The following are the syllabus copy as per Anna University curriculum and experiential learning document

1.3.2

COURSES THAT INCLUDE EXPEIENTIAL LEARNING THROUGH PROJECT WORK/FIELD WORK/INTERNSHIP DURING 2021-2022

1.3.2 AVERAGE PERCENTAGE OF COURSES THAT INCLUDE EXPERIENTIAL LEARNING THROUGH PROJECT WORK/FIELD WORK/INTERSHIP DURING 2021 – 2022

S.No	Programme Offering	Name of the Course	Course Code	Project/Field Work/ Internship	Page Number
1	B.E – Mechanical Engineering	Material Science	PH3251	Industrial Visit	6
2	B.E – Mechanical Engineering	Basic Electrical, Electronics and Instrumentation Engineering	BE3251	Industrial Visit	13
3	B.E – Mechanical Engineering	Engineering Mechanics	GE8292	Industrial Visit	21
4	B.E – Mechanical Engineering	Engineering Thermodynamics	ME8391	Project	30
5	B.E – Mechanical Engineering	Fluid Mechanics and Machinery	CE8394	Project	35
6	B.E – Mechanical Engineering	Manufacturing Technology – 1	ME8351	Inplant Training	42
7	B.E – Mechanical Engineering	Electrical Drives and Controls	EE8353	Inplant Training	45
8	B.E – Mechanical Engineering	Kinematics of Machinery	ME8492	Inplant Training	47
9	B.E – Mechanical Engineering	Manufacturing Technology – II	ME8451	Project	50
10	B.E – Mechanical Engineering	Engineering Metallurgy	ME8491	Project	56
11	B.E – Mechanical Engineering	Strength Of Materials for Mechanical Engineers	CE8395	Inplant Training	62
12	B.E – Mechanical Engineering	Thermal Engineering – I	ME8493	Internship	64
13	B.E – Mechanical Engineering	Thermal Engineering – II	ME8595	Internship	67
14	B.E – Mechanical Engineering	Design of Machine Elements	ME8593	Internship	70
15	B.E – Mechanical Engineering	Metrology and Measurements	ME8501	Project	73

NPR COLLEGE OF ENGG. & TECHNOLOGY NATHAM

S.No	Programme Offering	Name of the Course	Course Code	Project/Field Work/ Internship	Page Number
16	B.E – Mechanical Engineering	Dynamics of Machines	ME8594	Project	79
17	B.E – Mechanical Engineering	Automotive Systems	OAT551	Internship	85
18	B.E – Mechanical Engineering	Design of Transmission Systems	ME8651	Internship	88
19	B.E – Mechanical Engineering	Computer Aided Design and Manufacturing	ME8691	Project	91
20	B.E – Mechanical Engineering	Heat and Mass Transfer	ME8693	Inplant Training	97
21	B.E – Mechanical Engineering	Finite Element Analysis	ME8692	Project	100
22	B.E – Mechanical Engineering	Hydraulics and Pneumatics	ME8694	Inplant Training	106
23	B.E – Mechanical Engineering	Welding Technology	PR8592	Inplant Training	108
24	B.E – Mechanical Engineering	Power Plant Engineering	ME8792	Inplant Training	110
25	B.E – Mechanical Engineering	Process Planning and Cost Estimation	ME8793	Inplant Training	113
26	B.E – Mechanical Engineering	Mechatronics	ME8791	Internship	115
27	B.E – Mechanical Engineering	Robotics	OIE751	Internship	118
28	B.E – Mechanical Engineering	Unconventional Machining Processes	ME8073	Internship	121
29	B.E – Mechanical Engineering	Non-Destructive Testing and Evaluation	ME8097	Internship	123
30	B.E – Mechanical Engineering	Principles of Management	MG8591	Internship	126
31	B.E – Mechanical Engineering	Production Planning and Control	IE8693	Internship	128
32	B.E – Mechanical Engineering	Project Work	ME8811	Inplant Training	131

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

		L	T	P	C
PH3251	**MATERIALS SCIENCE** (Common to courses offered in Faculty of Mechanical Engineering Except B.E. Materials Science and Engineering)	3	0	0	3

OBJECTIVES:

- To introduce the essential principles of materials science for mechanical and related engineering applications.

UNIT I PHASE DIAGRAMS 9

Solid solutions - Hume Rothery's rules – the phase rule - single component system - one-component system of iron - binary phase diagrams - isomorphous systems - the tie-line rule - the lever rule - application to isomorphous system - eutectic phase diagram - peritectic phase diagram - other invariant reactions – free energy composition curves for binary systems - microstructural change during cooling.

UNIT II FERROUS ALLOYS 9

The iron-carbon equilibrium diagram - phases, invariant reactions - microstructure of slowly cooled steels - eutectoid steel, hypo and hypereutectoid steels - effect of alloying elements on the Fe-C system - diffusion in solids - Fick's laws - phase transformations - T-T-T-diagram for eutectoid steel – pearlitic, baintic and martensitic transformations - tempering of martensite – steels – stainless steels – cast irons.

UNIT III MECHANICAL PROPERTIES 9

Tensile test - plastic deformation mechanisms - slip and twinning - role of dislocations in slip - strengthening methods - strain hardening - refinement of the grain size - solid solution strengthening - precipitation hardening - creep resistance - creep curves - mechanisms of creep - creep-resistant materials - fracture - the Griffith criterion - critical stress intensity factor and its determination - fatigue failure - fatigue tests - methods of increasing fatigue life - hardness - Rockwell and Brinell hardness - Knoop and Vickers microhardness.

UNIT IV MAGNETIC, DIELECTRIC AND SUPERCONDUCTING MATERIALS 9

Ferromagnetism – domain theory – types of energy – hysteresis – hard and soft magnetic materials – ferrites - dielectric materials – types of polarization – Langevin-Debye equation – frequency effects on polarization - dielectric breakdown – insulating materials – Ferroelectric materials - superconducting materials and their properties.

UNIT V NEW MATERIALS 9

Ceramics – types and applications – composites: classification, role of matrix and reinforcement, processing of fiber reinforced plastics – metallic glasses: types , glass forming ability of alloys, melt spinning process, applications - shape memory alloys: phases, shape memory effect, pseudoelastic effect, NiTi alloy, applications – nanomaterials: preparation (bottom up and top down approaches), properties and applications – carbon nanotubes: types.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course,

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

- the students will have knowledge on the various phase diagrams and their applications
- the students will acquire knowledge on Fe-Fe_3C phase diagram,various microstructures and alloys
- the students will get knowledge on mechanical properties of materials and their measurement
- the students will gain knowledge on magnetic, dielectric and superconducting properties of materials
- the students will understand the basics of ceramics, composites and nanomaterials.

TEXT BOOKS:

1. Balasubramaniam, R. "Callister's Materials Science and Engineering". Wiley India Pvt. Ltd., 2014.
2. Raghavan, V. "Physical Metallurgy: Principles and Practice". PHI Learning, 2015.
3. Raghavan, V. "Materials Science and Engineering : A First course". PHI Learning, 2015.

REFERENCES

1. Askeland, D. "Materials Science and Engineering". Brooks/Cole, 2010.
2. Smith, W.F., Hashemi, J. & Prakash, R. "Materials Science and Engineering". Tata McGraw Hill Education Pvt. Ltd., 2014.
3. Wahab, M.A. "Solid State Physics: Structure and Properties of Materials". Narosa Publishing House, 2009.

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Website : www.nprcolleges.org, www.nprcet.org, Email:nprcetprincipal@nprcolleges.org

PERMISSION LETTER

From

Dr. T. Priya,
Head of the Department,
Department of Science and Humanities,
NPR College of Engineering & Technology,
Natham,
Dindigul – 624 401.

To

The Administrative Office,
NPR Group of Institutions,
Natham,
Dindigul – 624 401.

Through Proper Channel

Sir,

Sub: Requesting permission for Industrial visit – Reg.

This is to bring to your kind notice that we are planning to organize one dayvisit to **VEI Technologies** for the 1st Year students.

So, I request you to grant permission for 80 students from I Year (60 Boys & 20 Girls)and 2 staff members (Mr. P. Madasamy, AP/ Maths and Mrs.S.Visithra, AP/ Maths) on 18.12.2021to visit **VEI Technologies, Chennai.**

Kindly do the needful.

Thanking you,

Yours faithfully,

(Dr.T.Priya)

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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REQUISITION LETTER

Gmail

Inbox

NPR S&H<hodmathematicsnprcet@gmail.com>

To: info@veitecnologies.com

Mon, DEC 13, 2021,
10.16 AM

Respected Sir,

Greetings...!

Our NPR College of engineering and technology is situated in Natham, Dindigul district in a lush green environment established with the objective of ensuring the personal and professional development of the students from rural backgrounds offering UG and PG courses.

It has been a regular practice in our Science and Humanities Department to arrange industrial visits for our students every semester to reputed engineering industries. Based on that, 40 I YEAR students and 2 staff members of our Science and Humanities department have planned to visit VEI **Technologies**. We assure you sir, our students will follow the safety rules and will not disturb your regular processes. We humbly request you to grant us permission for the same and to confirm the permission through letter or mail.

Thanks, and regards

Dr. T. Priya,

Professor & Head

Department of Science and Humanities,

NPRCET,

Natham.

Reply Forward

NATHAM

NPR College of Engineering & Technology
NPR Nagar, Natham, Dindigul - 624401, Tamil Nadu, India.
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CONFIRMATION LETTER FROM INDUSTRY

NPR S&H<hodmathematicsnprcet@gmail.com>

Mon, DEC 13, 2021, 10.16 AM

To: info@veitecnologies.com

Respected Sir,

Greetings...!

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Thanks, and regards

Dr. T. Priya,

Prof & HOD,

Department of Science and Humanities,

NPRCET,

Natham.

Reply Forward

Gmail

Inbox

info@veitechnologies.com

Wed, Dec 15,2021, 12.28 PM

To: hodmathematicsnprcet@gmail.com

Dear Madam,

We are happy to give permission for the industrial visit to your wards in VEI Technologies, Chennai. Kindly remind us one day in advance for the visit schedule also send the original letter copy with your handduring the visit.

Thanks and Regards,

Dr B Ezhilavan,

Managing Director,

VEI Technologies, Chennai.

COLLEGE OF ENGG & TECHNOLOGY NATHAM

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
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Natham, Dindigul (Dt) - 624 401.

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Industrial Visit to VEI Technologies, Chennai

DEPARTMENT OF SCIENCE AND HUMANITIES

STUDENTS LIST

PLACE OF INDUSTRIAL VISIT: VEI Technologies, Chennai **DATE: 18.12.2021**

S. NO	NAME OF THE STUDENT	DEPARTMENT	GENDER	SIGNATURE
1.	JEEVADHARANI P	EEE	FEMALE	
2.	LOGESH KUMAR B	EEE	MALE	
3.	LOGESHWARAN S	EEE	MALE	
4.	MOHAMED THOUFEEK	EEE	MALE	
5.	RAMYA M	EEE	FEMALE	
6.	SANTHOSH A	EEE	MALE	
7.	SANTHOSH KUMAR R	EEE	MALE	
8.	JEYAVARTYIHINI	EEE	FEMALE	
9.	KEERTHIKA P	EEE	FEMALE	
10.	LAARADOLLY S	EEE	FEMALE	
11.	KIRTHIKANANTH M	CSE	MALE	
12.	MOHAMMED ABDULA S	CSE	MALE	
13.	MUTHUARIVU K	CSE	MALE	
14.	PRAVEEN C	CSE	MALE	
15.	RAGHUL S P	CSE	MALE	
16.	AARIF H	CSE	MALE	
17.	AJAY KUMAR K	CSE	MALE	
18.	ANBARASAN P	CSE	MALE	
19.	ANBARASU S	CSE	MALE	
20.	ANBULINGAM E	CSE	MALE	
21.	APSARA JASMINE S	CSE	FEMALE	
22.	ARASUTHANGAPANDI M	CSE	MALE	
23.	ARUSHA BANU A	CSE	FEMALE	
24.	BABY SHALINI C	CSE	FEMALE	
25.	DHARANI T	CSE	FEMALE	
26.	SUSMITHA N	CSE	FEMALE	
27.	THESHAN BANU S	CSE	FEMALE	
28.	DHARANI R	ECE-A	FEMALE	
29.	DHARSHINI B	ECE-A	FEMALE	
30.	DIVYA DHARSINI G	ECE-A	FEMALE	
31.	DURGA S	ECE-A	FEMALE	
32.	GANESAN M	ECE-A	MALE	
33.	GOPINATH S	ECE-A	MALE	
34.	HARESHKUMAR K	ECE-A	MALE	
35.	HARIHARAN R	ECE-A	MALE	
36.	MOHAMED IMTHIYAS K	ECE-A	MALE	

NPR COLLEGE OF ENGG. & TECHNOLOGY * NATHAM

37.	MOHAMMED HISSAM R	ECE-A	MALE	
38.	MOKESH NANDHU P	ECE-A	MALE	
39.	MUKESH VARMA M	ECE-A	MALE	
40.	NACHAMMAI C	ECE-A	FEMALE	
41.	AAKASH R	ECE-A	MALE	
42.	ABDUL RAHMAN A	ECE-A	MALE	
43.	ABHISHEK S	ECE-A	MALE	
44.	ALAGU PANDI P	ECE-A	MALE	
45.	ASHOK KUMAR S	ECE-A	MALE	
46.	BALURATHINAM B T	ECE-A	MALE	
47.	BHUWANESHWARAN B	ECE-A	MALE	
48.	CHINRAMAN V	ECE-A	MALE	
49.	DHANANJEYAN M	ECE-A	MALE	
50.	HARISHBALAJI E	ECE-A	MALE	
51.	HEMANTH BALA M	ECE-A	MALE	
52.	IMRANA Y	ECE-A	MALE	
53.	JOSEPH SAMUEL M	ECE-A	MALE	
54.	KALEESHWARAN M	ECE-A	MALE	
55.	KARTHICK B	ECE-A	MALE	
56.	LAKSHMANADHASAN S	ECE-A	MALE	
57.	LAKSHMANAN K	ECE-A	MALE	
58.	MANIKANDAN G	ECE-A	MALE	
59.	MANIKANDAN N	ECE-A	MALE	
60.	MANOJ KUMAR S	ECE-A	MALE	
61.	MELVIN MECVAAN J	ECE-A	MALE	
62.	MOHAMED BARUK S	ECE-A	MALE	
63.	SARANYA	ECE-B	MALE	
64.	PRIYA DHARSHINI S	ECE-B	MALE	
65.	SANGILI PERUMAL M	ECE-B	MALE	
66.	SIVA BALAN S	ECE-B	MALE	
67.	SIVABALAJI M	ECE-B	MALE	
68.	SUBASH CHANDRA BOSE S	ECE-B	MALE	
69.	NEHA A	ECE-B	FEMALE	
70.	NITHISHKUMAR K	ECE-B	MALE	
71.	NITHYASRI R	ECE-B	FEMALE	
72.	PARTHA SARATHI K	ECE-B	MALE	
73.	NADHIYA M	ECE-B	FEMALE	
74.	TAMILARASI C	ECE-B	FEMALE	
75.	RAGUL M	ECE-B	MALE	
76.	RAMAPRABAKARAN R	ECE-B	MALE	
77.	RAMJI M	ECE-B	MALE	
78.	RAVIKUMAR S	ECE-B	MALE	
79.	SABARI PRASATH P	ECE-B	MALE	
80.	SAKTHI PRASANNA M	ECE-B	MALE	

HOD-I YEAR

PRINCIPAL
Dr. J.SUNDARARAJAN,
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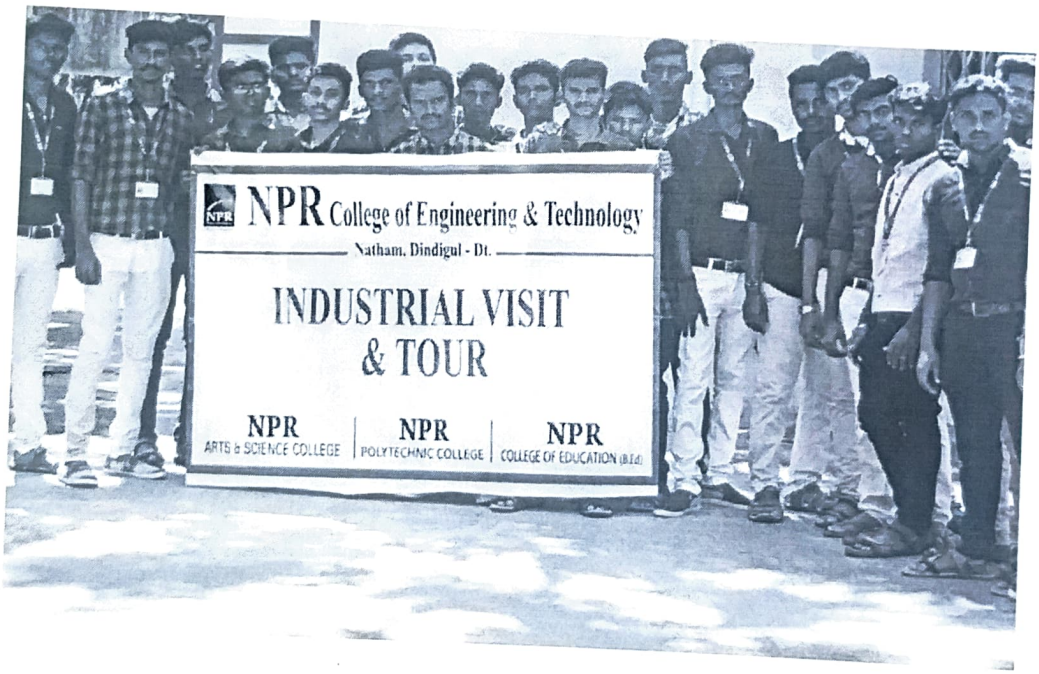
Industrial Visit to VEI Technologies, Chennai

PHOTO GALLERY



Students are standing in front of VEI Technologies

Dr. J.SUNDARARAJAN,
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Industrial Visit to VEI Technologies, Chennai

SUMMARY REPORT

The purpose of the visit was to provide the students with an opportunity to gain practical knowledge about the functioning of an industry and its various departments. The visit was attended by a I year Students from NPR CET and took place on December.18th.2021. We were picked up from NPR CET at9:30 pm and travelled by bus to Chennai. We reached Chennai at 6:00 am and returned to NPR CET at 5:00 am the next day.

VEI Technologies, is R&D company with proficient web development and software solution company based in Chennai. They offer an extensive range of services to reach our targeted spectators and carve upour valuable information focusing on retaining their customers.

From 9:00 am to 12:00 pm, the students visited VEI Technologies and were given a guided tour of thefacility. They were able to see the various departments in action and understand the working of the industry.

We met the Director of the company, Mr. Babu Ezhilavan, Poonamallee, Chennai, where the company staff explained about some of their services, Web application development, Website designing, corporate profiles and presentations, E-commerce solutions, Application development, maintenance, and re- engineering, Mail gateways, Web hosting solutions, Search Engine Optimization, and Flash development.

They interacted with students very well and gave us an insight about the value added coursesthey provide on IOT, Java and Python. Students are also asked some questions regarding the courses to them and cleared their doubts.

