ltd)

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul - 624 401.

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(An ISO 9001:2008 Certified Company)

CIN: U28131TZ2009PTC015549

Date:01.02.2023

TO WHOM IT MAY CONCERN

This is to certify that **Mr.Manikandan N** studying in final year Mechanical Engineering of NPR College of Engineering & Technology, Natham has undergone In-Plant training in our organization from **23.01.2023 to 28.01.2023.**

During the period, his conduct was found to be good.

With regards,

(For Thermo Solutions (INDIA) Pvt. Ltd)

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul dist - 624 401.

THERMO SOLUTIONS (INDIA) PRIVATE LIMITED

Corp. Office : #10/76, 2nd Cross St, Kumaran Nagar, Virugambakkam, Chennai - 600 092. Telefax : +91 44 2479 2151
Factory : #12A, Sidco Industrial Estate, Dindigul - 624 003. Telefax : +91 451 2470238 / 424
tsi@thermosolutions.net / www.thermosolutions.net

CIN: U28131TZ2009PTC015549

Date:01.02.2023

TO WHOM IT MAY CONCERN

This is to certify that **Mr.Ramakrishnan B** studying in final year Mechanical Engineering of NPR College of Engineering & Technology, Natham has undergone In-Plant training in our organization from **23.01.2023 to 28.01.2023.**

During the period, his conduct was found to be good.

With regards,

(For Thermo Solutions (INDIA) Pvt. Ltd)

Dr. J.SUNDARARAJAN,
B.E., M.Tech, Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul - 624 461.

CIN: U28131TZ2009PTC015549

Date:01.02.2023

TO WHOM IT MAY CONCERN

This is to certify that **Mr.Saravanakumar M** studying in final year Mechanical Engineering of NPR College of Engineering & Technology, Natham has undergone In-Plant training in our organization from **23.01.2023 to 28.01.2023.**

During the period, his conduct was found to be good.

With regards,

(For Thermo Solutions (INDIA) Pvt. Ltd)

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

Date: 04/08/2023

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Aathiraja D** studying IV year BE Mechanical Engineering in NPR

College of Engineering & Technology, Natham, Dindigul, has successfully completed Thirty days

internship from **03/07/2023 to 01/08/2023** in our company. During the period the training period

he was has been extremely inquisitive and hard working. He summed to be writing to learn the

functions/process with kwon interest.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

JM Frictech India Pvt. Ltd,
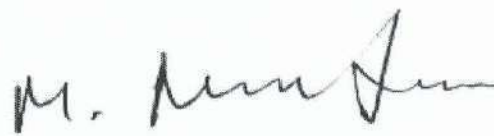**G-27, SIPCOT Industrial Park,**
Irrungattukottai,
Chennai-602 105.

Date: 04/08/2023

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Arikaran N** studying IV year BE Mechanical Engineering in NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed Thirty days internship from **03/07/2023 to 01/08/2023** in our company. During the period the training period he was has been extremely inquisitive and hard working. He summed to be writing to learn the functions/process with kwon interest.

We wish him every success in life.

J.SUNDARARAJAN,
BE., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul DM - 624 401.

JM Frictech India Pvt. Ltd,
G-27, SIPCOT Industrial Park,
Irrungattukottai,
Chennai-602 105.

JM Frictech India Pvt Ltd (JMI)
G27, SIPCOT Industrial Park,
Katrambakkam Village, Irrungattukottai,
Chennai-Nadu 602105

Date: 04/08/2023

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Chinnaiya Raja N** studying IV year BE Mechanical Engineering in NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed Thirty days internship from **03/07/2023 to 01/08/2023** in our company. During the period the training period he was has been extremely inquisitive and hard working. He summed to be writing to learn the functions/process with kwon interest.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

JM Frictech India Pvt. Ltd,
G-27, SIPCOT Industrial Park,
Irrungattukottai,
Chennai-602 105.

