As per DVV clarifications the proof document for experiential learning are attached.

The following are the syllabus copy as per anna university curriculum and relevant experiential learning document

1.3.2

COURSES THAT INCLUDE EXPERIENTIAL LEARNING THROUGH PROJECT WORK /FIELD WORK/ INTERNSHIP DURING 2015-2016

NPR College of Engineering & Technology

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1.3.2 AVERAGE PERCENTAGE OF COURSES THAT INCLUDE EXPERIENTIAL LEARNING THROUGH PROJECT WORK/FIELD WORK/INTERNSHIP DURING 2015-2016

S.No	Programme offering	Name of the course	Course code	Project / Field work / Internship	Page No
1	B.E-Mechanical Engineering	Basic Electrical and Electronics Engineering	GE6252	Internship	4
2	B.E-Mechanical Engineering	Engineering Mechanics	GE6253	Field work	6
3	B.E-Mechanical Engineering	Engineering Thermodynamics	ME6301	Field work	11
4	B.E-Mechanical Engineering	Strength of Materials	CE6306	Field work	14
5	B.E-Mechanical Engineering	Fluid Mechanics and Machinery	CE6451	Field work	16
6	B.E-Mechanical Engineering	Manufacturing Technology - I	ME6302	Internship	18
7	B.E-Mechanical Engineering	Electrical Drives and Controls	EE6351	Project	20
8	B.E-Mechanical Engineering	Statistics and Numerical Methods	MA6452	Internship	24
9	B.E-Mechanical Engineering	Kinematics of Machinery	ME6401	Field work	27
10	B.E-Mechanical Engineering	Manufacturing Technology– II	ME6402	Project	40
11	B.E-Mechanical Engineering	Engineering Materials and Metallurgy	ME6403	Field work	46
12	B.E-Mechanical Engineering	Thermal Engineering	ME6404	Internship	48
13	B.E-Mechanical Engineering	Computer Aided Design	ME6501	Field work	50
14	B.E-Mechanical Engineering	Heat and Mass Transfer	ME6502	Internship	52
15	B.E-Mechanical Engineering	Design of Machine Elements	ME6503	Internship	54
16	B.E-Mechanical Engineering	Metrology and Measurements	ME6504	Field work	57

17	B.E-Mechanical Engineering	Dynamics of Machines	ME6505	Project	59
18	B.E-Mechanical Engineering	Design of Transmission Systems	ME6601	Field work	63
19	B.E-Mechanical Engineering	Automobile Engineering	ME6602	Project	66
20	B.E-Mechanical Engineering	Finite Element Analysis	ME6603	Project	70
21	B.E-Mechanical Engineering	Gas Dynamics and Jet Propulsion	ME6604	Field work	74
22	B.E-Mechanical Engineering	Unconventional Machining Processes	ME6004	Field work	76
23	B.E-Mechanical Engineering	Total Quality Management	GE 2022	Field work	78
24	B.E-Mechanical Engineering	Mechatronics	ME 2401	Internship	86
25	B.E-Mechanical Engineering	Computer Integrated Manufacturing	ME 2402	Field work	89
26	B.E-Mechanical Engineering	Power Plant Engineering	ME 2403	Project	92
27	B.E-Mechanical Engineering	Engineering Economics and Cost Analysis	MG 2451	Project	96
28	B.E-Mechanical Engineering	Production Planning and Control	GE 2025	Internship	101
29	B.E-Mechanical Engineering	Advanced I.C. Engines	ME 2041	Field work	104
30	B.E-Mechanical Engineering	Project Work	ME 2453	Project	107

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GE6252 **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING** L T P C
4 0 0 4

OBJECTIVES:

- To explain the basic theorems used in Electrical circuits and the different components and function of electrical machines.
- To explain the fundamentals of semiconductor and applications.
- To explain the principles of digital electronics
- To impart knowledge of communication.

UNIT I ELECTRICAL CIRCUITS & MEASURMENTS 12

Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase Balanced Circuits.

Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT II ELECTRICAL MECHANICS 12

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, single phase induction Motor.

UNIT III SEMICONDUCTOR DEVICES AND APPLICATIONS 12

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation.

Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics – Elementary Treatment of Small Signal Amplifier.

UNIT IV DIGITAL ELECTRONICS 12

Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts)

UNIT V FUNDAMENTALS OF COMMUNICATION ENGINEERING 12

Types of Signals: Analog and Digital Signals – Modulation and Demodulation: Principles of Amplitude and Frequency Modulations.

Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).

TEXT BOOKS:

1. Mittle N., "Basic Electrical Engineering", Tata McGraw Hill Edition, New Delhi, 1990.
2. Sedha R.S., "Applied Electronics", S. Chand & Co., 2006.