From 12:00 pm to 1:00 pm, the students had their lunch at a nearby restaurant. From 1:00 pm to 3:00 pm,the students visited the planetarium, followed by a visit to the zoo from 3:00 pm to 5:00 pm, and then a visit to the beach from 5:00 pm to 6:30 pm. The students started to return at 8:00 pm and reached NPRCET at 5:00 am the next day.

Overall, the industrial visit to VEI Technologies in Chennai was a valuable experience for the students to understand the practical aspects of an industry and its functioning. The visit was well-organized and provided a good balance between the industrial visit and leisure activities.

1. S. Visitha
2. P. Madasamy

Faculty Co-ordinators

1. S. Visitha, AP/Maths
2. P. Madasamy, AP/Maths

HOD-I Year

IQAC

Coordinator - IQAC
NPR College of Engineering & Technology
Natham, Dindigul (Dt)-624 401

Principal

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology

BE3251 **BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING**

L	T	P	C
3	0	0	3

OBJECTIVES:

To impart knowledge on

- Electric circuit laws, single and three phase circuits and wiring
- Working principles of Electrical Machines
- Working principle of Various electronic devices and measuring instruments

UNIT I ELECTRICAL CIRCUITS 9

Basic circuit components – Ohms Law - Kirchoff's Law – Instantaneous Power – Inductors - Capacitors – Independent and Dependent Sources - steady state solution of DC circuits - Nodal analysis, Mesh analysis- Thevinin's Theorem, Norton's Theorem, Maximum Power transfer theorem- Linearity and Superposition Theorem.

UNIT II AC CIRCUITS 9

Introduction to AC circuits – waveforms and RMS value – power and power factor, single phase and three-phase balanced circuits – Three phase loads - housing wiring, industrial wiring, materials of wiring

UNIT III ELECTRICAL MACHINES 9

Principles of operation and characteristics of ; DC machines, Transformers (single and three phase) ,Synchronous machines , three phase and single phase induction motors.

UNIT IV ELECTRONIC DEVICES & CIRCUITS 9

Types of Materials – Silicon & Germanium- N type and P type materials – PN Junction –Forward and Reverse Bias –Semiconductor Diodes –Bipolar Junction Transistor – Characteristics – Field Effect Transistors – Transistor Biasing –Introduction to operational Amplifier –Inverting Amplifier –Non Inverting Amplifier –DAC – ADC .

UNIT V MEASUREMENTS & INSTRUMENTATION 9

Introduction to transducers - Classification of Transducers: Resistive, Inductive, Capacitive, Thermoelectric, piezoelectric, photoelectric, Hall effect and Mechanical - ,Classification of instruments - Types of indicating Instruments - multimeters –Oscilloscopes- – three-phase power measurements – instrument transformers (CT and PT)

TOTAL : 45 PERIODS

OUTCOMES:

Ability to

- Understand electric circuits and working principles of electrical machines
- Understand the concepts of various electronic devices
- Choose appropriate instruments for electrical measurement for a specific application

TEXT BOOKS

1. Leonard S Bobrow, "Foundations of Electrical Engineering", Oxford University Press, 2013
2. D P Kothari and I.J Nagarath, "Electrical Machines "Basic Electrical and Electronics Engineering", McGraw Hill Education(India) Private Limited, Third Reprint ,2016
3. Thereja .B.L., "Fundamentals of Electrical Engineering and Electronics", S. Chand & Co. Ltd., 2008

REFERENCES

1. Del Toro, "Electrical Engineering Fundamentals", Pearson Education, New Delhi, 2007
2. John Bird, "Electrical Circuit Theory and Technology", Elsevier, First Indian Edition, 2006
3. Allan S Moris, "Measurement and Instrumentation Principles", Elsevier, First Indian Edition, 2006

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PERMISSION LETTER

From

Dr. T. Priya,
Head of the Department,
Department of Science and Humanities,
NPR College of Engineering & Technology,
Natham,
Dindigul – 624 401.

To

The Administrative Office,
NPR Group of Institutions,
Natham,
Dindigul – 624 401.

Through Proper Channel

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Kindly do the needful.

Thanking you,

Yours faithfully,

(Dr.T.Priya)

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
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REQUISITION LETTER

Gmail

Inbox

NPR S&H<hodmathematicsnprcet@gmail.com>

To: info@veitecnologies.com

Mon, DEC 13, 2021,
10.16 AM

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Thanks, and regards

Dr. T. Priya,

Professor & Head

Department of Science and Humanities,

NPRCET,

Natham.

Reply Forward

NATHAM

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CONFIRMATION LETTER FROM INDUSTRY

NPR S&H<hodmathematicsnprcet@gmail.com>

Mon, DEC 13, 2021, 10.16 AM

To: info@veitecnologies.com

Respected Sir,

Greetings...!

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Thanks, and regards

Dr. T. Priya,

Prof & HOD,

Department of Science and Humanities,

NPRCET,

Natham.

Reply Forward

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Thanks and Regards,

Dr B Ezhilavan,

Managing Director,

VEI Technologies, Chennai.

COLLEGE OF ENGG & TECHNOLOGY NATHAM

Dr. J.SUNDARARAJAN,
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Industrial Visit to VEI Technologies, Chennai

DEPARTMENT OF SCIENCE AND HUMANITIES

STUDENTS LIST

PLACE OF INDUSTRIAL VISIT: VEI Technologies, Chennai **DATE: 18.12.2021**

S. NO	NAME OF THE STUDENT	DEPARTMENT	GENDER	SIGNATURE
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3.	LOGESHWARAN S	EEE	MALE	
4.	MOHAMED THOUFEEK	EEE	MALE	
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6.	SANTHOSH A	EEE	MALE	
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38.	MOKESH NANDHU P	ECE-A	MALE	
39.	MUKESH VARMA M	ECE-A	MALE	
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HOD-I YEAR

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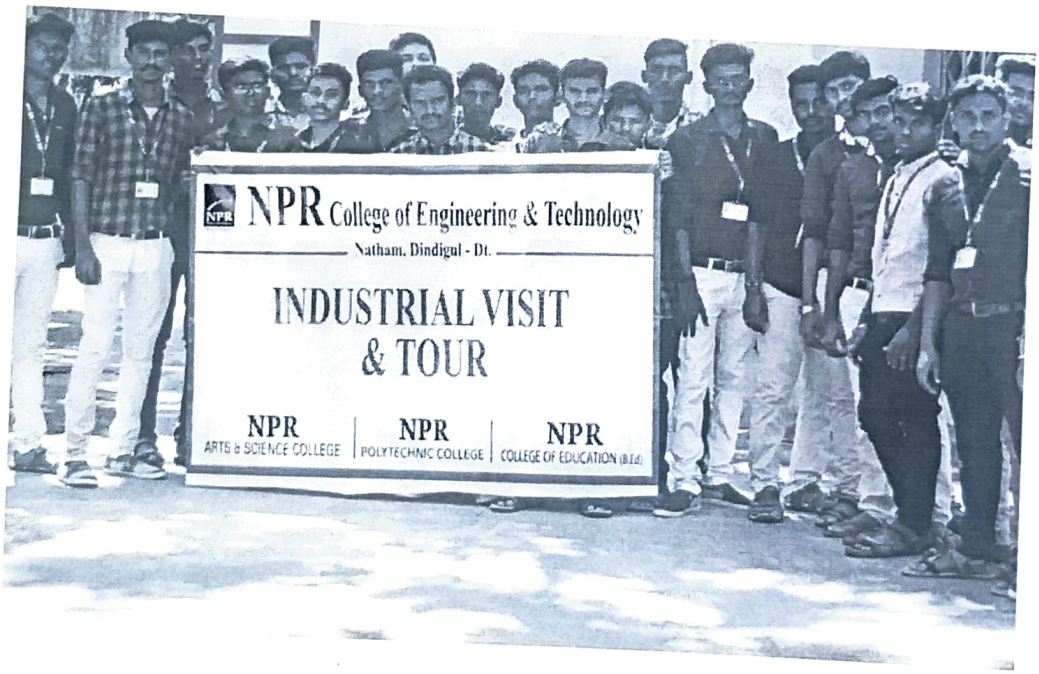
Industrial Visit to VEI Technologies, Chennai

PHOTO GALLERY



Students are standing in front of VEI Technologies

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Industrial Visit to VEI Technologies, Chennai

SUMMARY REPORT

The purpose of the visit was to provide the students with an opportunity to gain practical knowledge about the functioning of an industry and its various departments. The visit was attended by a I year Students from NPR CET and took place on December.18th.2021. We were picked up from NPR CET at9:30 pm and travelled by bus to Chennai. We reached Chennai at 6:00 am and returned to NPR CET at 5:00 am the next day.

VEI Technologies, is R&D company with proficient web development and software solution company based in Chennai. They offer an extensive range of services to reach our targeted spectators and carve upour valuable information focusing on retaining their customers.

From 9:00 am to 12:00 pm, the students visited VEI Technologies and were given a guided tour of thefacility. They were able to see the various departments in action and understand the working of the industry.

We met the Director of the company, Mr. Babu Ezhilavan, Poonamallee, Chennai, where the company staff explained about some of their services, Web application development, Website designing, corporate profiles and presentations, E-commerce solutions, Application development, maintenance, and re- engineering, Mail gateways, Web hosting solutions, Search Engine Optimization, and Flash development.

They interacted with students very well and gave us an insight about the value added coursesthey provide on IOT, Java and Python. Students are also asked some questions regarding the courses to them and cleared their doubts.

From 12:00 pm to 1:00 pm, the students had their lunch at a nearby restaurant. From 1:00 pm to 3:00 pm,the students visited the planetarium, followed by a visit to the zoo from 3:00 pm to 5:00 pm, and then a visit to the beach from 5:00 pm to 6:30 pm. The students started to return at 8:00 pm and reached NPRCET at 5:00 am the next day.

Overall, the industrial visit to VEI Technologies in Chennai was a valuable experience for the students to understand the practical aspects of an industry and its functioning. The visit was well-organized and provided a good balance between the industrial visit and leisure activities.

1. S. Visitha
2. P. Madasamy

Faculty Co-ordinators

1. S. Visitha, AP/Maths
2. P. Madasamy, AP/Maths

HOD-I Year

IQAC

Coordinator - IQAC
NPR College of Engineering & Technology
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Principal

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GE8292 **ENGINEERING MECHANICS** L T P C
3 2 0 4

OBJECTIVES:

- To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.

UNIT I STATICS OF PARTICLES 9+6

Introduction – Units and Dimensions – Laws of Mechanics – Lami's theorem, Parallelogram and triangular Law of forces – Vectorial representation of forces – Vector operations of forces -additions, subtraction, dot product, cross product – Coplanar Forces – rectangular components – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility

UNIT II EQUILIBRIUM OF RIGID BODIES 9+6

Free body diagram – Types of supports –Action and reaction forces – stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem – Single equivalent force -Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions

UNIT III PROPERTIES OF SURFACES AND SOLIDS 9+6

Centroids and centre of mass – Centroids of lines and areas - Rectangular, circular, triangular areas by integration – T section, I section, - Angle section, Hollow section by using standard formula – Theorems of Pappus - Area moments of inertia of plane areas – Rectangular, circular, triangular areas by integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Principal moments of inertia of plane areas – Principal axes of inertia-Mass moment of inertia –mass moment of inertia for prismatic, cylindrical and spherical solids from first principle – Relation to area moments of inertia.

UNIT IV DYNAMICS OF PARTICLES 9+6

Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion - Newton's laws of motion – Work Energy Equation– Impulse and Momentum – Impact of elastic bodies.

UNIT V FRICTION AND RIGID BODY DYNAMICS 9+6

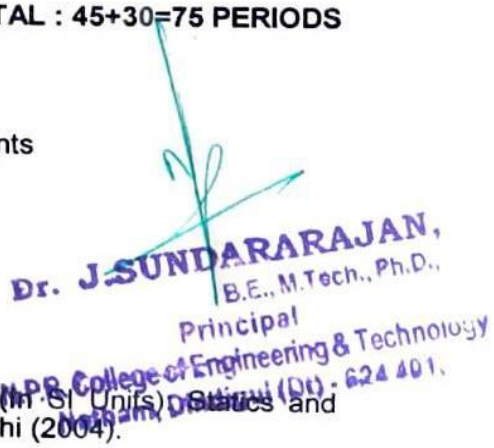
Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction – wedge friction-. Rolling resistance -Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion of simple rigid bodies such as cylinder, disc/wheel and sphere.

TOTAL : 45+30=75 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

- illustrate the vectorial and scalar representation of forces and moments
- analyse the rigid body in equilibrium
- evaluate the properties of surfaces and solids
- calculate dynamic forces exerted in rigid body
- determine the friction and the effects by the laws of friction



TEXT BOOKS:

1. Beer, F.P and Johnston Jr. E.R., "Vector Mechanics for Engineers (In SI Units) – Statics and Dynamics", 8th Edition, Tata McGraw-Hill Publishing company, New Delhi (2004).
2. Vela Murali, "Engineering Mechanics", Oxford University Press (2010)

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1. Bhavikatti, S.S and Rajashekarappa, K.G., "Engineering Mechanics", New Age International (P) Limited Publishers, 1998.
2. Hibbeller, R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 11th Edition, Pearson Education 2010.
3. Irving H. Shames and Krishna Mohana Rao. G., "Engineering Mechanics – Statics and Dynamics", 4th Edition, Pearson Education 2006.
4. Meriam J.L. and Kraige L.G., " Engineering Mechanics- Statics - Volume 1, Dynamics- Volume 2", Third Edition, John Wiley & Sons,1993.
5. Rajasekaran S and Sankarasubramanian G., "Engineering Mechanics Statics and Dynamics", 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005.

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PERMISSION LETTER

From

Dr. T. Priya,
Head of the Department,
Department of Science and Humanities,
NPR College of Engineering & Technology,
Natham,
Dindigul – 624 401.

To

The Administrative Office,
NPR Group of Institutions,
Natham,
Dindigul – 624 401.

Through Proper Channel

Sir,

Sub: Requesting permission for Industrial visit – Reg.

This is to bring to your kind notice that we are planning to organize one dayvisit to **VEI Technologies** for the 1st Year students.

So, I request you to grant permission for 80 students from I Year (60 Boys & 20 Girls)and 2 staff members (Mr. P. Madasamy, AP/ Maths and Mrs.S.Visithra, AP/ Maths) on 18.12.2021to visit **VEI Technologies, Chennai.**

Kindly do the needful.

Thanking you,

Yours faithfully,

(Dr.T.Priya)

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
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Thanks, and regards

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Professor & Head

Department of Science and Humanities,

NPRCET,

Natham.

Reply Forward

NATHAM

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Managing Director,

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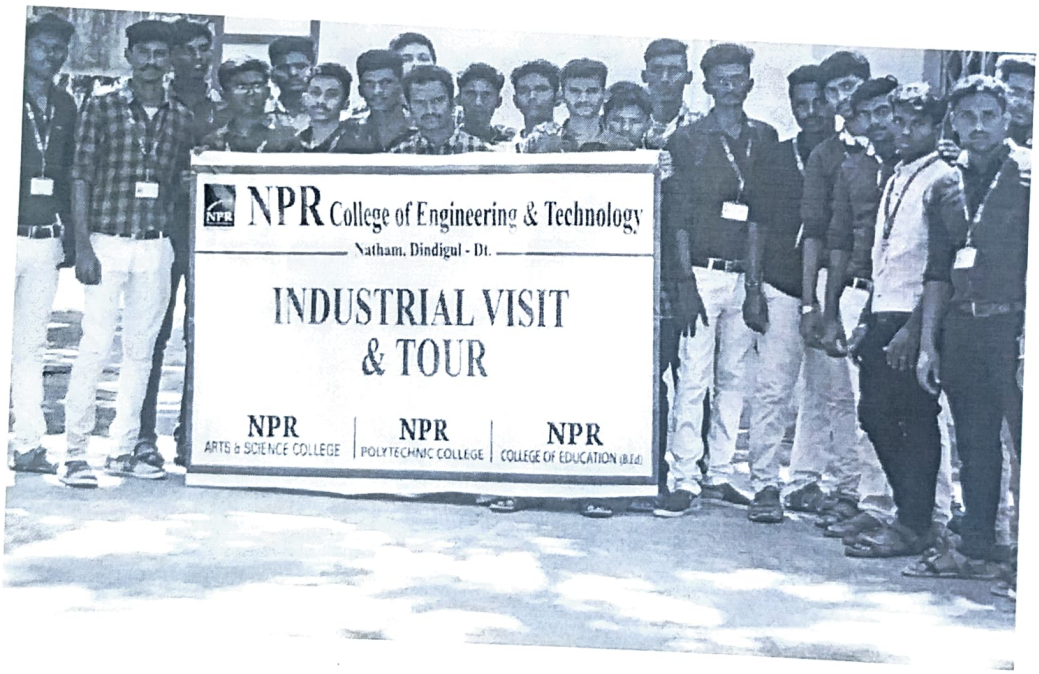
Industrial Visit to VEI Technologies, Chennai

PHOTO GALLERY



Students are standing in front of VEI Technologies

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Industrial Visit to VEI Technologies, Chennai

SUMMARY REPORT

The purpose of the visit was to provide the students with an opportunity to gain practical knowledge about the functioning of an industry and its various departments. The visit was attended by a I year Students from NPR CET and took place on December.18th.2021. We were picked up from NPR CET at9:30 pm and travelled by bus to Chennai. We reached Chennai at 6:00 am and returned to NPR CET at 5:00 am the next day.

VEI Technologies, is R&D company with proficient web development and software solution company based in Chennai. They offer an extensive range of services to reach our targeted spectators and carve upour valuable information focusing on retaining their customers.

From 9:00 am to 12:00 pm, the students visited VEI Technologies and were given a guided tour of thefacility. They were able to see the various departments in action and understand the working of the industry.

We met the Director of the company, Mr. Babu Ezhilavan, Poonamallee, Chennai, where the company staff explained about some of their services, Web application development, Website designing, corporate profiles and presentations, E-commerce solutions, Application development, maintenance, and re- engineering, Mail gateways, Web hosting solutions, Search Engine Optimization, and Flash development.

They interacted with students very well and gave us an insight about the value added coursesthey provide on IOT, Java and Python. Students are also asked some questions regarding the courses to them and cleared their doubts.

From 12:00 pm to 1:00 pm, the students had their lunch at a nearby restaurant. From 1:00 pm to 3:00 pm,the students visited the planetarium, followed by a visit to the zoo from 3:00 pm to 5:00 pm, and then a visit to the beach from 5:00 pm to 6:30 pm. The students started to return at 8:00 pm and reached NPRCET at 5:00 am the next day.

Overall, the industrial visit to VEI Technologies in Chennai was a valuable experience for the students to understand the practical aspects of an industry and its functioning. The visit was well-organized and provided a good balance between the industrial visit and leisure activities.

1. S. Visitha
2. P. Madasamy

Faculty Co-ordinators

1. S. Visitha, AP/Maths
2. P. Madasamy, AP/Maths

HOD-I Year

IQAC

Coordinator - IQAC
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Principal

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ME8391 **ENGINEERING THERMODYNAMICS**

L	T	P	C
3	2	0	4

OBJECTIVE:

- To familiarize the students to understand the fundamentals of thermodynamics and to perform thermal analysis on their behavior and performance.