G27, SIPCOT Industrial Park, Katrambakkam Village, Irrungattukottai, Chennai-Nadu 602105
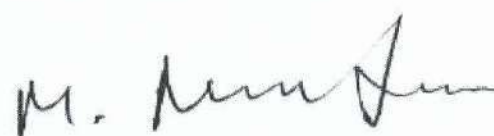E-mail: gestamp@gmail.com website : http:www.jmil.in

Date: **04/08/2023**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Deepak R** studying IV year BE Mechanical Engineering in NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed Thirty days internship from **03/07/2023 to 01/08/2023** in our company. During the period the training period he was has been extremely inquisitive and hard working. He summed to be writing to learn the functions/process with kwon interest.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.PR. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

JM Frictech India Pvt. Ltd,
G-27, SIPCOT Industrial Park,
Irrungattukottai,
Chennai-602 105.

Date: **04/08/2023**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Dhayal Priyadharsan S** studying IV year BE Mechanical Engineering in NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed Thirty days internship from **03/07/2023 to 01/08/2023** in our company. During the period the training period he was has been extremely inquisitive and hard working. He summed to be writing to learn the functions/process with kwon interest.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul(Dt) - 624 401.

JM Frictech India Pvt. Ltd,
G-27, SIPCOT Industrial Park,
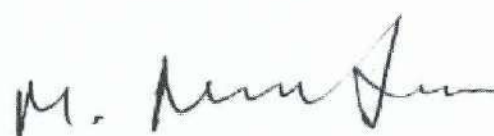**Irrungattukottai,**
Chennai-602 105.

NATHAM

Date: **30/01/2023**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Gunapathi V** studying II year BE Mechanical Engineering in NPR

College of Engineering & Technology, Natham, Dindigul, has successfully completed Eight days In-

Plant training from **18/01/2023 to 25/01/2023** in our company. During the period the training

period he was has been extremely inquisitive and hard working. He summed to be writing to learn the

functions/process with kwon interest.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E. M.Tech., Ph.D.,
Principal
NPR College of Engineering & Technology
Natham, Dindigul (DT) - 624 401.

JM Frictech India Pvt. Ltd,
G-27, SIPCOT Industrial Park,
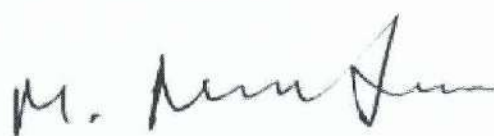**Irrungattukottai,**
Chennai-602 105.

Date: **30/01/2023**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Nazeer Khan B** studying II year BE Mechanical Engineering in NPR

College of Engineering & Technology, Natham, Dindigul, has successfully completed Eight days In-

Plant training from **18/01/2023 to 25/01/2023** in our company. During the period the training

period he was has been extremely inquisitive and hard working. He summed to be writing to learn the

functions/process with kwon interest.

We wish him every success in life.

Mr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR College of Engineering & Technology
Natham, Dindigul (DT) - 624 401.

JM Frictech India Pvt. Ltd,
G-27, SIPCOT Industrial Park,
Irrungattukottai,
Chennai-602 105.

Date: **30/01/2023**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Venkat Arjun A** studying II year BE Mechanical Engineering in NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed Eight days In-Plant training from **18/01/2023 to 25/01/2023** in our company. During the period the training period he was has been extremely inquisitive and hard working. He summed to be writing to learn the functions/process with kwon interest.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.PR. College of Engineering & Technology
Natham, Dindigul Dt - 624 401.

JM Frictech India Pvt. Ltd,
G-27, SIPCOT Industrial Park,
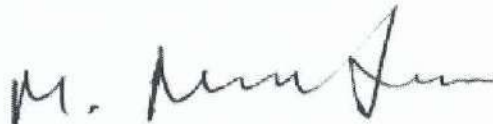Irrungattukottai,
Chennai-602 105.