  (Use of Standard and approved Steam Table, Mollier Chart, Compressibility Chart and Psychrometric Chart permitted)**UNIT I BASIC CONCEPTS AND FIRST LAW 9+6**

Basic concepts - concept of continuum, comparison of microscopic and macroscopic approach. Path and point functions. Intensive and extensive, total and specific quantities. System and their types. Thermodynamic Equilibrium State, path and process. Quasi-static, reversible and irreversible processes. Heat and work transfer, definition and comparison, sign convention. Displacement work and other modes of work .P-V diagram. Zeroth law of thermodynamics – concept of temperature and thermal equilibrium– relationship between temperature scales –new temperature scales. First law of thermodynamics –application to closed and open systems – steady and unsteady flow processes.

UNIT II SECOND LAW AND AVAILABILITY ANALYSIS 9+6

Heat Reservoir, source and sink. Heat Engine, Refrigerator, Heat pump. Statements of second law and its corollaries. Carnot cycle Reversed Carnot cycle, Performance. Clausius inequality. Concept of entropy, T-s diagram, Tds Equations, entropy change for - pure substance, ideal gases - different processes, principle of increase in entropy. Applications of II Law. High and low grade energy. Available and non-available energy of a source and finite body. Energy and irreversibility. Expressions for the energy of a closed system and open systems. Energy balance and entropy generation. Irreversibility. I and II law Efficiency.

UNIT III PROPERTIES OF PURE SUBSTANCE AND STEAM POWER CYCLE 9+6

Formation of steam and its thermodynamic properties, p-v, p-T, T-v, T-s, h-s diagrams. p-v-T surface. Use of Steam Table and Mollier Chart. Determination of dryness fraction. Application of I and II law for pure substances. Ideal and actual Rankine cycles, Cycle Improvement Methods - Reheat and Regenerative cycles, Economiser, preheater, Binary and Combined cycles.

UNIT IV IDEAL AND REAL GASES, THERMODYNAMIC RELATIONS 9+6

Properties of Ideal gas- Ideal and real gas comparison- Equations of state for ideal and real gases- Reduced properties. Compressibility factor-.Principle of Corresponding states. -Generalised Compressibility Chart and its use-. Maxwell relations, Tds Equations, Difference and ratio of heat capacities, Energy equation, Joule-Thomson Coefficient, Clausius Clapeyron equation, Phase Change Processes. Simple Calculations.

UNIT V GAS MIXTURES AND PSYCHROMETRY 9+6

Mole and Mass fraction, Dalton's and Amagat's Law. Properties of gas mixture – Molar mass, gas constant, density, change in internal energy, enthalpy, entropy and Gibbs function. Psychrometric properties, Psychrometric charts. Property calculations of air vapour mixtures by using chart and expressions. Psychrometric process – adiabatic saturation, sensible heating and cooling, humidification, dehumidification, evaporative cooling and adiabatic mixing. Simple Applications

TOTAL : 75 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

- CO1 Apply the first law of thermodynamics for simple open and closed systems under steady and unsteady conditions.
- CO2 Apply second law of thermodynamics to open and closed systems and calculate entropy and availability.
- CO3 Apply Rankine cycle to steam power plant and compare few cycle improvement methods

CO4 Derive simple thermodynamic relations of ideal and real gases
CO5 Calculate the properties of gas mixtures and moist air and its use in psychometric processes

TEXT BOOKS :

1. R.K.Rajput, "A Text Book Of Engineering Thermodynamics ",Fifth Edition,2017.
2. Yunus a. Cengel & michael a. Boles, "Thermodynamics", 8th edition 2015.

REFERENCES:

1. Arora C.P, "Thermodynamics", Tata McGraw-Hill, New Delhi, 2003.
2. Borgnakke & Sonnatag, "Fundamental of Thermodynamics", 8th Edition , 2016.
3. Chattopadhyay, P, "Engineering Thermodynamics", Oxford University Press, 2016.
4. Michael J. Moran, Howard N. Shapiro, "Fundamentals of Engineering Thermodynamics", 8th Edition.
5. Nag.P.K., "Engineering Thermodynamics", 5th Edition, Tata McGraw-Hill, New Delhi, 2013.

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Mitsubishi Corporation, Japan

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Passion for Perfection

03/05/2022

TO WHOMSOEVER IT MAY CONCERN

It is certified that **Mr.M.S.BALAMURUGAN**(Roll No: **920818114005**) Final Year student of B.E. Mechanical Engineering, NPR College of Engineering and Technology, Madurai has done Project work titled "**A Study on AUTOMATIC DIPPING MACHINE**" at our company from **05th April 2022 to 30th April 2022.**

He has attended project work regularly during the above said period in our organization.

For HI-TECH ARAI PRIVATE LIMITED

HI-TECH ARAI PRIVATE LIMITED ★ MADURAI ★

(Dr.K.DURAIRAJ)
DGM – HRD / ADMN

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bsi. IATF 16949 Automotive Quality Management | ISO 14001 Environmental Management | ISO 50001 Energy Management
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NPR COLLEGE OF ENGG. & TECHNOLOGY ★ NATHAM

TO WHOMSOEVER IT MAY CONCERN

It is certified that **Mr.J.HARISH** (Roll No: **920818114008**) Final Year student of B.E. Mechanical Engineering, NPR College of Engineering and Technology, Madurai has done Project work titled **"A Study on AUTOMATIC DIPPING MACHINE"** at our company from **05th April 2022 to 30th April 2022.**

He has attended project work regularly during the above said period in our organization.

For HI-TECH ARAI PRIVATE LIMITED

(Dr.K.DURAIRAJ)

DGM – HRD / ADMN

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03/05/2022

TO WHOMSOEVER IT MAY CONCERN

It is certified that **Mr.S.PRAVEENRAJ** (Roll No: **920818114020**) Final Year student of B.E. Mechanical Engineering, NPR College of Engineering and Technology, Madurai has done Project work titled **"A Study on AUTOMATIC DIPPING MACHINE"** at our company from **05th April 2022 to 30th April 2022.**

He has attended project work regularly during the above said period in our organization.

For HI-TECH ARAI PRIVATE LIMITED

HI-TECH ARAI PRIVATE LIMITED ★ MADURAI ★

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CE8394 **FLUID MECHANICS AND MACHINERY** L T P C 4 0 0 4

OBJECTIVES

- The properties of fluids and concept of control volume are studied
- The applications of the conservation laws to flow through pipes are studied.
- To understand the importance of dimensional analysis
- To understand the importance of various types of flow in pumps.
- To understand the importance of various types of flow in turbines.

UNIT I FLUID PROPERTIES AND FLOW CHARACTERISTICS 12

Units and dimensions- Properties of fluids- mass density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapor pressure, surface tension and capillarity. Flow characteristics – concept of control volume - application of continuity equation, energy equation and momentum equation.

UNIT II FLOW THROUGH CIRCULAR CONDUITS 12

Hydraulic and energy gradient - Laminar flow through circular conduits and circular annuli- Boundary layer concepts – types of boundary layer thickness – Darcy Weisbach equation –friction factor- Moody diagram- commercial pipes- minor losses – Flow through pipes in series and parallel.

UNIT III DIMENSIONAL ANALYSIS 12

Need for dimensional analysis – methods of dimensional analysis – Similitude –types of similitude - Dimensionless parameters- application of dimensionless parameters – Model analysis.

UNIT IV PUMPS 12

Impact of jets - Euler's equation - Theory of roto-dynamic machines – various efficiencies– velocity components at entry and exit of the rotor- velocity triangles - Centrifugal pumps– working principle - work done by the impeller - performance curves - Reciprocating pump- working principle – Rotary pumps –classification.

UNIT V TURBINES 12

Classification of turbines – heads and efficiencies – velocity triangles. Axial, radial and mixed flow turbines. Pelton wheel, Francis turbine and Kaplan turbines- working principles - work done by water on the runner – draft tube. Specific speed - unit quantities – performance curves for turbines – governing of turbines.

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of this course, the students will be able to

- Apply mathematical knowledge to predict the properties and characteristics of a fluid.
- Can analyse and calculate major and minor losses associated with pipe flow in piping networks.
- Can mathematically predict the nature of physical quantities
- Can critically analyse the performance of pumps
- Can critically analyse the performance of turbines.

TEXT BOOK:

1. Modi P.N. and Seth, S.M. "Hydraulics and Fluid Mechanics", Standard Book House, New Delhi, 2013.

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REFERENCES:

1. Graebel. W.P, "Engineering Fluid Mechanics", Taylor & Francis, Indian Reprint, 2011
2. Kumar K. L., "Engineering Fluid Mechanics", Eurasia Publishing House(p) Ltd., New Delhi 2016
3. Robert W.Fox, Alan T. McDonald, Philip J.Pritchard, "Fluid Mechanics and Machinery", 2011.
4. Streeter, V. L. and Wylie E. B., "Fluid Mechanics", McGraw Hill Publishing Co. 2010

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MULTI PURPOSE AGRICULTURE MACHINE

A PROJECT REPORT

Submitted by

M.ALAGAR SAMY	**920818114002**
C.BHUVANESWARAN	**920818114006**
D.SURYA	**920118114030**
P.VELMURUGAN	**920818114033**

In partial fulfilment for the award of the degree

Of

BACHELOR OF ENGINEERING

IN

MECHANICAL ENGINEERING

NPR COLLEGE OF ENGINEERING AND TECHNOLOGY

Natham, Dindigul – 624402.

ANNA UNIVERSITY: CHENNAI 600025

JUNE 2022

ANNA UNIVERSITY : CHENNAI 600025

BONAFIDE CERTIFICATE

Certified that this project report **'MULTI PURPOSE AGRICULTURE MACHINE'** is the bonafide work of **M.ALAGAR SAMY (920818114002) C.BHUVANSEWARAN (920818114006), D.SURYA (920818114030), P.VELMURUGAN (920818114033)** who carried out the project work under my supervision academic year 2021-2022

25/6/22

SIGNATURE

Dr.S.PAULSINGARAYAR,ME., Ph.D

HEAD OF THE DEPARTMENT,
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25/6/22

SIGNATURE

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Submitted for viva-voce held on 25/06/2022

INTERNAL EXAMINER

NPR COLLEGE OF ENGG. & TECHNOLOGY NATHAM

25/6/22

EXTERNAL EXAMINER

ABSTRACT

Presently, small land holding farmers use work bulls mostly for land preparation. Their use can be increased and made more economical by using them for other farm operations such as harrowing, fertilizer application, sowing and weeding. Improved hand tools will also facilitate farm work. Oxen can be used to pull a cart throughout the year which keeps them in training. Ploughs, ridgers, seeders and weeders are all seasonal implements. Manual method of seed planting, results in low seed placement, low crop yield and serious back ache for the farmer which limits the size of field that can be planted. The cost price of imported planters has gone beyond the purchasing power of most of our farmers. Farmers can do much to increase crop production especially grains if drudgery can be reduced or totally removed from their planting operations.

Generally cultivation of any crop involves various steps like seed selection, field preparation, fertilizing, sowing, irrigation, germination, thinning and filling, weed removal, vegetative stage, flowering stage, pesticide spraying, fruit or pod formation stage, harvesting and threshing. Farmer has to use various agricultural equipments and labors for caring out those steps, our purpose is to combine all the individual tools to provide farmers with multipurpose

equipment which implements all the scientific farming techniques and specifications and suitable for all type of seed to seed cultivation with as minimum cost as possible.

This project work is focused on the design and fabrication of multipurpose equipment which is used for land preparation, sowing, fertilizing, leveling and weed removal process. The multi-crop planter has the capability of delivering the seeds precisely with uniform depth in the furrow, and also with uniform spacing between the seeds .The seed planter consist of the main frame, adjustable handle, seed hopper, seed metering disc, adjustable furrow opener, adjustable furrow closer, drive wheels, seed tube . Seed metering disc was designed to be interchangeable to allow for sowing of the different varieties of seeds. The multipurpose agricultural equipment is very simple to use, the various adjustments are made with ease, and it is maintenance free.

CHAPTER 7

CONCLUSION

7.1 CONCLUSION:

The project work has been completed successfully. The project hardware functions satisfactorily as per the design. The project work was developed after conducting a number of experiments before finalizing the design work, this reduced the bottle necks and we did not face much difficulty in the final integration process.

In general the entire development of the project work was educative and we could gain a lot of experience by way of doing the project practically. We could understand the practical constraints of developing such systems about which we have studied by way of lectures in the theory classes.

It was satisfying to see so many theoretical aspects work before us in real life practice of which we have heard through lectures and of which we have studied in the books.

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ME8351 **MANUFACTURING TECHNOLOGY – I** L T P C
3 0 0 3

OBJECTIVE:

- To introduce the concepts of basic manufacturing processes and fabrication techniques, such as metal casting, metal joining, metal forming and manufacture of plastic components.

UNIT I METAL CASTING PROCESSES 9

Sand Casting : Sand Mould – Type of patterns - Pattern Materials – Pattern allowances –Moulding sand Properties and testing – Cores –Types and applications – Moulding machines– Types and applications; Melting furnaces : Blast and Cupola Furnaces; Principle of special casting processes : Shell - investment – Ceramic mould – Pressure die casting - Centrifugal Casting - CO_2 process – Stir casting; Defects in Sand casting

UNIT II JOINING PROCESSES 9

Operating principle, basic equipment, merits and applications of: Fusion welding processes: Gas welding - Types – Flame characteristics; Manual metal arc welding – Gas Tungsten arc welding - Gas metal arc welding – Submerged arc welding – Electro slag welding; Operating principle and applications of: Resistance welding - Plasma arc welding – Thermit welding – Electron beam welding – Friction welding and Friction Stir Welding; Brazing and soldering; Weld defects: types, causes and cure.

UNIT III METAL FORMING PROCESSES 9

Hot working and cold working of metals – Forging processes – Open, impression and closed die forging – forging operations. Rolling of metals– Types of Rolling – Flat strip rolling – shape rolling operations – Defects in rolled parts. Principle of rod and wire drawing – Tube drawing – Principles of Extrusion – Types – Hot and Cold extrusion.

UNIT IV SHEET METAL PROCESSES 9

Sheet metal characteristics – shearing, bending and drawing operations – Stretch forming operations – Formability of sheet metal – Test methods –special forming processes-Working principle and applications – Hydro forming – Rubber pad forming – Metal spinning– Introduction of Explosive forming, magnetic pulse forming, peen forming, Super plastic forming – Micro forming

UNIT V MANUFACTURE OF PLASTIC COMPONENTS 9

Types and characteristics of plastics – Moulding of thermoplastics – working principles and typical applications – injection moulding – Plunger and screw machines – Compression moulding, Transfer Moulding – Typical industrial applications – introduction to blow moulding –Rotational moulding – Film blowing – Extrusion – Thermoforming – Bonding of Thermoplastics.

TOTAL: 45 PERIODS

OUTCOMES:

CO1 Explain different metal casting processes, associated defects, merits and demerits
CO2 Compare different metal joining processes.
CO3 Summarize various hot working and cold working methods of metals.
CO4 Explain various sheet metal making processes.
CO5 Distinguish various methods of manufacturing plastic components.

TEXT BOOKS:

1. Hajra Chouldhary S.K and Hajra Choudhury. AK., "Elements of workshop Technology", volume I and II, Media promoters and Publishers Private Limited, Mumbai, 2008
2. Kalpakjian. S, "Manufacturing Engineering and Technology", Pearson Education India Edition, 2013

REFERENCES:

1. Gowri P. Hariharan, A.Suresh Babu, "Manufacturing Technology I", Pearson Education, 2008
2. Paul Degarma E, Black J.T and Ronald A. Kosher, "Materials and Processes, in Manufacturing" Eight Edition, Prentice – Hall of India, 1997.
3. Rao, P.N. "Manufacturing Technology Foundry, Forming and Welding", 4th Edition, TMH-2013
4. Roy. A. Lindberg, "Processes and Materials of Manufacture", PHI / Pearson education, 2006
5. Sharma, P.C., "A Text book of production Technology", S.Chand and Co. Ltd., 2014.

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MADURAI - 625 018

Date: **13.08.2022**

TO WHOM IT MAY CONCERN

This is to certify that **MUTHUSAMY P** a student of Third Year BE Mechanical Engineering of NPR college of Engineering & Technology, Natham, Dindigul, India has successfully completed INPLANT TRAINING from **20.07.2022 to 13.08.2022** at **OSHO BODY BUILDERS, MADURAI**. During the period of his INPLANT TRAINING with us, he was found Punctual, Hardworking and Inquisitive.

For Osho Body Builders
R. Anandeshwari
Partner

NPR COLLEGE OF ENGG. & TECHNOLOGY * NATHAM

Dr. [illegible]RAJAN,
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EE8353 **ELECTRICAL DRIVES AND CONTROLS** **L T P C**
3 0 0 3

OBJECTIVES:

- To understand the basic concepts of different types of electrical machines and their performance.
- To study the different methods of starting D.C motors and induction motors.
- To study the conventional and solid-state drives

UNIT I INTRODUCTION **8**

Basic Elements – Types of Electric Drives – factors influencing the choice of electrical drives – heating and cooling curves – Loading conditions and classes of duty – Selection of power rating for drive motors with regard to thermal overloading and Load variation factors**UNIT II DRIVE MOTOR CHARACTERISTICS** **9**

Mechanical characteristics – Speed-Torque characteristics of various types of load and drive motors – Braking of Electrical motors – DC motors: Shunt, series and compound - single phase and three phase induction motors.

UNIT III STARTING METHODS **8**

Types of D.C Motor starters – Typical control circuits for shunt and series motors – Three phase squirrel cage and slip ring induction motors.

UNIT IV CONVENTIONAL AND SOLID STATE SPEED CONTROL OF D.C. DRIVES **10**

Speed control of DC series and shunt motors – Armature and field control, Ward-Leonard control system - Using controlled rectifiers and DC choppers –applications.

UNIT V CONVENTIONAL AND SOLID STATE SPEED CONTROL OF A.C. DRIVES **10**

Speed control of three phase induction motor – Voltage control, voltage / frequency control, slip power recovery scheme – Using inverters and AC voltage regulators – applications.

TOTAL: 45 PERIODS

OUTCOME:

- Upon Completion of this subject, the students can able to explain different types of electrical machines and their performance

TEXT BOOKS:

1. Nagrath .I.J. & Kothari .D.P, "Electrical Machines", Tata McGraw-Hill, 2006
2. Vedam Subrahmaniam, "Electric Drives (Concepts and Applications)", Tata McGraw-Hill, 2010

REFERENCES:

1. Partab. H., "Art and Science and Utilisation of Electrical Energy", Dhanpat Rai and Sons, 2017
2. Pillai.S.K "A First Course on Electric Drives", Wiley Eastern Limited, 2012
3. Singh. M.D., K.B.Khanchandani, "Power Electronics", Tata McGraw-Hill, 2006.

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Date: **13.08.2022**

TO WHOM IT MAY CONCERN

This is to certify that **MEENAKSHI SUNDARAM** a student of Third Year BE Mechanical Engineering from NPR college of Engineering & Technology, Natham, Dindigul, India has successfully completed INPLANT TRAINING from **20.07.2022 to 13.08.2022** at **OSHO BODY BUILDERS, MADURAI.** During the period of his INPLANT TRAINING with us, he was found Punctual, Hardworking and Inquisitive.

For Osho Body Builders
R. Annakkodi
Partner

Dr. J. SUNDARARAJAN, BE., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
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ME8492 **KINEMATICS OF MACHINERY**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the basic components and layout of linkages in the assembly of a system machine.
- To understand the principles in analyzing the assembly with respect to the displacement, velocity, and acceleration at any point in a link of a mechanism.
- To understand the motion resulting from a specified set of linkages, design few linkage mechanisms and cam mechanisms for specified output motions.
- To understand the basic concepts of toothed gearing and kinematics of gear trains and the effects of friction in motion transmission and in machine components.

UNIT I BASICS OF MECHANISMS **9**

Classification of mechanisms – Basic kinematic concepts and definitions – Degree of freedom, Mobility – Kutzbach criterion, Gruebler's criterion – Grashof's Law – Kinematic inversions of four-bar chain and slider crank chains – Limit positions – Mechanical advantage – Transmission Angle – Description of some common mechanisms – Quick return mechanisms, Straight line generators, Universal Joint – rocker mechanisms.

UNIT II KINEMATICS OF LINKAGE MECHANISMS **9**

Displacement, velocity and acceleration analysis of simple mechanisms – Graphical method– Velocity and acceleration polygons – Velocity analysis using instantaneous centres – kinematic analysis of simple mechanisms – Coincident points – Coriolis component of Acceleration – Introduction to linkage synthesis problem.

UNIT III KINEMATICS OF CAM MECHANISMS **9**

Classification of cams and followers – Terminology and definitions – Displacement diagrams – Uniform velocity, parabolic, simple harmonic and cycloidal motions – Derivatives of follower motions – Layout of plate cam profiles – Specified contour cams – Circular arc and tangent cams – Pressure angle and undercutting – sizing of cams.

UNIT IV GEARS AND GEAR TRAINS **9**

Law of toothed gearing – Involutes and cycloidal tooth profiles –Spur Gear terminology and definitions –Gear tooth action – contact ratio – Interference and undercutting. Helical, Bevel, Worm, Rack and Pinion gears [Basics only]. Gear trains – Speed ratio, train value – Parallel axis gear trains – Epicyclic Gear Trains.

UNIT V FRICTION IN MACHINE ELEMENTS **9**

Surface contacts – Sliding and Rolling friction – Friction drives – Friction in screw threads – Bearings and lubrication – Friction clutches – Belt and rope drives – Friction in brakes- Band and Block brakes.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Discuss the basics of mechanism
CO2 Calculate velocity and acceleration in simple mechanisms
CO3 Develop CAM profiles
CO4 Solve problems on gears and gear trains
CO5 Examine friction in machine elements

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TEXT BOOKS:

1. F.B. Sayyad, "Kinematics of Machinery", MacMillan Publishers Pvt Ltd., Tech-max Educational resources, 2011.
2. Rattan, S.S, "Theory of Machines", 4th Edition, Tata McGraw-Hill, 2014.
3. Uicker, J.J., Pennock G.R and Shigley, J.E., "Theory of Machines and Mechanisms", 4 Edition, Oxford University Press, 2014.

REFERENCES:

1. Allen S. Hall Jr., "Kinematics and Linkage Design", Prentice Hall, 1961
2. Cleghorn. W. L, "Mechanisms of Machines", Oxford University Press, 2014
3. Ghosh. A and Mallick, A.K., "Theory of Mechanisms and Machines", 3rd Edition Affiliated East-West Pvt. Ltd., New Delhi, 2006.
4. John Hannah and Stephens R.C., "Mechanics of Machines", Viva Low-Prices Student Edition, 1999.
5. Thomas Bevan, "Theory of Machines", 3rd Edition, CBS Publishers and Distributors, 2005.

N.P.R. COLLEGE OF ENGG. & TECHNOLOGY * NATHAM

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Date: **13.08.2022**

TO WHOM IT MAY CONCERN

This is to certify that **GOWTHAMAN M** a student of Third Year BE Mechanical Engineering from NPR college of Engineering & Technology, Natham, Dindigul, India has successfully completed INPLANT TRAINING from **20.07.2022 to 13.08.2022** at **OSHO BODY BUILDERS, MADURAI**. During the period of his INPLANT TRAINING with us, he was found Punctual, Hardworking and Inquisitive.

For Osho Body Builders
R. Arunachalam
Partner

NPR COLLEGE OF ENGG. & TECHNOLOGY
NATHAM

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ME8451 **MANUFACTURING TECHNOLOGY – II**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the concept and basic mechanics of metal cutting, working of standard machine tools such as lathe, shaping and allied machines, milling, drilling and allied machines, grinding and allied machines and broaching.
- To understand the basic concepts of Computer Numerical Control (CNC) of machine tools and CNC Programming

UNIT I THEORY OF METAL CUTTING 9

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

UNIT II TURNING MACHINES 9

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

UNIT III SHAPER, MILLING AND GEAR CUTTING MACHINES 9

Shaper - Types of operations. Drilling ,reaming, boring, Tapping. Milling operations-types of milling cutter. Gear cutting – forming and generation principle and construction of gear milling ,hobbing and gear shaping processes –finishing of gears.

UNIT IV ABRASIVE PROCESS AND BROACHING 9

Abrasive processes: grinding wheel – specifications and selection, types of grinding process– cylindrical grinding, surface grinding, centreless grinding and internal grinding- Typical applications – concepts of surface integrity, broaching machines: broach construction – push, pull, surface and continuous broaching machines

UNIT V CNC MACHINING 9

Numerical Control (NC) machine tools – CNC types, constructional details, special features, machining centre, part programming fundamentals CNC – manual part programming – micromachining – wafer machining.

TOTAL : 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the mechanism of material removal processes.
CO2 Describe the constructional and operational features of centre lathe and other special purpose lathes.
CO3 Describe the constructional and operational features of shaper, planner, milling, drilling, sawing and broaching machines.
CO4 Explain the types of grinding and other super finishing processes apart from gear manufacturing processes.
CO5 Summarize numerical control of machine tools and write a part program.

TEXT BOOKS:

1. Hajra Choudhury, "Elements of Workshop Technology", Vol.II., Media Promoters 2014
2. Rao. P.N "Manufacturing Technology - Metal Cutting and Machine Tools", 3rd Edition, Tata

REFERENCES:

1. Richerd R Kibbe, John E Neely, Roland O Merges and Warren J.White "Machine Tool Practices", Prentice Hall of India, 1998
2. Geofrey Boothroyd, "Fundamentals of Metal Machining and Machine Tools", Mc Graw Hill, 1984
3. HMT, "Production Technology", Tata McGraw Hill, 1998.
4. Roy A.Lindberg, "Process and Materials of Manufacture," Fourth Edition, PHI/Pearson Education 2006.

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DESIGN OF AGV USING EMBEDDED SYSTEM

A PROJECT REPORT

submitted by

ABINASH.V	(920818114001)
PRATHIBAN.K	(920818114018)
MANIKANDAN.K	(920818114303)
GOWTHAM KUMAR.M	(920818114701)

in partial fulfillment for theaward of the degree

of

BACHELOR OF ENGINEERING

IN

MECHANICAL ENGINEERING

NPR COLLEGE OF ENGINEERING AND TECHNOLOGY

NATHAM, DINDIGUL.

ANNA UNIVERSITY :: CHENNAI-600025.

ANNA UNIVERSITY: CHENNAI-600025

BONAFIDE CERTIFICATE

Certified that this project report "**DESIGN OF AGV USING EMBEDDED SYSTEM**" is the Bonafide work of "**ABINASH.V, (920818114001), PRATHIBAN. K (920818114018) ,MANIKANDAN.K (920818114303), GOWTHAM KUMAR.M (920818114701)**" who carried out the project work under my supervision.

25/6/22

SIGNATURE

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M.E.,PhD.,
HEAD OF THE DEPARTMENT
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T.BALASUBRAMANI M.E.,

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Submitted for the ANNA UNIVERSITY viva-voce Examination held on 25.06.22 at NPR College of Engineering and Technology,Natham.

INTERNAL EXAMINER

NPR COLLEGE OF ENGG. & TECHNOLOGY NATHAM

25/6/22

EXTERNAL EXAMINER

ABSTRACT

The Automatic Guided Vehicle refers a type of system that can be used in production as well as in other industries etc. This system includes a battery-operated remote sensing locomotive (carrier) on which a small lift is provided, specific path over which it moves, sensors for sensing the obstructions on the path of the carrier. Also, sensors for sensing exact positions from where load wants to carry and to anywhere. The remote sensing carrier moves using the electric power from the battery. It moves with a low and constant speed on the prescribed path. The path has a specific color. The bottom of the carrier has sensor which is always coupled with the path. From the remote station we send only information for moving the carrier, not for steering it. The steering is done by the path. The front side of carrier vehicle contains sensors for sensing the obstructions on the path. As it reaches the collecting station, its top floor lift to a small distance and lift the stand which contains the parts wants to assemble, supply. And the carrier moves through the path and reaches the supply station. The sensor provided on the carrier detected the station and unload the stand contains assembly parts at that station. And move to collecting stations again. Continues working cycles for making this project a reality.

CHAPTER VI

CONCLUSION

The AGV is a productivity increasing feature in a factory. During the manufacturing of this AGV we had found many of intelligence that can be given to it. We provide the basic functions like line following and collision avoiding. And the main function, transportation of goods from station to station. The followings are the main features of the prototype which we fabricated.

1. Speed of delivery
2. Adjustment of vehicle speed
3. Flexibility of path
4. Adaptive to changes in factory layouts
5. Avoid collision with other objects
6. Reduction in labour cost
7. Reduction in running cost compared to conveyer systems
8. Ability to add sensors to detect the payload conditions
9. Ability to adjust the lifting time
10. Continues cycle of working
11. Conditions for line following can be change easily

Automatic Guided Vehicle can be used in a wide variety of applications to transport many different types of material including pallets, rolls, racks, carts, and containers. AGVs excel in applications with the following characteristics:

- Repetitive movement of material over a distance
- Regular delivery of stable loads
- Medium throughput/volume

ME8491 **ENGINEERING METALLURGY**

L	T	P	C
3	0	0	3

OBJECTIVE:

- To impart knowledge on the structure, properties, treatment, testing and applications of metals and non-metallic materials so as to identify and select suitable materials for various engineering applications.

UNIT I ALLOYS AND PHASE DIAGRAMS 9

Constitution of alloys – Solid solutions, substitutional and interstitial – phase diagrams, Isomorphous, eutectic, eutectoid, peritectic, and peritectoid reactions, Iron – carbon equilibrium diagram. Classification of steel and cast Iron microstructure, properties and application.

UNIT II HEAT TREATMENT 9

Definition – Full annealing, stress relief, recrystallisation and spheroidising – normalising, hardening and Tempering of steel. Isothermal transformation diagrams – cooling curves superimposed on I.T. diagram CCR – Hardenability, Jominy end quench test - Austempering, martempering – case hardening, carburizing, Nitriding, cyaniding, carbonitriding – Flame and Induction hardening – Vacuum and Plasma hardening. .

UNIT III FERROUS AND NON-FERROUS METALS 9

Effect of alloying additions on steel- α and β stabilisers– stainless and tool steels – HSLA, Maraging steels – Cast Iron - Grey, white, malleable, spheroidal – alloy cast irons, Copper and copper alloys – Brass, Bronze and Cupronickel – Aluminium and Al-Cu – precipitation strengthening treatment – Bearing alloys, Mg-alloys, Ni-based super alloys and Titanium alloys.

UNIT IV NON-METALLIC MATERIALS 9

Polymers – types of polymer, commodity and engineering polymers – Properties and applications of various thermosetting and thermoplastic polymers (PP, PS, PVC, PMMA, PET,PC, PA, ABS, PI, PAI, PPO, PPS, PEEK, PTFE, Polymers – Urea and Phenol formaldehydes)- Engineering Ceramics – Properties and applications of Al_2O_3, SiC, Si_3N_4, PSZ and SIALON –Composites- Classifications- Metal Matrix and FRP - Applications of Composites.

UNIT V MECHANICAL PROPERTIES AND DEFORMATION MECHANISMS 9

Mechanisms of plastic deformation, slip and twinning – Types of fracture – Testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell), hardness tests, Impact test Izod and charpy, fatigue and creep failure mechanisms.

TOTAL: 45 PERIODS

OUTCOMES

Upon the completion of this course the students will be able to

CO1 Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification.
CO2 Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.
CO3 Clarify the effect of alloying elements on ferrous and non-ferrous metals
CO4 Summarize the properties and applications of non metallic materials.
CO5 Explain the testing of mechanical properties.

TEXT BOOKS:

1. Avner, S.H., "Introduction to Physical Metallurgy" McGraw Hill Book Company,1997
2. Williams D Callister, "Material Science and Engineering" Wiley India Pvt Ltd, Revised Indian Edition 2014

REFERENCES:

1. Kenneth G.Budinski and Michael K. Budinski, "Engineering Materials", Prentice Hall of India Private Limited, 2010.
2. Raghavan.V, "Materials Science and Engineering", Prentice Hall of India Pvt. Ltd., 2015.
3. U.C.Jindal : Material Science and Metallurgy, "Engineering Materials and Metallurgy", First Edition, Dorling Kindersley, 2012
4. Upadhyay. G.S. and Anish Upadhyay, "Materials Science and Engineering", Viva Books Pvt. Ltd., New Delhi, 2006.

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DRIVING CYCLE DEVELOPMENT OF E-VEHICLE

A PROJECT REPORT

Submitted by

P.PERIYANDI	920818114016
M.SURIYAVISWA	920818114029
P.VISAKAN	920818114035

In partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

IN

MECHANICAL ENGINEERING

NPR COLLEGE OF ENGINEERING AND TECHNOLOGY, NATHAM

ANNA UNIVERSITY: CHENNAI 600 025

JUNE 2022

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"DRIVING CYCLE DEVELOPMENT OF E-VEHICLE"** is the bonafide work of **"P.PERIYANDI (920818114016), M.SURIYAVISWA (920818114029), P.VISAKAN (920818114035)"** who carried out the project work under my supervision.

25/6/22

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Mr. M.SHAANMAADHURAN, M.Tech.,
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Assistant Professor
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Submitted for the Project viva-voce examination held on 25/06/2022

INTERNAL EXAMINER

NPR COLLEGE OF ENGG. & TECHNOLOGY NATHAM

25/6/22

EXTERNAL EXAMINER

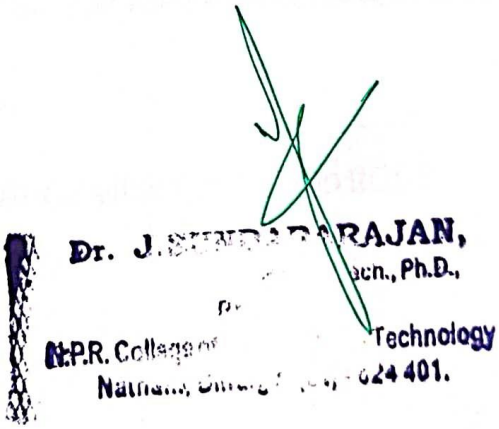
ABSTRACT

In present scenario, air pollution has become a serious concern for the India. According to recent global report, many cities in the India are most polluted cities. Major sectors contributing to the air pollution are industrial sector and transport sector. Among this 51% of air pollution is caused by the industrial sector and 27% by the transport sector. Air pollution contributes to the premature deaths of 2 million Indians every year. In order to minimize the air pollution, Electric Vehicle (EV) can act as blessing in lowering the GHG emission. Electric Vehicles offer numerous advantages such as decreasing the pollution level and reduction in oil import bills etc. Although there is considerable amount of threats in establishing the Electric Vehicles in India. This paper provides the brief literature review on the Electric Vehicles and compiles the advantages and threats in promotingEVs in India.

CHAPTER 12

CONCLUSION

We the students took the initiative in doing this project work **DRIVING CYCLE DEVELOPMENT OF E-VEHICLE"** to the peak of SUCCESS. During the course of action of our project work, we have gained sufficient technical as well as practical knowledge as how a machine is to be designed fabricated, and priced. Driving cycles are important for the design and evaluation of electric vehicles. Here, we use conventional Markov method with road type data to improve the quality of constructed driving cycle. In future work, road slope data and other environmental parameters during driving process will be taken into consideration to further improve the quality of constructed driving cycle.



OBJECTIVES:

- To understand the concepts of stress, strain, principal stresses and principal planes.
- To study the concept of shearing force and bending moment due to external loads in determinate beams and their effect on stresses.
- To determine stresses and deformation in circular shafts and helical spring due to torsion.
- To compute slopes and deflections in determinate beams by various methods.
- To study the stresses and deformations induced in thin and thick shells.

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS 9

Rigid bodies and deformable solids – Tension, Compression and Shear Stresses – Deformation of simple and compound bars – Thermal stresses – Elastic constants – Volumetric strains –Stresses on inclined planes – principal stresses and principal planes – Mohr's circle of stress.

UNIT II TRANSVERSE LOADING ON BEAMS AND STRESSES IN BEAM 9

Beams – types transverse loading on beams – Shear force and bending moment in beams – Cantilevers – Simply supported beams and over – hanging beams. Theory of simple bending– bending stress distribution – Load carrying capacity – Proportioning of sections – Flitched beams – Shear stress distribution.

UNIT III TORSION 9

Torsion formulation stresses and deformation in circular and hollows shafts – Stepped shafts– Deflection in shafts fixed at the both ends – Stresses in helical springs – Deflection of helical springs, carriage springs.

UNIT IV DEFLECTION OF BEAMS 9

Double Integration method – Macaulay's method – Area moment method for computation of slopes and deflections in beams - Conjugate beam and strain energy – Maxwell's reciprocal theorems.

UNIT V THIN CYLINDERS, SPHERES AND THICK CYLINDERS 9

Stresses in thin cylindrical shell due to internal pressure circumferential and longitudinal stresses and deformation in thin and thick cylinders – spherical shells subjected to internal pressure – Deformation in spherical shells – Lame's theorem.

TOTAL: 45 PERIODS

OUTCOMES

Students will be able to

- Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes.
- Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment.
- Apply basic equation of simple torsion in designing of shafts and helical spring
- Calculate the slope and deflection in beams using different methods.
- Analyze and design thin and thick shells for the applied internal and external pressures.

TEXT BOOKS:

1. Bansal, R.K., "Strength of Materials", Laxmi Publications (P) Ltd., 2016
2. Jindal U.C., "Strength of Materials", Asian Books Pvt. Ltd., New Delhi, 2008

Ayyanar Thunai

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Date: **13.08.2022**

TO WHOM IT MAY CONCERN

This is to certify that **ASWIN BALAJI S** a student of Third Year BE Mechanical Engineering from NPR college of Engineering & Technology, Natham, Dindigul, India has successfully completed INPLANT TRAINING from **20.07.2022 to 13.08.2022** at **OSHO BODY BUILDERS, MADURAI.** During the period of his INPLANT TRAINING with us, he was found Punctual, Hardworking and Inquisitive.

For Osho Body Builders
R. Annadurai
Partner

NPR COLLEGE OF ENGG. & TECHNOLOGY * NATHAM

Dr. J. SUNDARARAJAN, B.E., M.Tech., Ph.D.,
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ME8493 **THERMAL ENGINEERING - I**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To integrate the concepts, laws and methodologies from the first course in thermodynamics into analysis of cyclic processes
- To apply the thermodynamic concepts into various thermal application like IC engines, Steam.
- Turbines, Compressors and Refrigeration and Air conditioning systems

(Use of standard refrigerant property data book, Steam Tables, Mollier diagram and Psychrometric chart permitted)

UNIT I GAS AND STEAM POWER CYCLES 9

Air Standard Cycles - Otto, Diesel, Dual, Brayton – Cycle Analysis, Performance and Comparison – Rankine, reheat and regenerative cycle.