Date: **30/01/2023**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Kavin Arasu P** studying II year BE Mechanical Engineering in NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed Eight days In-Plant training from **18/01/2023 to 25/01/2023** in our company. During the period the training period he was has been extremely inquisitive and hard working. He summed to be writing to learn the functions/process with kwon interest.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul PIN - 624 401.

JM Frictech India Pvt. Ltd,
G-27, SIPCOT Industrial Park,
Irrungattukottai,
Chennai-602 105.

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(An ISO 9001:2008 Certified Company)

CIN: U28131TZ2009PTC015549

Date:01.08.2023

TO WHOM IT MAY CONCERTN

This is to certify that **Mr.Manokaran K** studying in second year Mechanical Engineering of NPR College of Engineering & Technology, Natham has undergone In-Plant training in our organization from **24.07.2023 to 28.07.2023.**

During the period, his conduct was found to be good.

With regards,

(For Thermo Solutions (INDIA) Pvt. Ltd)

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul(Dt) - 624 401.

NATHAM

THERMO SOLUTIONS (INDIA) PRIVATE LIMITED

Corp. Office : #10/76, 2nd Cross St, Kumaran Nagar, Virugambakkam, Chennai - 600 092. Telefax : +91 44 2479 2151
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tsi@thermosolutions.net / www.thermosolutions.net

CIN: U28131TZ2009PTC015549

Date:01.08.2023

TO WHOM IT MAY CONCERN

This is to certify that **Mr.Poovarasan S** studying in second year Mechanical Engineering of NPR College of Engineering & Technology, Natham has undergone In-Plant training in our organization from **24.07.2023 to 28.07.2023.**

During the period, his conduct was found to be good.

With regards,

(For Thermo Solutions (INDIA) Pvt. Ltd)

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NP.R. College of Engineering & Technology
Natham, Dindigul(Dt) - 624 401.

CIN: U28131TZ2009PTC015549

Date:01.08.2023

TO WHOM IT MAY CONCERN

This is to certify that **Mr.Vidhya Shankar P** studying in second year Mechanical Engineering of NPR College of Engineering & Technology, Natham has undergone In-Plant training in our organization from **24.07.2023 to 28.07.2023.**

During the period, his conduct was found to be good.

With regards,

(For Thermo Solutions (INDIA) Pvt. Ltd)

Dr. J.SUNDARARAJAN,
B.E., M.Tech, Ph.D.,
Princioal
NPR. College of Engineering & Technology
Natham, Dindigul(Dt) - 624 401.

THERMO SOLUTIONS (INDIA) PRIVATE LIMITED

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tsi@thermosolutions.net / www.thermosolutions.net

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(An ISO 9001:2008 Certified Company)

CIN: U28131TZ2009PTC015549

Date:01.08.2023

TO WHOM IT MAY CONCERN

This is to certify that **Mr.Santhosh Kumar K** studying in second year Mechanical Engineering of NPR College of Engineering & Technology, Natham has undergone In-Plant training in our organization from **24.07.2023 to 28.07.2023.**

During the period, his conduct was found to be good.

With regards,

(For Thermo Solutions (INDIA) Pvt. Ltd)

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul - 624 401.

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tsi@thermosolutions.net / www.thermosolutions.net

Web : oshobodybuilders.in
E.mail : osho.osho5@gmail.com
Ph : 0452 - 6562250

Cell : 98425 - 32220
98430 - 83074

Osho
Body builders

ARAI ACCREDIATED &
ISO CERTIFIED COMPANY

TIN No. 33915023027

Plot No.32, (S.V.D.Nagar)
Rajappa Nagar,
Kovil Pappakudi (P.o)
MADURAI - 625 018

Date: 01.08.2023

TO WHOM IT MAY CONCERN

This to certify that **Mr.Charanjith.P** a student of BE (Mechanical Engineering – Second Year) NPR College of Engineering and Technology, Natham, Dindigul, India has successfully completed Internship (**30.06.2023 to 28.07.2023**) at Osho Body builders, Madurai. During the period of his Internship with us, he was found punctual, Hardworking and inquisitive.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