UNIT II RECIPROCATING AIR COMPRESSOR 9

Classification and comparison, working principle, work of compression - with and without clearance, Volumetric efficiency, Isothermal efficiency and Isentropic efficiency. Multistage air compressor with Intercooling. Working principle and comparison of Rotary compressors with reciprocating air compressors.

UNIT III INTERNAL COMBUSTION ENGINES AND COMBUSTION 9

IC engine – Classification, working, components and their functions. Ideal and actual : Valve and port timing diagrams, p-v diagrams- two stroke & four stroke, and SI & CI engines – comparison. Geometric, operating, and performance comparison of SI and CI engines. Desirable properties and qualities of fuels. Air-fuel ratio calculation – lean and rich mixtures. Combustion in SI & CI Engines – Knocking – phenomena and control.

UNIT IV INTERNAL COMBUSTION ENGINE PERFORMANCE AND SYSTEMS 9

Performance parameters and calculations. Morse and Heat Balance tests. Multipoint Fuel Injection system and Common Rail Direct Injection systems. Ignition systems – Magneto, Battery and Electronic. Lubrication and Cooling systems. Concepts of Supercharging and Turbocharging – Emission Norms.

UNIT V GAS TURBINES 9

Gas turbine cycle analysis – open and closed cycle. Performance and its improvement Regenerative, Intercooled, Reheated cycles and their combinations. Materials for turbines.

TOTAL : 45 PERIODS

CO1 Apply thermodynamic concepts to different air standard cycles and solve problems. CO2 Solve problems in single stage and multistage air compressors
CO3 Explain the functioning and features of IC engines, components and auxiliaries. CO4 Calculate performance parameters of IC Engines.
CO5 Explain the flow in Gas turbines and solve problems.

TEXT BOOKS:

1. Kothandaraman.C.P., Domkundwar. S,Domkundwar. A.V., "A course in thermal Engineering", Fifth Edition, "Dhanpat Rai & sons , 2016
2. Rajput. R. K., "Thermal Engineering" S.Chand Publishers, 2017

REFERENCES:

1. Arora.C.P, "Refrigeration and Air Conditioning ," Tata McGraw-Hill Publishers 2008
2. Ganesan V.." Internal Combustion Engines" , Third Edition, Tata Mcgraw-Hill 2012
3. Ramalingam. K.K., "Thermal Engineering", SCITECH Publications (India) Pvt. Ltd., 2009.
4. Rudramoorthy, R, "Thermal Engineering ",Tata McGraw-Hill, New Delhi,2003
5. Sarkar, B.K,"Thermal Engineering" Tata McGraw-Hill Publishers, 2007

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TSI
CONCEPT TO COMMISIONING

THERMO SOLUTIONS

(An ISO 9001:2008 Certified Company)

CIN: U28131TZ2009PTC015549

Date: 17.08.2022

TO WHOM IT MAY CONCERN

This is to certify that Mr. ABILASH A studying in Third Year BE Mechanical Engineering of NPR College of Engineering & Technology, Natham has undergone internship in our organization from 18.07.2022 to 17.08.2022.

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

With Regards

(For Thermo Solutions (INDIA) Pvt. Ltd)

NPR COLLEGE OF ENGG. & TECHNOLOGY
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Dr. J. SUNDARARAJAN,
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tsi@thermosolutions.net / www.thermosolutions.net

ME8595 **THERMAL ENGINEERING – II**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To apply the thermodynamic concepts for Nozzles, Boilers, Turbines, and Refrigeration & Air Conditioning Systems.
- To understand the concept of utilising residual heat in thermal systems.

UNIT I STEAM NOZZLE 9

Types and Shapes of nozzles, Flow of steam through nozzles, Critical pressure ratio, Variation of mass flow rate with pressure ratio. Effect of friction. Metastable flow.

UNIT II BOILERS 9

Types and comparison. Mountings and Accessories. Fuels - Solid, Liquid and Gas. Performance calculations, Boiler trial.

UNIT III STEAM TURBINES 9

Types, Impulse and reaction principles, Velocity diagrams, Work done and efficiency – optimal operating conditions. Multi-staging, compounding and governing.

UNIT IV COGENERATION AND RESIDUAL HEAT RECOVERY 9

Cogeneration Principles, Cycle Analysis, Applications, Source and utilisation of residual heat. Heat pipes, Heat pumps, Recuperative and Regenerative heat exchangers. Economic Aspects.

UNIT V REFRIGERATION AND AIR – CONDITIONING 9

Vapour compression refrigeration cycle, Effect of Superheat and Sub-cooling, Performance calculations, Working principle of air cycle, vapour absorption system, and Thermoelectric refrigeration. Air conditioning systems, concept of RSHF, GSHF and ESHF, Cooling load calculations. Cooling towers – concept and types.

TOTAL:45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Solve problems in Steam Nozzle

CO2 Explain the functioning and features of different types of Boilers and auxiliaries and calculate performance parameters.

CO3 Explain the flow in steam turbines, draw velocity diagrams for steam turbines and solve problems.

CO4 Summarize the concept of Cogeneration, Working features of Heat pumps and Heat exchangers

CO5 Solve problems using refrigerant table / charts and psychrometric charts

TEXT BOOKS:

1. Kothandaraman, C.P., Domkundwar .S and Domkundwar A.V.,"A course in Thermal Engineering", Dhanpat Rai & Sons, 2016.
2. Mahesh. M. Rathore, "Thermal Engineering", 1st Edition, Tata Mc Graw Hill Publications, 2010.

REFERENCES:

1. Arora .C.P., "Refrigeration and Air Conditioning", Tata Mc Graw Hill, 2008
2. Ballaney. P.L ." Thermal Engineering", Khanna publishers, 24th Edition 2012
3. Charles H Butler : Cogeneration" McGraw Hill, 1984.
4. Donald Q. Kern, " Process Heat Transfer", Tata Mc Graw Hill, 2001.
5. Sydney Reiter "Industrial and Commercial Heat Recovery Systems" Van Nostrand Reinhols, 1985.

N.P.R. COLLEGE OF ENGG. & TECHNOLOGY * NATHAM

Dr. J.SUNDARARAJAN,
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TSI
CONCEPT TO COMMISIONING

THERMO SOLUTIONS

ZQA
(An ISO 9001:2008 Certified Company)

CIN: U28131TZ2009PTC015549

Date: 17.08.2022

TO WHOM IT MAY CONCERN

This is to certify that Mr. IMAN MOHAMMED studying in Third Year BE Mechanical Engineering of NPR College of Engineering & Technology, Natham has undergone internship in our organization from 18.07.2022 to 17.08.2022

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

With Regards

(For Thermo Solutions (INDIA) Pvt. Ltd)

NPR COLLEGE OF ENGG & TECHNOLOGY
NATHAM

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ME8593

DESIGN OF MACHINE ELEMENTS

L	T	P	C
3	0	0	3

OBJECTIVES

- To familiarize the various steps involved in the Design Process
- To understand the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements
- To learn to use standard practices and standard data
- To learn to use catalogues and standard machine components
- (Use of P S G Design Data Book is permitted)

UNIT I STEADY STRESSES AND VARIABLE STRESSES IN MACHINE MEMBERS 9

Introduction to the design process - factors influencing machine design, selection of materials based on mechanical properties - Preferred numbers, fits and tolerances – Direct, Bending and torsional stress equations – Impact and shock loading – calculation of principle stresses for various load combinations, eccentric loading – curved beams – crane hook and 'C' frame- Factor of safety - theories of failure – Design based on strength and stiffness – stress concentration – Design for variable loading.

UNIT II SHAFTS AND COUPLINGS 9

Design of solid and hollow shafts based on strength, rigidity and critical speed – Keys, keyways and splines - Rigid and flexible couplings.

UNIT III TEMPORARY AND PERMANENT JOINTS 9

Threaded fastners - Bolted joints including eccentric loading, Knuckle joints, Cotter joints – Welded joints, riveted joints for structures - theory of bonded joints.

UNIT IV ENERGY STORING ELEMENTS AND ENGINE COMPONENTS 9

Various types of springs, optimization of helical springs - rubber springs - Flywheels considering stresses in rims and arms for engines and punching machines- Connecting Rods and crank shafts.

UNIT V BEARINGS 9

Sliding contact and rolling contact bearings - Hydrodynamic journal bearings, Sommerfeld Number, Raimondi and Boyd graphs, -- Selection of Rolling Contact bearings.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the influence of steady and variable stresses in machine component design.
CO2 Apply the concepts of design to shafts, keys and couplings.
CO3 Apply the concepts of design to temporary and permanent joints.
CO4 Apply the concepts of design to energy absorbing members, connecting rod and crank shaft
CO5 Apply the concepts of design to bearings

TEXT BOOKS:

1. Bhandari V, "Design of Machine Elements", 4th Edition, Tata McGraw-Hill Book Co, 2016.
2. Joseph Shigley, Charles Mischke, Richard Budynas and Keith Nisbett, "Mechanical Engineering Design", 9th Edition, Tata McGraw-Hill, 2011.

REFERENCES:

1. Alfred Hall, Halowenko, A and Laughlin, H., "Machine Design", Tata McGraw-Hill BookCo.(Schaum's Outline), 2010
2. Ansel Ugural, "Mechanical Design – An Integral Approach", 1st Edition, Tata McGraw-Hill Book Co, 2003.
3. P.C. Gope, "Machine Design – Fundamental and Application", PHI learning private ltd, New Delhi, 2012.
4. R.B. Patel, "Design of Machine Elements", MacMillan Publishers India P Ltd., Tech-Max Educational resources, 2011.
5. Robert C. Juvinall and Kurt M. Marshek, "Fundamentals of Machine Design", 4th Edition, Wiley, 2005
6. Sundararajamoorthy T. V. Shanmugam .N, "Machine Design", Anuradha Publications, Chennai, 2015.

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

With Regards

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ME8501 **METROLOGY AND MEASUREMENTS**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide knowledge on various Metrological equipments available to measure the dimension of the components.
- To provide knowledge on the correct procedure to be adopted to measure the dimension of the components.

UNIT I BASICS OF METROLOGY 9

Introduction to Metrology – Need – Elements – Work piece, Instruments – Persons – Environment – their effect on Precision and Accuracy – Errors – Errors in Measurements – Types – Control – Types of standards.

UNIT II LINEAR AND ANGULAR MEASUREMENTS 9

Linear Measuring Instruments – Evolution – Types – Classification – Limit gauges – gauge design – terminology – procedure – concepts of interchange ability and selective assembly – Angular measuring instruments – Types – Bevel protractor clinometers angle gauges, spirit levels sine bar – Angle alignment telescope – Autocollimator – Applications.

UNIT III ADVANCES IN METROLOGY 9

Basic concept of lasers Advantages of lasers – laser Interferometers – types – DC and AC Lasers interferometer – Applications – Straightness – Alignment. Basic concept of CMM – Types of CMM – Constructional features – Probes – Accessories – Software – Applications – Basic concepts of Machine Vision System – Element – Applications.

UNIT IV FORM MEASUREMENT 9

Principles and Methods of straightness – Flatness measurement – Thread measurement, gear measurement, surface finish measurement, Roundness measurement – Applications.

UNIT V MEASUREMENT OF POWER, FLOW AND TEMPERATURE 9

Force, torque, power - mechanical , Pneumatic, Hydraulic and Electrical type. Flow measurement: Venturimeter, Orifice meter, rotameter, pitot tube – Temperature: bimetallic strip, thermocouples, electrical resistance thermometer – Reliability and Calibration – Readability and Reliability.

TOTAL : 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Describe the concepts of measurements to apply in various metrological instruments
CO2 Outline the principles of linear and angular measurement tools used for industrial applications
CO3 Explain the procedure for conducting computer aided inspection
CO4 Demonstrate the techniques of form measurement used for industrial components
CO5 Discuss various measuring techniques of mechanical properties in industrial applications

TEXT BOOKS:

1. Gupta. I.C., "Engineering Metrology", Dhanpatrai Publications, 2005.
2. Jain R.K. "Engineering Metrology", Khanna Publishers, 2009.

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REFERENCES:

1. Alan S. Morris, "The essence of Measurement", Prentice Hall of India 1996.
2. Beckwith, Marangoni, Lienhard, "Mechanical Measurements", Pearson Education , 2014.
3. Charles Reginald Shotbolt, "Metrology for Engineers", 5th edition, Cengage Learning EMEA,1990.
4. Donald Peckman, "Industrial Instrumentation", Wiley Eastern, 2004.
5. Raghavendra ,Krishnamurthy "Engineering Metrology & Measurements", Oxford Univ. Press, 2013.

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360 DEGREE FIRE PROTECTION

A PROJECT REPORT

Submitted by

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J.Sebastinjerald	**920818114025**
A.Sriram	**920818114026**
A.Vinith kumar	**920818114034**

in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

IN

MECHANICAL ENGINEERNGING

NPR COLLEGE OF ENGINEERING & TECHNOLOGY

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ANNA UNIVERSITY : CHENNAI 600 025

JUNE2022

ANNA UNIVERSITY : CHENNAI 600025

BONAFIDE CERTIFICATE

Certified that this project report **"360^0 FIRE PROTECTION MACHINE"** is the Bonafide work of **"V.Manivannan (920818114011), J.Sebastinjerald (920818114025), A.Sriram (920818114026), A.Vinith kumar (920818114034)"** who carried out the project work under my supervision, during the academic year 2021-2022.

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Submitted for viva-voice held on 25.06.2022

INTERNALEXAMINER

EXTERNALEXAMINER

ABSTRACT

Fire monitors and sprayers are an aimable and controllable high-capacity water jet used to deal with large fires. Unlike Fire extinguishers, Fire Monitors are permanently installed and cannot be moved. While traditional fire monitor systems need a human operator to change the direction of the water jet and aim it appropriately, this fire monitor has been equipped with RF control and an onboard camera. Thereby allowing the user to operate it from a safe distance. The system makes use of 2 x Motors coupled with a powerful sprayer motor with piping system and onboard wireless streaming camera to run this system. The 2 motors are used to control the nozzle direction movement. The user may use a wireless remote to transmit movement commands. The receiver circuitry mounted on system receives users commands and operates the motors to achieve desired motion. Also the receiver operates the pump motor to start and stop the spray .The sprayer nozzle can also be adjusted to adjust the water spray outlet. The sprayer mechanism is built to operate in a 2 DOF operation to adjust position in x and Y directions and achieve a 360 Degree water spray coverage.

CHAPTER-9

CONCLUSION

As per the sketch of design and enforcement of a firefighting device that moves towards 360 degrees for a fire fighting. This machine is used to control the fire by spraying a continuous water using a water pump. The system may be useful for accompanied fire fighters and preventing an outbreak. This is an one of the ample opportunity to automation. It will be used in the location or sites where it is impossible to reach or dangerous for humans.

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ME8594

DYNAMICS OF MACHINES

L	T	P	C
4	0	0	4

OBJECTIVES:

- To understand the force-motion relationship in components subjected to external forces and analysis of standard mechanisms.
- To understand the undesirable effects of unbalances resulting from prescribed motions in mechanism.
- To understand the effect of Dynamics of undesirable vibrations.
- To understand the principles in mechanisms used for speed control and stability control.

UNIT I FORCE ANALYSIS

12

Dynamic force analysis – Inertia force and Inertia torque– D Alembert's principle –Dynamic Analysis in reciprocating engines – Gas forces – Inertia effect of connecting rod– Bearing loads – Crank shaft torque – Turning moment diagrams –Fly Wheels – Flywheels of punching presses- Dynamics of Cam- follower mechanism.

UNIT II BALANCING

12

Static and dynamic balancing – Balancing of rotating masses – Balancing a single cylinder engine – Balancing of Multi-cylinder inline, V-engines – Partial balancing in engines – Balancing of linkages – Balancing machines-Field balancing of discs and rotors.

UNIT III FREE VIBRATION

12

Basic features of vibratory systems – Degrees of freedom – single degree of freedom – Free vibration– Equations of motion – Natural frequency – Types of Damping – Damped vibration– Torsional vibration of shaft – Critical speeds of shafts – Torsional vibration – Two and three rotor torsional systems.

UNIT IV FORCED VIBRATION

12

Response of one degree freedom systems to periodic forcing – Harmonic disturbances – Disturbance caused by unbalance – Support motion –transmissibility – Vibration isolation vibration measurement.

UNIT V MECHANISM FOR CONTROL

12

Governors – Types – Centrifugal governors – Gravity controlled and spring controlled centrifugal governors – Characteristics – Effect of friction – Controlling force curves. Gyroscopes –Gyroscopic forces and torques – Gyroscopic stabilization – Gyroscopic effects in Automobiles, ships and airplanes.

TOTAL : 60 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Calculate static and dynamic forces of mechanisms.
CO2 Calculate the balancing masses and their locations of reciprocating and rotating masses.
CO3 Compute the frequency of free vibration.
CO4 Compute the frequency of forced vibration and damping coefficient.
CO5 Calculate the speed and lift of the governor and estimate the gyroscopic effect on automobiles, ships and airplanes.

TEXT BOOKS:

1. F. B. Sayyad, "Dynamics of Machinery", McMillan Publishers India Ltd., Tech-Max Educational resources, 2011.
2. Rattan, S S, "Theory of Machines", 4th Edition, Tata McGraw-Hill, 2014.
3. Uicker, J.J., Pennock G.R and Shigley, J.E., "Theory of Machines and Mechanisms", 4th Edition, Oxford University Press, 2014.

REFERENCES:

1. Cleghorn. W. L, "Mechanisms of Machines", Oxford University Press, 2014
2. Ghosh. A and Mallick, A.K., "Theory of Mechanisms and Machines", 3rd Edition Affiliated East-West Pvt. Ltd., New Delhi, 2006.
3. Khurmi, R.S.,"Theory of Machines", 14th Edition, S Chand Publications, 2005.
4. Rao.J.S. and Dukkipati.R.V. "Mechanisms and Machine Theory", Wiley-Eastern Ltd., New Delhi, 1992.
5. Robert L. Norton, "Kinematics and Dynamics of Machinery", Tata McGraw-Hill, 2009.
6. V.Ramamurthi, "Mechanics of Machines", Narosa Publishing House, 2002.

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A PNEUMATIC AXLE SAFETY FOR FLATTED VEHICLE USING IR SENSOR

A PROJECT REPORT

Submitted by

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ANNA UNIVERSITY: CHENNAI 600 025

APRIL 2022

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"A PNEUMATIC AXLE SAFETY FOR FLATTED VEHICLE USING IR SENSOR"** is the bonafide work of **"R.THILIPAN (920818114503), G.RITHISH KUMAR (920818114501), M.SANTHOSHKUMAR(920818114502),S.JEEVAKALIDAS(920818114302)"** who carried out the project work under my supervision.

25/6/22

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624401Submitted for viva-voice held on 28.6.2022

INTERNAL EXAMINER

NPR COLLEGE OF ENGG. & TECHNOLOGY NATHAM

25/6/22

EXTERNAL EXAMINER

ABSTRACT

In pneumatic systems, compressors are used to compress and supply the necessary quantity of air. Basically a compressor increases the pressure of a gas by reducing its volume as described by gas laws. Pneumatic systems normally use a centralized air compressor which is considered to be an infinite air source. This pressurized air can be piped from one source to the various locations. The air is piped to each circuit though an air filter, to remove contaminants which mighty harm the pneumatic components such as valves and cylinders. The speed bumps are effective in keeping vehicle speeds down, their use is sometimes controversial—as they can increase traffic noise, may damage vehicles if traversed at too great a speed, and slow emergency vehicles. So, it can be avoided by using an pneumatic pressure lifting for an bumper and axle safety. The aim is to design and develop a control system based an intelligent electronically controlled pneumatic system is called " PNEUMATIC AXLE SAFETY FOR FLATTED VEHICLE BY USING IR SENSOR. **Sensor Operated Bumper and lifting Mechanism** is consists of IR transmitter and Receiver circuit, Control Unit, Pneumatic lifting system. The IR sensor is used to detect the obstacle. There is any obstacle and a speed bumps in the path, the IR sensor senses the obstacle and giving the control signal and react to lift the axle by the action of pneumatic system.

CONCLUSIONS

This project has provided us an excellent opportunity and experience to use our limited knowledge.

In pneumatic systems, compressors are used to compress and supply the necessary quantity of air. Basically a compressor increases the pressure of a gas by reducing its volume as described by gas laws. Pneumatic systems normally use a centralized air compressor which is considered to be an infinite air source. This pressurized air can be piped from one source to the various locations. The air is piped to each circuit though an air filter, to remove contaminants which mighty harm the pneumatic components such as valves and cylinders. The speed bumps are effective in keeping vehicle speeds down, their use is sometimes controversial—as they can increase traffic noise, may damage vehicles if traversed at too great a speed, and slow emergency vehicles. So, it can be avoided by using an pneumatic pressure lifting for an bumper and axle safety. The aim is to design and develop a control system based an intelligent electronically controlled pneumatic system is called - PNEUMATIC AXLE SAFETY FOR FLATTED VEHICLE BY USING IR SENSOR. **Sensor Operated Bumper and lifting Mechanism** is consists of IR transmitter and Receiver circuit, Control Unit.

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OAT551 **AUTOMOTIVE SYSTEMS** L T P C
3 0 0 3

OBJECTIVES:

- To understand the construction and working principle of various parts of an automobile.
- To have the practice for assembling and dismantling of engine parts and transmission system

UNIT I AUTOMOTIVE ENGINE AUXILIARY SYSTEMS 9

Automotive engines- External combustion engines –Internal combustion engines -classification of engines- SI Engines- CI Engines- two stroke engines -four stroke engines- construction and working principles - IC engine components- functions and materials -valve timing –port timing diagram- Injection system -Unit injector system- Rotary distributor type - Electronically controlled injection system for SI engines-CI engines-Ignition system - Electronic ignition system -Transistorized ignition system, capacitive discharge ignition system.

UNIT II VEHICLE FRAMES AND STEERING SYSTEM 9

Vehicle construction and different Chassis layouts –classifications of chassis- types of frames- frameless chassis construction –articulated vehicles- vehicle body - Vehicle aerodynamics-various resistances and its effects - steering system –conventional – sophisticated vehicle- and types of steering gear box-Power Steering- Steering geometry-condition for true rolling motion-Ackermann's- Devi's steering system - types of stub axle –Types of rear axles.

UNIT III TRANSMISSION SYSTEMS 9

Clutch-types and construction, gear boxes- manual and automatic, gear shift mechanisms, Over drive, transfer box, fluid flywheel, torque converter, propeller shaft, slip joints, universal joints –- Hotchkiss Drive and Torque Tube Drive- rear axle- Differential-wheels and tyres.

UNIT IV SUSPENSION AND BRAKES SYSTEMS 9

Suspension Systems- conventional Suspension Systems -independent Suspension Systems –leaf spring – coil spring –taper-lite - eligo,s spring Types of brakes -Pneumaticand Hydraulic Braking Systems, Antilock Braking System (ABS), electronic brake force distribution (EBD) and Traction Control. Derive the equation of Forces acting while applying a brakes on plain surface - inclined road-gradient.

UNIT V ALTERNATIVE ENERGY SOURCES 9

Use of Natural Gas, Liquefied Petroleum Gas, Bio-diesel, Bio-ethanol, Gasohol and Hydrogen in Automobiles- Engine modifications required –Performance, Combustion and Emission Characteristics of SI and CI engines with these alternate fuels - Electric and HybridVehicles, Fuel Cell. Turbo chargers -Engine emission control by three way catalytic convertersystem.
Note: Practical Training in dismantling and assembling of Engine parts and Transmission Systems should be given to the students.

TOTAL: 45 PERIODS

OUTCOMES:

- Upon completion of this course, the students will be able to identify the different components in automobile engineering.
- Have clear understanding on different auxiliary and transmission systems usual.

TEXT BOOKS:

1. Ganesan V. "Internal Combustion Engines", Third Edition, Tata McGraw-Hill, 2007.
2. Jain K.K. and Asthana .R.B, "Automobile Engineering" Tata McGraw Hill Publishers, New Delhi, 2002.
3. Kirpal Singh, "Automobile Engineering", Vol 1 & 2, Seventh Edition, Standard Publishers,New Delhi, 1997.

REFERENCES:

1. Heinz Heisler, "Advanced Engine Technology," SAE International Publications USA, 1998.
2. Joseph Heitner, "Automotive Mechanics," Second Edition, East-West Press, 1999.
3. Martin W, Stockel and Martin T Stockle , "Automotive Mechanics Fundamentals,"The Good heart –Will Cox Company Inc, USA ,1978.
4. Newton ,Steeds and Garet, "Motor Vehicles", Butterworth Publishers,1989.

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TO WHOM IT MAY CONCERN

This is to certify that Mr. RAKESH M studying in Third Year BE Mechanical Engineering of NPR College of Engineering & Technology, Natham has undergone internship in our organization from 18.07.2022 to 17.08.2022.

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

With Regards

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ME8651 **DESIGN OF TRANSMISSION SYSTEMS**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To gain knowledge on the principles and procedure for the design of Mechanical power Transmission components.
- To understand the standard procedure available for Design of Transmission of Mechanical elements
- To learn to use standard data and catalogues (Use of P S G Design Data Book permitted)

UNIT I DESIGN OF FLEXIBLE ELEMENTS 9

Design of Flat belts and pulleys - Selection of V belts and pulleys – Selection of hoisting wire ropes and pulleys – Design of Transmission chains and Sprockets.

UNIT II SPUR GEARS AND PARALLEL AXIS HELICAL GEARS 9

Speed ratios and number of teeth-Force analysis -Tooth stresses - Dynamic effects – Fatigue strength - Factor of safety - Gear materials – Design of straight tooth spur & helical gears based on strength and wear considerations – Pressure angle in the normal and transverse plane-Equivalent number of teeth-forces for helical gears.

UNIT III BEVEL, WORM AND CROSS HELICAL GEARS 9

Straight bevel gear: Tooth terminology, tooth forces and stresses, equivalent number of teeth. Estimating the dimensions of pair of straight bevel gears. Worm Gear: Merits and demerits-terminology. Thermal capacity, materials-forces and stresses, efficiency, estimating the size of the worm gear pair. Cross helical: Terminology-helix angles-Estimating the size of the pair of cross helical gears.

UNIT IV GEAR BOXES 9

Geometric progression - Standard step ratio - Ray diagram, kinematics layout -Design of sliding mesh gear box - Design of multi speed gear box for machine tool applications - Constant mesh gear box - Speed reducer unit. – Variable speed gear box, Fluid Couplings, Torque Converters for automotive applications.

UNIT V CAMS, CLUTCHES AND BRAKES 9

Cam Design: Types-pressure angle and under cutting base circle determination-forces and surface stresses. Design of plate clutches –axial clutches-cone clutches-internal expanding rim clutches-Electromagnetic clutches. Band and Block brakes - external shoe brakes – Internal expanding shoe brake.

TOTAL : 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 apply the concepts of design to belts, chains and rope drives.
CO2 apply the concepts of design to spur, helical gears.
CO3 apply the concepts of design to worm and bevel gears.
CO4 apply the concepts of design to gear boxes .
CO5 apply the concepts of design to cams, brakes and clutches

TEXT BOOKS:

1. Bhandari V, "Design of Machine Elements", 4th Edition, Tata McGraw-Hill Book Co., 2016.
2. Joseph Shigley, Charles Mischke, Richard Budynas and Keith Nisbett, "Mechanical Engineering Design", 8th Edition, Tata McGraw-Hill, 2008.

REFERENCES:

1. Merhyle F. Spotts, Terry E. Shoup and Lee E. Hornberger, "Design of Machine Elements" 8th Edition, Printice Hall, 2003.
2. Orthwein W, "Machine Component Design", Jaico Publishing Co, 2003.
3. Prabhu. T.J., "Design of Transmission Elements", Mani Offset, Chennai, 2000.
4. Robert C. Juvinall and Kurt M. Marshek, "Fundamentals of Machine Design", 4th Edition, Wiley, 2005
5. Sundararajamoorthy T. V, Shanmugam .N, "Machine Design", Anuradha Publications, Chennai, 2003.

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Date: 17.08.2022

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ME8691 **COMPUTER AIDED DESIGN AND MANUFACTURING** L T P C
3 0 0 3

OBJECTIVES:

- To provide an overview of how computers are being used in mechanical component design
- To understand the application of computers in various aspects of Manufacturing viz., Design, Proper planning, Manufacturing cost, Layout & Material Handling system.

UNIT I INTRODUCTION 9

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

UNIT II GEOMETRIC MODELING 9

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 andB-rep

UNIT III CAD STANDARDS 9

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.

UNIT IV FUNDAMENTAL OF CNC AND PART PROGRAMING 9

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.

UNIT V CELLULAR MANUFACTURING AND FLEXIBLE MANUFACTURING SYSTEM (FMS) 9

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

TOTAL : 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

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CO1	Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metri cs
CO2	Explain the fundamentals of parametric curves, surfaces and Solids
CO3	Summarize the different types of Standard systems used in CAD
CO4	Apply NC & CNC programming concepts to develop part programme for Lathe & Milling Machines
CO5	Summarize the different types of techniques used in Cellular Manufacturing and FMS

TEXT BOOKS:

1. Ibrahim Zeid "Mastering CAD CAM" Tata McGraw-Hill PublishingCo.2007
2. Mikell.P.Groover "Automation, Production Systems and Computer Integrated Manufacturing", Prentice Hall of India, 2008.
3. Radhakrishnan P, SubramanyanS.andRaju V., "CAD/CAM/CIM", 2nd Edition, New Age International (P) Ltd, New Delhi,2000.

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. William M Neumann and Robert F.Sproul "Principles of Computer Graphics", McGraw Hill Book Co. Singapore, 1989.

COLLEGE OF ENGG. & TECHNOLOGY NATHAM

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DESIGN AND FABRICATION OF TREADMILL BICYCLE

A PROJECT REPORT

Submitted by

S.DINESH KUMAR	**920818114007**
M.JOTHIVEL	**920818114010**
R.NAVEEN PRAKASH	**920818114014**
R.SANGUNATHAN	**920818114023**

in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

IN

MECHANICAL ENGINEERING

NPR COLLEGE OF ENGINEERING AND TECHNOLOGY, NATHAM

ANNA UNIVERSITY::CHENNAI 600 025

JUNE 2022

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"DESIGN AND FABRICATION OF TREADMILL BICYCLE"**is the bonafide work of **"S.DINESH KUMAR (920818114007), M.JOTHIVEL (920818114010), R.NAVEEN PRAKASH (920818114014), R.SANGUNATHAN (920818114023)"** who carried out the project work under my supervision.

25/6/22

SIGNATURE

Dr.S.PAULSINGARAYAR, ME., Ph.D.,

HEAD OF THE DEPARTMENT

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SIGNATURE

Mr. B.GOPI, ME.,

SUPERVISOR

Assistant Professor

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Submitted for the Project viva-voce examination held on 25.06.2022

INTERNAL EXAMINER

NPR COLLEGE OF ENGG. & TECHNOLOGY NATHAM

25/6/22

EXTERNAL EXAMINER

ABSTRACT

This project deals with conversion of a conventional bicycle into treadmill bicycle. In this bicycle the frame of the bicycle is completely modified and the treadmill is placed in between the two wheels, on which user will walk. As the user walks or runs on the treadmill the belt moves to the rear. At the rear roller RPM Sensor is attached to the roller from where Sensor will sense the speed of the roller and accordingly it will send signal to motor. The motion of motor is transmitted to the front wheel by which we can get the motion of wheel and bicycle runs.

Exercise is inevitable to keep health in good status. There are few scientific studies to show the differences between different types of exercises in health and disease. This two type of cardio exercise mostly help to reduce health disease. But each one have some defect from compare one to another. So we combine this two to make more efficient to use for cardio advantages and disadvantages of treadmill exercise and bicycle ergometer exercise, so that these two types of exercise can be appropriately used for health promotion, diagnosis of diseases and for rehabilitation of the individuals.

CHAPTER 13

CONCLUSION

This innovation can be perfectly used for both travelling and exercising purposes. As it runs on electric energy so there is no emission, we can say it emission free device. And is also fuel saving as well. It is pleasant to those people who loves to exercise. In future, an alternator can also be added for generation of electricity to charge a battery itself while walking on the treadmill and the stored energy can be utilized in requirement of excess power.

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ME8693	HEAT AND MASS TRANSFER	L	T	P	C
		3	2	0	4

OBJECTIVES:

- To understand the mechanisms of heat transfer under steady and transient conditions.
- To understand the concepts of heat transfer through extended surfaces.
- To learn the thermal analysis and sizing of heat exchangers and to understand the basic concepts of mass transfer.

(Use of standard HMT data book permitted)

UNIT I CONDUCTION **9+6**

General Differential equation of Heat Conduction– Cartesian and Polar Coordinates – One Dimensional Steady State Heat Conduction — plane and Composite Systems – Conduction with Internal Heat Generation – Extended Surfaces – Unsteady Heat Conduction – Lumped Analysis – Semi Infinite and Infinite Solids –Use of Heisler's charts.

UNIT II CONVECTION **9+6**

Free and Forced Convection - Hydrodynamic and Thermal Boundary Layer. Free and Forced Convection during external flow over Plates and Cylinders and Internal flow through tubes .

UNIT III PHASE CHANGE HEAT TRANSFER AND HEAT EXCHANGERS **9+6**

Nusselt's theory of condensation - Regimes of Pool boiling and Flow boiling. Correlations in boiling and condensation. Heat Exchanger Types - Overall Heat Transfer Coefficient – Fouling Factors - Analysis – LMTD method - NTU method.

UNIT IV RADIATION **9+6**

Black Body Radiation – Grey body radiation - Shape Factor – Electrical Analogy – Radiation Shields. Radiation through gases.

UNIT V MASS TRANSFER **9+6**

Basic Concepts – Diffusion Mass Transfer – Fick's Law of Diffusion – Steady state Molecular Diffusion – Convective Mass Transfer – Momentum, Heat and Mass Transfer Analogy – Convective Mass Transfer Correlations.

TOTAL : 75 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1	Apply heat conduction equations to different surface configurations under steady state and transient conditions and solve problems
CO2	Apply free and forced convective heat transfer correlations to internal and external flows through/over various surface configurations and solve problems
CO3	Explain the phenomena of boiling and condensation, apply LMTD and NTU methods of thermal analysis to different types of heat exchanger configurations and solve problems
CO4	Explain basic laws for Radiation and apply these principles to radiative heat transfer between different types of surfaces to solve problems
CO5	Apply diffusive and convective mass transfer equations and correlations to solve problems for different applications

TEXT BOOKS:

1. Holman, J.P., "Heat and Mass Transfer", Tata McGraw Hill, 2000
2. Yunus A. Cengel, "Heat Transfer A Practical Approach", Tata McGraw Hill, Second Edition 2003

REFERENCES:

1. Frank P. Incropera and David P. Dewitt, "Fundamentals of Heat and Mass Transfer", John Wiley & Sons, 1998.
2. Kothandaraman, C.P., "Fundamentals of Heat and Mass Transfer", New Age International, New Delhi, 1998.
3. Nag, P.K., "Heat Transfer", Tata McGraw Hill, New Delhi, 2002
4. Ozisik, M.N., "Heat Transfer", McGraw Hill Book Co., 1994.
5. R.C. Sachdeva, "Fundamentals of Engineering Heat & Mass transfer", New Age International Publishers, 2009

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Date: 11.08.2022

TO WHOM IT MAY CONCERN

This is to certify that **ARUNKUMAR K E** a student of Second Year BE Mechanical Engineering of NPR college of Engineering & Technology, Natham, Dindigul, has successfully completed the in-plant training from 21.07.2022 to 11.08.2022 at this **Bnazrum Agro Exports (P) Ltd.** During the period of her in-plant training with us, he was found Punctual, Hardworking and Inquisitive.

We wish her all the best in future endeavors.

For Bnazrum Agro Exports (P) Ltd.,
Manager.HR
(R.SUBRAMANI)

(Manager HR)

Dr. J.SUNDARARAJAN.
B.E., M.Tech., Ph.D.,
Principal

NPR COLLEGE OF ENGG. & TECHNOLOGY
NATHAM

ME8692 **FINITE ELEMENT ANALYSIS**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the concepts of Mathematical Modeling of Engineering Problems.
- To appreciate the use of FEM to a range of Engineering Problems.

UNIT I INTRODUCTION **9**

Historical Background – Mathematical Modeling of field problems in Engineering – Governing Equations – Discrete and continuous models – Boundary, Initial and Eigen Value problems– Weighted Residual Methods – Variational Formulation of Boundary Value Problems – Ritz Technique – Basic concepts of the Finite Element Method.

UNIT II ONE-DIMENSIONAL PROBLEMS **9**

One Dimensional Second Order Equations – Discretization – Element types- Linear and Higher order Elements – Derivation of Shape functions and Stiffness matrices and force vectors- Assembly of Matrices - Solution of problems from solid mechanics and heat transfer. Longitudinal vibration frequencies and mode shapes. Fourth Order Beam Equation –Transverse deflections and Natural frequencies of beams.

UNIT III TWO DIMENSIONAL SCALAR VARIABLE PROBLEMS **9**

Second Order 2D Equations involving Scalar Variable Functions – Variational formulation –Finite Element formulation – Triangular elements – Shape functions and element matrices and vectors. Application to Field Problems - Thermal problems – Torsion of Non circular shafts –Quadrilateral elements – Higher Order Elements.

UNIT IV TWO DIMENSIONAL VECTOR VARIABLE PROBLEMS **9**

Equations of elasticity – Plane stress, plane strain and axisymmetric problems – Body forces and temperature effects – Stress calculations - Plate and shell elements.

UNIT V ISOPARAMETRIC FORMULATION **9**

Natural co-ordinate systems – Isoparametric elements – Shape functions for iso parametric elements – One and two dimensions – Serendipity elements – Numerical integration and application to plane stress problems - Matrix solution techniques – Solutions Techniques to Dynamic problems – Introduction to Analysis Software.

TOTAL : 45 PERIODS

OUTCOMES

CO1 Summarize the basics of finite element formulation.
CO2 Apply finite element formulations to solve one dimensional Problems.
CO3 Apply finite element formulations to solve two dimensional scalar Problems.
CO4 Apply finite element method to solve two dimensional Vector problems.
CO5 Apply finite element method to solve problems on iso parametric element and dynamic Problems.