For Osho Body Builders
R. Anmeleeshmi
Partner

ELEGANCE IN SHAPE AND EXCELLENCE IN QUALITY IS OUR WATCH WORD

Date: 01.08.2023

TO WHOM IT MAY CONCERN

This to certify that **Mr.Jeeva Kumar.S** a student of BE (Mechanical Engineering – Second Year) NPR College of Engineering and Technology, Natham, Dindigul, India has successfully completed Internship **(30.06.2023 to 28.07.2023)** at Osho Body builders, Madurai. During the period of his Internship with us, he was found punctual, Hardworking and inquisitive.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

For Osho Body Builders
R. Annalekshmi
Partner

ELEGANCE IN SHAPE AND EXCELLENCE IN QUALITY IS OUR WATCH WORD

Ayyanar Thunai

Date: 01.08.2023

TO WHOM IT MAY CONCERN

This to certify that **Mr.Sukumar.K** a student of BE (Mechanical Engineering – Second Year) NPR College of Engineering and Technology, Natham, Dindigul, India has successfully completed Internship (**30.06.2023 to 28.07.2023**) at Osho Body builders, Madurai. During the period of his Internship with us, he was found punctual, Hardworking and inquisitive.

We wish him every success in life.

Mr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR. College of Engineering & Tech... ...ge
Natham, Dindigul Dist - 82... ...

For Osho Body Builders

R. Annalakshmi
Partner

ELEGANCE IN SHAPE AND EXCELLENCE IN QUALITY IS OUR WATCH WORD

Web : oshobodybuilders.in
E.mail : osho.osho5@gmail.com
Ph : 0452 - 6562250

Cell : 98425 - 32220
98430 - 83074

Osho
Body builders

ARAI ACCREDIATED &
ISO CERTIFIED COMPANY

TIN No. 33915023027

Plot No 32, (S V.D.Nagar)
Rajappa Nagar,
Kovil Pappakudi (P.o)
MADURAI - 625 018

Date: 01.08.2023

TO WHOM IT MAY CONCERN

This to certify that **Mr.Kannan.S** a student of BE (Mechanical Engineering – Second Year)
NPR College of Engineering and Technology, Natham, Dindigul, India has successfully
completed Internship **(30.06.2023 to 28.07.2023)** at Osho Body builders, Madurai. During the
period of his Internship with us, he was found punctual, Hardworking and inquisitive.

We wish him every success in life.

Dr. J.SUNDARARAJAN.
B.E., M.Tech, Ph.D.,
Principal
NPR College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

For Osho Body Builders
R. Annalakshmi
Partner

NATHAM

ELEGANCE IN SHAPE AND EXCELLENCE IN QUALITY IS OUR WATCH WORD

Ayyanar Thunai

Date: 01.08.2023

TO WHOM IT MAY CONCERN

This to certify that **Mr.Kesavabommaiah.T** a student of BE (Mechanical Engineering – Second Year) NPR College of Engineering and Technology, Natham, Dindigul, India has successfully completed Internship (**30.06.2023 to 28.07.2023**) at Osho Body builders, Madurai. During the period of his Internship with us, he was found punctual, Hardworking and inquisitive.

We wish him every success in life.