TEXT BOOKS:

1. Reddy. J.N., "An Introduction to the Finite Element Method", 3rd Edition, Tata McGraw-Hill, 2005
2. Seshu, P, "Text Book of Finite Element Analysis", Prentice-Hall of India Pvt. Ltd., New Delhi, 2007.

REFERENCES:

1. Bhatti Asghar M, "Fundamental Finite Element Analysis and Applications", John Wiley & Sons, 2005 (Indian Reprint 2013)*
2. Chandrupatla & Belagundu, "Introduction to Finite Elements in Engineering", 3rd Edition, Prentice Hall College Div, 1990
3. Logan, D.L., "A first course in Finite Element Method", Thomson Asia Pvt. Ltd., 2002
4. Rao, S.S., "The Finite Element Method in Engineering", 3rd Edition, Butterworth Heinemann, 2004
5. Robert D. Cook, David S. Malkus, Michael E. Plesha, Robert J. Witt, "Concepts and Applications of Finite Element Analysis", 4th Edition, Wiley Student Edition, 2002.

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SMART BRAKING SYSTEM BY USING AN ULTRASONIC SENSOR IN TWO WHEELER

A PROJECT REPORT

Submitted by

S.SRIRAM – 920818114027

A.SRIVEL – 920818114028

M.SYED AKMAL – 920818114032

G.VISHVA – 920818114036

in partial fulfillment for the award of the degree

Of

BACHELOR OF ENGINEERING

IN

MECHANICAL ENGINEERING

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ANNA UNIVERSITY: CHENNAI 600 025

JUNE 2022

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"SMART BRAKING SYSTEM BY USING AN ULTRASONIC SENSOR IN TWO WHEELER"** is the bonafide work of **"S.SRIRAM (920818114027), A.SRIVEL (920818114028), M.SYED AKMAL (920818114032), G.VISHVA (920818114036)"** who carried out the project work under my supervision.

SIGNATURE

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Submitted for the Project viva-voce examination held on 25.06.2022

INTERNAL EXAMINER

EXTERNAL EXAMINER

ABSTRACT

Motorized accidents on many motorways are caused by sudden braking. Sudden braking occurs because of the distance between the driver and the obstacles in front that are too short, and the driving speed is too high, there is a delay in braking and a surge of force.

Supposedly, vehicle motion when braking occurs must comply with the physics principle of following the kinematics concept of non-uniform motion slowing down between the driver with obstacles in front, and the concept of non-uniform circular motion slowing down on the wheels of a motorized vehicle.

For this reason, an automatic braking instrumentation system is created using the principle of non-uniform motion slowing down and nonuniform circular motion slowing down, with distance and speed variables obtained from the sensor mounted on a motorized vehicle.

The technology applied includes the main parts, the controller unit as microcontroller, distance measuring unit use ultrasonic sensor, servo as mechanical drive automatic brakes, and battery as power source.

CHAPTER 9

CONCLUSION

As a result, the Arduino circuit is built and operated for testing. The safety of the vehicle's driver and passengers is extremely effectively safeguarded. For safety, the sensor connection from the Arduino board is chosen for a specific purpose. Motorcycle accidents are dramatically reduced when this safety device is used. The scooter/motorcycle comes to a complete stop during the test, with no system faults. If we utilise this strategy, we might be able to avoid many of the accidents caused by the following system. Ultrasonic sensor, LCD, are only a few of the low-cost components in the system. This technology may have a number of benefits, including the estimating the distance between two vehicles. We will reduce the speed of one car in the future based on the following distance of another vehicle. We may be able to prevent many accidents with this technology, and INDIA will become an accident-free country.

Dr. J.SUNDA[illegible]JAN,
[illegible] D.,
P[illegible]
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NATTAM

ME8694 **HYDRAULICS AND PNEUMATICS**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide student with knowledge on the application of fluid power in process, construction and manufacturing Industries.
- To provide students with an understanding of the fluids and components utilized in modern industrial fluid power system.
- To develop a measurable degree of competence in the design, construction and operation of fluid power circuits.

UNIT I FLUID POWER PRINICIPLES AND HYDRAULIC PUMPS 9

Introduction to Fluid power – Advantages and Applications – Fluid power systems – Types of fluids - Properties of fluids and selection – Basics of Hydraulics – Pascal's Law – Principles of flow - Friction loss – Work, Power and Torque Problems, Sources of Hydraulic power : Pumping Theory – Pump Classification – Construction, Working, Design, Advantages, Disadvantages, Performance, Selection criteria of Linear and Rotary – Fixed and Variable displacement pumps – Problems.

UNIT II HYDRAULIC ACTUATORS AND CONTROL COMPONENTS 9

Hydraulic Actuators: Cylinders – Types and construction, Application, Hydraulic cushioning – Hydraulic motors - Control Components : Direction Control, Flow control and pressure control valves – Types, Construction and Operation – Servo and Proportional valves – Applications – Accessories : Reservoirs, Pressure Switches – Applications – Fluid Power ANSI Symbols – Problems.

UNIT III HYDRAULIC CIRCUITS AND SYSTEMS 9

Accumulators, Intensifiers, Industrial hydraulic circuits – Regenerative, Pump Unloading, Double-Pump, Pressure Intensifier, Air-over oil, Sequence, Reciprocation, Synchronization, Fail-Safe, Speed Control, Hydrostatic transmission, Electro hydraulic circuits, Mechanical hydraulic servo systems.

UNIT IV PNEUMATIC AND ELECTRO PNEUMATIC SYSTEMS 9

Properties of air – Perfect Gas Laws – Compressor – Filters, Regulator, Lubricator, Muffler, Air control Valves, Quick Exhaust Valves, Pneumatic actuators, Design of Pneumatic circuit – Cascade method – Electro Pneumatic System – Elements – Ladder diagram – Problems, Introduction to fluidics and pneumatic logic circuits.

UNIT V TROUBLE SHOOTING AND APPLICATIONS 9

Installation, Selection, Maintenance, Trouble Shooting and Remedies in Hydraulic and Pneumatic systems, Design of hydraulic circuits for Drilling, Planning, Shaping, Surface grinding, Press and Forklift applications. Design of Pneumatic circuits for Pick and Place applications and tool handling in CNC Machine tools – Low cost Automation – Hydraulic and Pneumatic power packs.

TOTAL:45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the Fluid power and operation of different types of pumps.

CO2 Summarize the features and functions of Hydraulic motors, actuators and Flow control valves

CO3 Explain the different types of Hydraulic circuits and systems

CO4 Explain the working of different pneumatic circuits and systems

CO5 Summarize the various trouble shooting methods and applications of hydraulic and pneumatic systems.

TEXT BOOKS:

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Date: 11.08.2022

TO WHOM IT MAY CONCERN

This is to certify that **ABU ALI A** a student of Second Year BE Mechanical Engineering of NPR college of Engineering & Technology, Natham, Dindigul, has successfully completed the in-plant training from 21.07.2022 to 11.08.2022 at this **Bnazrum Agro Exports (P) Ltd.** During the period of his in-plant training with us, he was found Punctual, Hardworking and Inquisitive.

We wish him all the best in future endeavors.

For Bnazrum Agro Exports (P) Ltd.,
Manager HR
(R.SUBRAMANI)

(Manager HR)

Dr. J. SUBRAMANIAN, M.E., M.Tech., Ph.D.,
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NPR COLLEGE OF ENGG. & TECHNOLOGY * NATHAM

fssai 100 % E.O.U FDA BSCI

PR8592 **WELDING TECHNOLOGY** L T P C
3 0 0 3

OBJECTIVE:

- To understand the basics of welding and to know about the various types of welding processes

UNIT I GAS AND ARC WELDING PROCESSES: 9

Fundamental principles – Air Acetylene welding, Oxyacetylene welding, Carbon arc welding, Shielded metal arc welding, Submerged arc welding, TIG & MIG welding, Plasma arc welding and Electroslag welding processes - advantages, limitations and applications.

UNIT II RESISTANCE WELDING PROCESSES: 9

Spot welding, Seam welding, Projection welding, Resistance Butt welding, Flash Butt welding, Percussion welding and High frequency resistance welding processes - advantages, limitations and applications.

UNIT III SOLID STATE WELDING PROCESSES: 9

Cold welding, Diffusion bonding, Explosive welding, Ultrasonic welding, Friction welding, Forge welding, Roll welding and Hot pressure welding processes - advantages, limitations and applications.

UNIT IV OTHER WELDING PROCESSES: 9

Thermit welding, Atomic hydrogen welding, Electron beam welding, Laser Beam welding, Friction stir welding, Under Water welding, Welding automation in aerospace, nuclear and surface transport vehicles.

UNIT V DESIGN OF WELD JOINTS, WELDABILITY AND TESTING OF WELDMENTS 9

Various weld joint designs – Welding defects – causes and remedies - Weldability of Aluminium, Copper, and Stainless steels. Destructive and non destructive testing of weldments.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course, the students can able

- Understand the construction and working principles of gas and arc welding process.
- Understand the construction and working principles of resistance welding process.
- Understand the construction and working principles of various solid state welding process.
- Understand the construction and working principles of various special welding processes.
- Understand the concepts on weld joint design, weldability and testing of weldments.

TEXT BOOKS

1. Little R.L., "Welding and welding Technology", Tata McGraw Hill Publishing Co., Ltd., New Delhi, 34th reprint, 2008.
2. Parmer R.S., "Welding Engineering and Technology", 1st Edition, Khanna Publishers, New Delhi, 2008.
3. Parmer R.S., "Welding Processes and Technology", Khanna Publishers, New Delhi, 1992.

REFERENCES

1. AWS- Welding Hand Book. 8th Edition. Vol- 2. "Welding Process"
2. Christopher Davis. "Laser Welding- Practical Guide". Jaico Publishing House.
3. Davis A.C., "The Science and Practice of Welding", Cambridge University Press, Cambridge, 1993
4. Nadkarni S.V. "Modern Arc Welding Technology", Oxford IBH Publishers, 1st Edition, 2005.
5. Schwartz M.M. "Metals Joining Manual". McGraw Hill Books, 1979.
6. Tylecote R.F. "The Solid Phase Welding of Metals". Edward Arnold Publishers Ltd. London.

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Date: 11.08.2022

TO WHOM IT MAY CONCERN

This is to certify that **KARTHICK S** a student of Second Year BE Mechanical Engineering of NPR college of Engineering & Technology, Natham, Dindigul, has successfully completed in-plant training from 21.07.2022 to 11.08.2022 at this **Bnazrum Agro Exports (P) Ltd.** During the period of his in-plant training with us, he was found Punctual, Hardworking and Inquisitive.

We wish him all the best in future endeavors.

For Bnazrum Agro Exports (P) Ltd.,
Manager.HR
(R.SUBRAMANI)

(Manager HR)

fssai 100% FDA BSCI

NPR COLLEGE OF ENGG. & TECHNOLOGY
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ME8792 **POWER PLANT ENGINEERING** L T P C 3 0 0 3

OBJECTIVE:

- Providing an overview of Power Plants and detailing the role of Mechanical Engineers in their operation and maintenance.

UNIT I COAL BASED THERMAL POWER PLANTS 9

Rankine cycle - improvisations, Layout of modern coal power plant, Super Critical Boilers, FBC Boilers, Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants – Fuel and ash handling, Draught system, Feed water treatment. Binary Cycles and Cogeneration systems.

UNIT II DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS 9

Otto, Diesel, Dual & Brayton Cycle - Analysis & Optimisation. Components of Diesel and Gas Turbine power plants. Combined Cycle Power Plants. Integrated Gasifier based Combined Cycle systems.

UNIT III NUCLEAR POWER PLANTS 9

Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors : Boiling *Water Reactor* (BWR), *Pressurized Water Reactor* (PWR), CANada Deuterium- Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants.

UNIT IV POWER FROM RENEWABLE ENERGY 9

Hydro Electric Power Plants – Classification, Typical Layout and associated components including Turbines. Principle, Construction and working of Wind, Tidal, *Solar* Photo Voltaic (SPV), Solar Thermal, Geo Thermal, Biogas and Fuel Cell power systems.

UNIT V ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS 9

Power tariff types, Load distribution parameters, load curve, Comparison of site selection criteria, relative merits & demerits, Capital & Operating Cost of different power plants. Pollution control technologies including Waste Disposal Options for Coal and Nuclear Power Plants.

TOTAL : 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the layout, construction and working of the components inside a thermal power plant.

CO2 Explain the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants.

CO3 Explain the layout, construction and working of the components inside nuclear power plants.

CO4 Explain the layout, construction and working of the components inside Renewable energy power plants.

CO5 Explain the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.

TEXT BOOK:

1. Nag. P.K., "Power Plant Engineering", Third Edition, Tata McGraw – Hill Publishing Company Ltd., 2008.

REFERENCES:

1. El-Wakil. M.M., "Power Plant Technology", Tata McGraw – Hill Publishing Company Ltd., 2010.
2. Godfrey Boyle, "Renewable energy", Open University, Oxford University Press in association with the Open University, 2004.
3. Thomas C. Elliott, Kao Chen and Robert C. Swanekamp, "Power Plant Engineering", Second Edition, Standard Handbook of McGraw - Hill, 1998.

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Date: 11.08.2022

TO WHOM IT MAY CONCERN

This is to certify that **NITHESH M** a student of Second Year BE Mechanical Engineering of NPR college of Engineering & Technology, Natham, Dindigul, has successfully completed the in-plant training from 21.07.2022 to 11.08.2022 at this **Bnazrum Agro Exports (P) Ltd**. During the period of her in-plant training with us, she was found Punctual, Hardworking and Inquisitive.

We wish her all the best in future endeavors.

For Bnazrum Agro Exports (P) Ltd.,
Manager.HR
(R.SUBRAMANI)

(Manager HR)

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

NPR COLLEGE OF ENGG. & TECHNOLOGY * NATHAM

ME8793 **PROCESS PLANNING AND COST ESTIMATION**

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce the process planning concepts to make cost estimation for various products after process planning

UNIT I INTRODUCTION TO PROCESS PLANNING 9

Introduction- methods of process planning-Drawing interpretation-Material evaluation – steps in process selection-.Production equipment and tooling selection

UNIT II PROCESS PLANNING ACTIVITIES 9

Process parameters calculation for various production processes-Selection jigs and fixtures election of quality assurance methods - Set of documents for process planning-Economics of process planning- case studies

UNIT III INTRODUCTION TO COST ESTIMATION 9

Importance of costing and estimation -methods of costing-elements of cost estimation -Types of estimates – Estimating procedure- Estimation labor cost, material cost- allocation of over head charges- Calculation of depreciation cost

UNIT IV PRODUCTION COST ESTIMATION 9

Estimation of Different Types of Jobs - Estimation of Forging Shop, Estimation of Welding Shop, Estimation of Foundry Shop

UNIT V MACHINING TIME CALCULATION 9

Estimation of Machining Time - Importance of Machine Time Calculation- Calculation of Machining Time for Different Lathe Operations ,Drilling and Boring - Machining Time Calculation for Milling, Shaping and Planning -Machining Time Calculation for Grinding.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 select the process, equipment and tools for various industrial products.
CO2 prepare process planning activity chart.
CO3 explain the concept of cost estimation.
CO4 compute the job order cost for different type of shop floor.
CO5 calculate the machining time for various machining operations.

TEXT BOOKS:

1. Peter scalon, "Process planning, Design/Manufacture Interface", Elsevier science technology Books, Dec 2002.
2. Sinha B.P, "Mechanical Estimating and Costing", Tata-McGraw Hill publishing co, 1995.

REFERENCES:

1. Chitale A.V. and Gupta R.C., "Product Design and Manufacturing", 2nd Edition, PHI, 2002.
2. Ostwalal P.F. and Munez J., "Manufacturing Processes and systems", 9th Edition, John Wiley, 1998.
3. Russell R.S and Tailor B.W, "Operations Management", 4th Edition, PHI, 2003.
4. Mikell P. Groover, "Automation, Production, Systems and Computer Integrated Manufacturing", Pearson Education 2001.
5. K.C. Jain & L.N. Aggarwal, "Production Planning Control and Industrial Management", Khanna Publishers 1990.

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Website : www.bnazrum.com

Date: 11.08.2022

TO WHOM IT MAY CONCERN

This is to certify that **SABARINATHAN S** a student of Second Year BE Mechanical Engineering of NPR college of Engineering & Technology, Natham, Dindigul, has successfully completed the in-plant training from 21.07.2022 to 11.08.2021 at **Bnazrum Agro Exports (P) Ltd.** During the period of his in-plant training with us, he was found Punctual, Hardworking and Inquisitive.

We wish him all the best in future endeavors.

For Bnazrum Agro Exports (P) Ltd.,
Manager.HR
(R.SUBRAMANI)

(Manager HR)

Dr. J.SUNDARARAJA
B.E; M.Tech., Ph.D.,
Principal
Engineering & Technology
624 401.

100 % E.O.U

NPR COLLEGE OF ENGG. & TECHNOLOGY
NATHAM

ME8791 **MECHATRONICS** L T P C
3 0 0 3

OBJECTIVE:

- To impart knowledge about the elements and techniques involved in Mechatronics systems which are very much essential to understand the emerging field of automation.

UNIT I INTRODUCTION 9

Introduction to Mechatronics – Systems – Concepts of Mechatronics approach – Need for Mechatronics - Emerging areas of Mechatronics - Classification of Mechatronics. Sensors and Transducers: Static and dynamic Characteristics of Sensor, Potentiometers - LVDT - Capacitance sensors - Strain gauges - Eddy current sensor - Hall effect sensor - Temperature sensors - Light sensors

UNIT II MICROPROCESSOR AND MICROCONTROLLER 9

Introduction - Architecture of 8085 - Pin Configuration - Addressing Modes -Instruction set, Timing diagram of 8085 - Concepts of 8051 microcontroller - Block diagram,.

UNIT III PROGRAMMABLE PERIPHERAL INTERFACE 9

Introduction - Architecture of 8255, Keyboard interfacing, LED display -interfacing, ADC and DAC interface, Temperature Control - Stepper Motor Control - Traffic Control interface.

UNIT IV PROGRAMMABLE LOGIC CONTROLLER 9

Introduction - Basic structure - Input and output processing - Programming - Mnemonics - Timers, counters and internal relays - Data handling - Selection of PLC.

UNIT V ACTUATORS AND MECHATRONIC SYSTEM DESIGN 9

Types of Stepper and Servo motors – Construction – Working Principle – Advantages and Disadvantages. Design process-stages of design process - Traditional and Mechatronics design concepts - Case studies of Mechatronics systems - Pick and place Robot - Engine Management system – Automatic car park barrier.

TOTAL : 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Discuss the interdisciplinary applications of Electronics, Electrical, Mechanical and Computer Systems for the Control of Mechanical, Electronic Systems and sensor technology.

CO2 Discuss the architecture of Microprocessor and Microcontroller, Pin Diagram, Addressing Modes of Microprocessor and Microcontroller.

CO3 Discuss Programmable Peripheral Interface, Architecture of 8255 PPI, and various device interfacing

CO4 Explain the architecture, programming and application of programmable logic controllers to problems and challenges in the areas of Mechatronic engineering.

CO5 Discuss various Actuators and Mechatronics system using the knowledge and skills acquired through the course and also from the given case studies

TEXT BOOKS:

1. Bolton, "Mechatronics", Prentice Hall, 2008
2. Ramesh S Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", 5th Edition, Prentice Hall, 2008.

REFERENCES:

1. Bradley D.A, Dawson D, Buru N.C and Loader A.J, "Mechatronics", Chapman and Hall, 1993.
2. Clarence W, de Silva, "Mechatronics" CRC Press, First Indian Re-print, 2013
3. Devadas Shetty and Richard A. Kolk, "Mechatronics Systems Design", PWS publishing company, 2007.
4. Krishna Kant, "Microprocessors & Microcontrollers", Prentice Hall of India, 2007.
5. Michael B.Histand and Davis G.Alciatore, "Introduction to Mechatronics and Measurement systems", McGraw Hill International edition, 2007.

N.P.R. COLLEGE OF ENGG. & TECHNOLOGY NATHAM

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

Date: 11.07.2022

To

The Principal,

NPR College of Engineering & Technology,

Natham.

Sir,

Sub: Letter of Acceptance for internship- Reg.

Ref: Your Letter Dated on 28.06.2022

With reference to your letter dated 28.06.2022, we are pleased to permit the listed students for internship training programme from **19/07/2022 to 04/08/2022** in our organization. During the period of internship, the students have to follow the rules and safety practices and our organization is not responsible for any bad happenings. Students should be punctual and absenteeism is not encouraged.

Expecting your kind cooperation in this regard.

With Regards

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

NPR COLLEGE OF ENGG. & TECHNOLOGY NATHAM

Dr. J. [illegible] RAJAN,
B.E., M.Tech., Ph.D.,
Principal
NPR College of Engineering & Technology

OIE751 **ROBOTICS** L T P C
3 0 0 3

OBJECTIVES:

- To understand the functions of the basic components of a Robot.
- To study the use of various types of End of Effectors and Sensors
- To impart knowledge in Robot Kinematics and Programming
- To learn Robot safety issues and economics.

UNIT I FUNDAMENTALS OF ROBOT 6

Robot - Definition - Robot Anatomy - Co ordinate Systems, Work Envelope Types and Classification- Specifications-Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load-Robot Parts and their Functions-Need for Robots-Different Applications.

UNIT II ROBOT DRIVE SYSTEMS AND END EFFECTORS 9

Pneumatic Drives-Hydraulic Drives-Mechanical Drives-Electrical Drives-D.C. Servo Motors, Stepper Motors, A.C. Servo Motors-Salient Features, Applications and Comparison of all these Drives, End Effectors-Grippers-Mechanical Grippers, Pneumatic and Hydraulic- Grippers, Magnetic Grippers,
Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.

UNIT III SENSORS AND MACHINE VISION 12

Requirements of a sensor, Principles and Applications of the following types of sensors- Position sensors - Piezo Electric Sensor, LVDT, Resolvers, Optical Encoders, pneumatic Position Sensors, Range Sensors Triangulations Principles, Structured, Lighting Approach, Time of Flight, Range Finders, Laser Range Meters, Touch Sensors ,binary Sensors., Analog Sensors, Wrist Sensors, Compliance Sensors, Slip Sensors, Camera, Frame Grabber, Sensing and Digitizing Image Data- Signal Conversion, Image Storage, Lighting Techniques, Image Processing and Analysis-Data Reduction, Segmentation, Feature Extraction, Object Recognition, Other Algorithms, Applications- Inspection, Identification, Visual Serving and Navigation.

UNIT IV ROBOT KINEMATICS AND ROBOT PROGRAMMING 13

Forward Kinematics, Inverse Kinematics and Difference; Forward Kinematics and Reverse Kinematics of manipulators with Two, Three Degrees of Freedom (in 2 Dimension), Four Degrees of freedom (in 3 Dimension) Jacobians, Velocity and Forces-Manipulator Dynamics, Trajectory Generator, Manipulator Mechanism Design-Derivations and problems. Lead through Programming, Robot programming Languages-VAL Programming-Motion Commands, Sensor Commands, End Effector commands and simple Programs.

UNIT V IMPLEMENTATION AND ROBOT ECONOMICS 5

RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

TOTAL: 45 PERIODS

OUTCOME:

- Upon completion of this course, the students can able to apply the basic engineering knowledge for the design of robotics

TEXT BOOKS:

1. Klafter R.D., Chmielewski T.A and Negin M., "Robotic Engineering - An Integrated Approach", Prentice Hall, 2003.
2. Groover M.P., "Industrial Robotics -Technology Programming and Applications", McGraw Hill, 2001.

REFERENCES:

1. Craig J.J., "Introduction to Robotics Mechanics and Control", Pearson Education, 2008.
2. Deb S.R., "Robotics Technology and Flexible Automation" Tata McGraw Hill Book Co., 1994.
3. Koren Y., "Robotics for Engineers", Mc Graw Hill Book Co., 1992.
4. Fu.K.S.,Gonzalz R.C. and Lee C.S.G., "Robotics Control, Sensing, Vision and Intelligence", McGraw Hill Book Co., 1987.

5. Janakiraman P.A., "Robotics and Image Processing", Tata McGraw Hill, 1995.
6. Rajput R.K., "Robotics and Industrial Automation", S.Chand and Company, 2008.
7. Surender Kumar, "Industrial Robots and Computer Integrated Manufacturing", Oxford and IBH Publishing Co. Pvt. Ltd., 1991.

NPR COLLEGE OF ENGG & TECHNOLOGY NATHAM

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Principal
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G27, SIPCOT Industrial Park,
Katrambakkam Village, Irrungattukottai,
Chennai-Nadu 602105

Date: **17/08/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **P. RUBAN** studying III year BE Mechanical Engineering in NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed Twenty-Nine days internship from **19/07/2022 to 17/08/2022** 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.

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

Dr. J. SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
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NPR COLLEGE OF ENGG. & TECHNOLOGY ★ NATHAM

ME8073 **UNCONVENTIONAL MACHINING PROCESSES** L T P C 3 0 0 3

OBJECTIVE:

- To learn about various unconventional machining processes, the various process parameters and their influence on performance and their applications

UNIT I INTRODUCTION AND MECHANICAL ENERGY BASED PROCESSES 9

Unconventional machining Process – Need – classification – merits, demerits and applications. Abrasive Jet Machining – Water Jet Machining – Abrasive Water Jet Machining - Ultrasonic Machining. (AJM, WJM, AWJM and USM). Working Principles – equipment used – Process parameters – MRR- Applications.

UNIT II THERMAL AND ELECTRICAL ENERGY BASED PROCESSES 9

Electric Discharge Machining (EDM) – Wire cut EDM – Working Principle-equipments-Process Parameters-Surface Finish and MRR- electrode / Tool – Power and control Circuits-Tool Wear – Dielectric – Flushing — Applications. Laser Beam machining and drilling, (LBM), plasma, Arc machining (PAM) and Electron Beam Machining (EBM). Principles – Equipment –Types - Beam control techniques – Applications.

UNIT III CHEMICAL AND ELECTRO-CHEMICAL ENERGY BASED PROCESSES 9

Chemical machining and Electro-Chemical machining (CHM and ECM)- Etchants – Maskant - techniques of applying maskants - Process Parameters – Surface finish and MRR-Applications. Principles of ECM- equipments-Surface Roughness and MRR Electrical circuit-Process Parameters-ECG and ECH - Applications.

UNIT IV ADVANCED NANO FINISHING PROCESSES 9

Abrasive flow machining, chemo-mechanical polishing, magnetic abrasive finishing, magneto rheological finishing, magneto rheological abrasive flow finishing their working principles, equipments, effect of process parameters, applications, advantages and limitations.

UNIT V RECENT TRENDS IN NON-TRADITIONAL MACHINING PROCESSES 9

Recent developments in non-traditional machining processes, their working principles, equipments, effect of process parameters, applications, advantages and limitations. Comparison of non-traditional machining processes.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the need for unconventional machining processes and its classification
CO2 Compare various thermal energy and electrical energy based unconventional machining processes.
CO3 Summarize various chemical and electro-chemical energy based unconventional machining processes.
CO4 Explain various nano abrasives based unconventional machining processes.
CO5 Distinguish various recent trends based unconventional machining processes.

TEXT BOOKS:

1. Vijay.K. Jain "Advanced Machining Processes" Allied Publishers Pvt. Ltd., New Delhi, 2007
2. Pandey P.C. and Shan H.S. "Modern Machining Processes" Tata McGraw-Hill, New Delhi, 2007.

REFERENCES:

1. Benedict. G.F. "Nontraditional Manufacturing Processes", Marcel Dekker Inc., New York, 1987.
2. Mc Geough, "Advanced Methods of Machining", Chapman and Hall, London, 1998.
3. Paul De Garmo, J.T.Black, and Ronald. A.Kohser, "Material and Processes in Manufacturing" Prentice Hall of India Pvt. Ltd., 8thEdition, New Delhi , 2001.

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Katrambakkam Village, Irrungattukottai,
Chennai-Nadu 602105

Date: **17/08/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **PAYAVULLA SAI PRASAD** studying III year BE Mechanical Engineering in NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed Twenty-Nine days internship from **19/07/2022 to 17/08/2022** 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.

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

NPR COLLEGE OF ENGG. & TECHNOLOGY ★ NATHAM

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ME8097 **NON DESTRUCTIVE TESTING AND EVALUATION**

L	T	P	C
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OBJECTIVE:

- To study and understand the various Non Destructive Evaluation and Testing methods, theory and their industrial applications.

UNIT I OVERVIEW OF NDT **9**

NDT Versus Mechanical testing, Overview of the Non Destructive Testing Methods for the detection of manufacturing defects as well as material characterisation. Relative merits and limitations, Various physical characteristics of materials and their applications in NDT., Visual inspection – Unaided and aided.

UNIT II SURFACE NDE METHODS **9**

Liquid Penetrant Testing - Principles, types and properties of liquid penetrants, developers, advantages and limitations of various methods, Testing Procedure, Interpretation of results. Magnetic Particle Testing- Theory of magnetism, inspection materials Magnetisation methods, Interpretation and evaluation of test indications, Principles and methods of demagnetization, Residual magnetism.

UNIT III THERMOGRAPHY AND EDDY CURRENT TESTING (ET) **9**

Thermography- Principles, Contact and non contact inspection methods, Techniques for applying liquid crystals, Advantages and limitation - infrared radiation and infrared detectors, Instrumentations and methods, applications. Eddy Current Testing-Generation of eddy currents, Properties of eddy currents, Eddy current sensing elements, Probes, Instrumentation, Types of arrangement, Applications, advantages, Limitations, Interpretation/Evaluation.

UNIT IV ULTRASONIC TESTING (UT) AND ACOUSTIC EMISSION (AE) **9**

Ultrasonic Testing-Principle, Transducers, transmission and pulse-echo method, straight beam and angle beam, instrumentation, data representation, A/Scan, B-scan, C-scan. Phased Array Ultrasound, Time of Flight Diffraction. Acoustic Emission Technique – Principle, AE parameters, Applications

UNIT V RADIOGRAPHY (RT) **9**

Principle, interaction of X-Ray with matter, imaging, film and film less techniques, types and use of filters and screens, geometric factors, Inverse square, law, characteristics of films - graininess, density, speed, contrast, characteristic curves, Penetrameters, Exposure charts, Radiographic equivalence. Fluoroscopy- Xero-Radiography, Computed Radiography, Computed Tomography

TOTAL : 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the fundamental concepts of NDT
CO2 Discuss the different methods of NDE
CO3 Explain the concept of Thermography and Eddy current testing
CO4 Explain the concept of Ultrasonic Testing and Acoustic Emission
CO5 Explain the concept of Radiography

TEXT BOOKS:

1. Baldev Raj, T.Jayakumar, M.Thavasimuthu "Practical Non-Destructive Testing", Narosa Publishing House, 2014.
2. Ravi Prakash, "Non-Destructive Testing Techniques", 1st revised edition, New Age International Publishers, 2010

REFERENCES:

1. ASM Metals Handbook, "Non-Destructive Evaluation and Quality Control", American Society of Metals, Metals Park, Ohio, USA, 200, Volume-17.
2. ASNT, American Society for Non Destructive Testing, Columbus, Ohio, NDT Handbook,Vol. 1, Leak Testing, Vol. 2, Liquid Penetrant Testing, Vol. 3, Infrared and Thermal Testing Vol. 4, Radiographic Testing, Vol. 5, Electromagnetic Testing, Vol. 6, Acoustic Emission Testing, Vol. 7, Ultrasonic Testing
3. Charles, J. Hellier," Handbook of Nondestructive evaluation", McGraw Hill, New York 2001.
4. Paul E Mix, "Introduction to Non-destructive testing: a training guide", Wiley, 2nd Edition New Jersey, 2005

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Chennai-Nadu 602105

Date: **17/08/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **R. MANIKANDAN** studying III year BE Mechanical Engineering in NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed Twenty-Nine days internship from **19/07/2022 to 17/08/2022** 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.

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

NPR COLLEGE OF ENGG. & TECHNOLOGY * NPR NATHAM

Dr. J. SUNDARARAJAN,
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Natham, Dindigul (Dt) - 624 401.

MG8591 **PRINCIPLES OF MANAGEMENT**

L	T	P	C
3	0	0	3

OBJECTIVE:

- To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management - Science or Art - Manager Vs Entrepreneur - types of managers - managerial roles and skills - Evolution of Management - Scientific, human relations , system and contingency approaches – Types of Business organization - Sole proprietorship, partnership, company-public and private sector enterprises - Organization culture and Environment – Current trends and issues in Management.

UNIT II PLANNING 9

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives - policies - Planning premises - Strategic Management - Planning Tools and Techniques - Decision making steps and process.

UNIT III ORGANISING 9

Nature and purpose - Formal and informal organization - organization chart - organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design - Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management.

UNIT IV DIRECTING 9

Foundations of individual and group behaviour - motivation - motivation theories - motivational techniques - job satisfaction - job enrichment - leadership - types and theories of leadership - communication - process of communication - barrier in communication - effective communication - communication and IT.

UNIT V CONTROLLING 9

System and process of controlling - budgetary and non-budgetary control techniques - use of computers and IT in Management control - Productivity problems and management - control and performance - direct and preventive control – reporting.

TOTAL: 45 PERIODS

OUTCOME:

- Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXT BOOKS:

1. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", 6th Edition, Pearson Education, 2004.
2. Stephen P. Robbins & Mary Coulter, "Management", Prentice Hall (India)Pvt. Ltd., 10th Edition, 2009.

REFERENCES:

1. Harold Koontz & Heinz Weihrich, "Essentials of Management", Tata McGraw Hill, 1998.
2. Robert Kreitner & Mamata Mohapatra, "Management", Biztantra, 2008.
3. Stephen A. Robbins & David A. Decenzo & Mary Coulter, "Fundamentals of Management", 7th Edition, Pearson Education, 2011.
4. Tripathy PC & Reddy PN, "Principles of Management", Tata Mcgraw Hill, 199

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Date: **17/08/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **B. DINESHPANDI** studying III year BE Mechanical Engineering in NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed Twenty-Nine days internship from **19/07/2022 to 17/08/2022** 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.

JM Frictech India Pvt. Ltd,
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IE8693 **PRODUCTION PLANNING AND CONTROL**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the various components and functions of production planning and control such as work study, product planning, process planning, production scheduling, Inventory Control.
- To know the recent trends like manufacturing requirement Planning (MRP II) and Enterprise Resource Planning (ERP).

UNIT I INTRODUCTION **9**

Objectives and benefits of planning and control-Functions of production control-Types of production- job- batch and continuous-Product development and design-Marketing aspect - Functional aspects- Operational aspect-Durability and dependability aspect aesthetic aspect. Profit consideration- Standardization, Simplification & specialization- Break even analysis-Economics of a new design.

UNIT II WORK STUDY **9**

Method study, basic procedure-Selection-Recording of process - Critical analysis, Development - Implementation - Micro motion and memo motion study – work measurement - Techniques of work measurement - Time study - Production study - Work sampling - Synthesis from standard data - Predetermined motion time standards.

UNIT III PRODUCT PLANNING AND PROCESS PLANNING **9**

Product planning-Extending the original product information-Value analysis-Problems in lack of product planning-Process planning and routing-Pre requisite information needed for process planning- Steps in process planning-Quantity determination in batch production-Machine capacity, balancing- Analysis of process capabilities in a multi product system.

UNIT IV PRODUCTION SCHEDULING **9**

Production Control Systems-Loading and scheduling-Master Scheduling-Scheduling rules-Gantt charts-Perpetual loading-Basic scheduling problems - Line of balance – Flow production scheduling- Batch production scheduling-Product sequencing – Production Control systems-Periodic batch control-Material requirement planning kanban - Dispatching-Progress reporting and expediting- Manufacturing lead time-Techniques for aligning completion times and due dates.

UNIT V INVENTORY CONTROL AND RECENT TRENDS IN PPC **9**

Inventory control-Purpose of holding stock-Effect of demand on inventories-Ordering procedures. Two bin system - Ordering cycle system-Determination of Economic order quantity and economic lot size- ABC analysis - Recorder procedure-Introduction to computer integrated production planning systems- elements of JUST IN TIME SYSTEMS-Fundamentals of MRP II and ERP.

TOTAL: 45 PERIODS

OUTCOMES:

- Upon completion of this course, the students can able to prepare production planning and control activities such as work study, product planning, production scheduling, Inventory Control.
- They can plan manufacturing requirements manufacturing requirement Planning (MRP II) and Enterprise Resource Planning (ERP).

TEXT BOOKS:

1. James. B. Dilworth, "Operations management – Design, Planning and Control for manufacturing and services" Mcgraw Hill International edition 1992.
2. Martand Telsang, "Industrial Engineering and Production Management", First edition, S. Chand and Company, 2000.

REFERENCES:

1. Chary. S.N., "Theory and Problems in Production & Operations Management", Tata McGraw Hill, 1995.
2. Elwood S.Buffa, and Rakesh K.Sarin, "Modern Production / Operations Management", 8th Edition John Wiley and Sons, 2000.
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COLLEGE OF ENGG. & TECHNOLOGY * N.P.R.
NATHAM

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

Date: **17/08/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **P. AYYAM PERUMAL** studying III year BE Mechanical Engineering in NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed Twenty-Nine days internship from **19/07/2022 to 17/08/2022** 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.

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

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

ME8811	PROJECT WORK	L	T	P	C
		0	0	20	10

OBJECTIVE:

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 300 PERIODS

OUTCOME:

- On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

Ayyanar Thunai

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Cell : 98425 - 32220
98430 - 83074

Osho*
Body builders

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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

Ref: NPRCET/OFF/MECH/IPT/2021-22

Date: 12.07.2022

To

The Principal,
NPR College of Engineering & Technology,
Natham,
Dindigul-624 401.

Sir,

Sub: Letter of Acceptance for Internship– reg.

Ref: Your letter dated on 01.07.2022

With reference to the above ASWIN BALAJI S, GOWTHAMAN M, MEENAKSHI SUNDARAM, and MUTHUSAMY P of III Year BE Mechanical Engineering students from your institution has been offered In-plant training from 20.07.2022 to 13.08.2022

For Osho Body Builders

R. Arunlakshmi

Partner

NPR COLLEGE OF ENGG. & TECHNOLOGY * NATHAM

Dr. J. SUNDARARAJAN,
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