Dr. J.SUNDARARAJAN,
B.E., M.Tech, Ph.D.,
Principal
NPR College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

For Osho Body Builders

Partner

ELEGANCE IN SHAPE AND EXCELLENCE IN QUALITY IS OUR WATCH WORD

Curriculum of Compliances

NPR
College of Engineering & Technology
Approved by AICTE, Affiliated to Anna University,
Accredited by NAAC WITH 'A' GRADE | Recognized by UGC under 2 (f)
Natham, Dindigul - 624 401. Web: www.nprcet.org

DEPARTMENT OF MECHANICAL ENGINEERING
COMPLIANCE OF CURRICULUM

S.No.	Course Component	Course Title	No. of Credits	Total no. of Credits	Number of Contact Periods	Total Number of Contact Periods	%
1	Humanities and Social Science (HS)	Professional English - I	3		45		
2		Heritage of Tamil	1		15		
3		Professional English - II	2	10	30	150	04.31
4		Tamils and Technology	1		15		
5		Principles of Management	3		45		
6	Basic Science (BS)	Matrices and Calculus	4		60		
7		Engineering Physics	3		45		
8		Engineering Chemistry	3		45		
9		Physics and Chemistry Laboratory	2		60		
10		Statistics and Numerical Methods	4	25	60	405	11.63
11		Transforms and Partial Differential Equations	4		60		
12		Environmental Sciences and Sustainability	2		30		
13		Materials Science	3		45		
14	Engineering Science (ES)	Problem Solving and Python Programming	3		45		
15		Problem Solving and Python Programming Laboratory	2		60		
16		Engineering Graphics	4		90		

17	**Engineering Science (ES)**	Engineering Practices Laboratory	2	28	60	525	15.08
18		Engineering Mechanics	3		45		
19		Basic Electrical and Electronics Engineering	3		45		
20		Basic Electrical, Electronics and Engineering Laboratory	2		60		
21		Fluid Mechanics and Machinery	4		60		
22		Computer Aided Machine Drawing	2		60		
23	**Professional Core (PC)**	Engineering Thermodynamics	3		45		
24		Engineering Materials and Metallurgy	3		45		
25		Manufacturing Processes	3		45		
26		Manufacturing Technology Laboratory	2		60		
27		Thermal Engineering	4		60		
28		Hydraulics and Pneumatics	3		45		
29		Manufacturing Technology	3		45		
30		Strength of Materials	3		45		
31		Theory of Machines	3		45		
32		Strength of Materials and Fluid Machinery Laboratory	2		60		
33		Thermal Engineering Laboratory	2		60		
34		Thermal Engineering-II	3		45		
35		Design of Machine Elements	3		45		
36		Metrology and Measurements	3		45		
37		Dynamics of Machines	4		60		

38	Professional Core (PC)	Kinematics and Dynamics Laboratory	2		60	
39		Thermal Engineering Laboratory	2		60	
40		Metrology and Measurements Laboratory	2		60	
41		Design of Transmission Systems	3		45	
42		Computer Aided Design and Manufacturing	3		45	
43		Heat and Mass Transfer	4		75	
44		Finite Element Analysis	3	81	45	1500	43.10
45		Hydraulics and Pneumatics	3		45	
46		CAD/CAM Laboratory	2		60	
47		Process Planning and Cost Estimation	3		45	
48		Mechatronics	3		45	
49		Power Plant Engineering	3		45	
50		Simulation and Analysis Laboratory	2		60	
51		Mechatronics Laboratory	2		60	
52	Employability Enhancement Course (EEC)	English Laboratory	1		30	
53		Communication Laboratory / Foreign Language	2		60	
54		Professional Development	1	18	30	540	15.51
55		Professional Communication	1		30	
56		Design and Fabrication Project	2		60	
57		Technical Seminar	1		30	
58		Project Work	10		300	
59	Professional Elective (PE)	Block Chain Development	3		45	
60		Digital Marketing	3		45	
61		Robotic Process Automation Development	3		45	

62		Powering IOT using ARDUINO	3		45		
63		Industry 4.0	3		45		
64		Product Design Engineering and Modeling	3		45		
65		Robotics Simulation for Manufacturing	3		45		
66		Electrical System for E-Mobility	3		45		
67	**Professional Elective (PE)**	Welding Technology	3	42	45	630	18.10
68		Smart and Advanced Manufacturing Design and Simulation	3		45		
69		Electric Vehicle Design	3		45		
70		Unconventional Machining Processes	3		45		
71		Non Destructive Testing and Evaluation	3		45		
72		Production Planning and Control	3		45		
73	**Open Elective (OE)**	Automotive System	3	06	45	90	2.58
74		Robotics	3		45		
			116	116	3480	3480	

NPR
College of Engineering & Technology
Approved by AICTE, Affiliated to Anna University,
Accredited by NAAC WITH 'A' GRADE | Recognized by UGC under 2 (f)
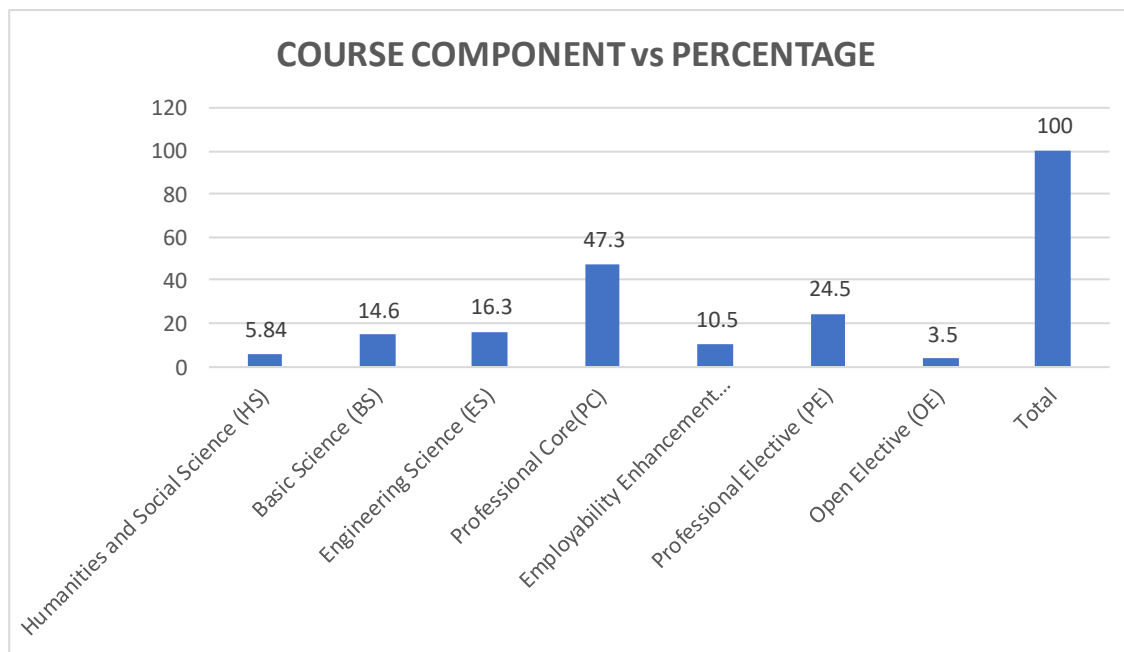Natham, Dindigul - 624 401. Web: www.nprcet.org

Department of Mechanical Engineering

Contribution of Curriculum Components

Course Components	Credits Total	Curriculum Content
Humanities and Social Science (HS)	10	5.84%
Basic Science (BS)	25	14.6%
Engineering Science (ES)	28	16.3%
Professional Core(PC)	81	47.3%
Employability Enhancement Course (EEC)	18	10.5%
Professional Elective (PE)	42	24.5%
Open Elective (OE)	06	3.5%
Total	171	100%

COURSE COMPONENT vs PERCENTAGE

Humanities and Social Science (HS): 5.84
Basic Science (BS): 14.6
Engineering Science (ES): 16.3
Professional Core(PC): 47.3
Employability Enhancement...: 10.5
Professional Elective (PE): 24.5
Open Elective (OE): 3.5
Total: 100

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.