REFERENCES:

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw Hill, Second Edition, 2006.
2. Nagsarkar T K and Sukhija M S, "Basics of Electrical Engineering", Oxford press 2005.
3. Mehta V K, "Principles of Electronics", S.Chand & Company Ltd, 1994.
4. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.

TOTAL: 60 PERIOD

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E-mail : info@bnazrum.com
Website : www.bnazrum.com

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. P. JEYASURYA,** II year Mechanical Engineering of NPR College of Engineering & Technology, Natham, Dindigul has completed 12 days Internship from **23-05-2016 to 03-06-2016** in our organization. During this period, he was sincere, enthusiastic and hard working.

Date: 03.06.2016

For BNAZRUM AGRO EXPORTS (P) LTD.,

(A.M.Yusuf Ansari)
General Manager

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GE6253 **ENGINEERING MECHANICS** L T P C
3 1 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 BASICS AND STATICS OF PARTICLES 12

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 12

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 12

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 12

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 ELEMENTS OF RIGID BODY DYNAMICS 12

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 : 60 PERIODS

OUTCOMES:

- ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
- ability to analyse the forces in any structures.
- ability to solve rigid body subjected to dynamic forces.

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)

REFERENCES:

1. Hibbeller, R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 11th Edition, Pearson Education 2010.

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2. Irving H. Shames and Krishna Mohana Rao. G., "Engineering Mechanics – Statics and Dynamics", 4th Edition, Pearson Education 2006.
3. Meriam J.L. and Kraige L.G., " Engineering Mechanics- Statics - Volume 1, Dynamics- Volume 2", Third Edition, John Wiley & Sons,1993.
4. Rajasekaran S and Sankarasubramanian G., "Engineering Mechanics Statics and Dynamics", 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005.
5. Bhavikatti, S.S and Rajashekarappa, K.G., "Engineering Mechanics", New Age International (P) Limited Publishers, 1998.
6. Kumar, K.L., "Engineering Mechanics", 3rd Revised Edition, Tata McGraw-Hill Publishing company, New Delhi 2008.

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EXPERIMENTAL INVESTIGATION AND TAGUCHI OPTIMIZATION OF TURNING PROCESS PARAMETERS FOR GFRP THROUGH CNC TURNING PROCESS

A PROJECT REPORT

Submitted by

1. **D.SAMARAESH** — **REG.NO.: 920812114085**
2. **P.J.VIDHYA SHANKAR** — **REG.NO.: 920812114105**
3. **S.YASAR ARAFATH** — **REG.NO.: 920812114115**
4. **K.MURALITHARAN** — **REG.NO.: 920812114308**

In partial fulfillment for the award of degree

of

BACHELOR OF ENGINEERING

in

MECHANICAL ENGINEERING

NPR COLLEGE OF ENGINEERING&TECHNOLOGY,NATHAM

ANNA UNIVERSITY: CHENNAI 600 025

APRIL 2016

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ABSTRACT

Production and manufacturing process deals with conversation of raw materials inputs to finished products as per required dimensions specifications and efficiently using recent technology The metal cutting essential try for high metal removing rate and best product quality the major problem in achieving high productivity and best quality is short life span of tool To enhance the tool life many new materials are developed so has to meet the market demand and competitive price for this there should be proper control over various cost involved in machining named as material cost labour cost and tooling cost the material cost can be controlled by using special material which meet all required properties with reduced price. The present work is focused on the influence of cutting speed, feed rate and depth of cut on the de-lamination damage and surface roughness on Glass Fiber Reinforced Polymeric composite material (GFRP) during turning. Taguchi design method will be employed to investigate the machining characteristics of GFRP. In this work, experiments has to be carried out as per the Taguchi experimental design and an L9 orthogonal array will be used to study the influence of various combinations of process parameters on surface quality.

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CHAPTER-8

CONCLUSION AND RESULT

In this study, the Taugchi technique and ANOVA were used to obtain optimal Turning parameters in the Turning of GFRP under dry conditions. The experimental results were evaluated using Taguchi technique. The following conclusion can be drawn.

OPTIMAL CONTROL FACTOR

1.Surface Roughness-A1(Speed -1000)B3(Feed -0.07)C2(DOC-0.7)

2.Machining Timing-A2(Speed-1500)B1(Feed 0.03)C3(DOC 1)

3.Material Removal Rate- A3(Speed-2000)B2(Feed 0.05)C1(DOC 0.5)

Percentage of contribution of Process parameter

1.Surface Roughness- speed 28%

2.Machining Timing- Feed 65.5%

3. Material Removal –DOC-Rate-46%

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ME6301 **ENGINEERING THERMODYNAMICS** **L T P C**
3 0 0 3

OBJECTIVES:

- 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**

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**

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**

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**

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.

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UNIT V GAS MIXTURES AND PSYCHROMETRY 9

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 : 45 PERIODS

OUTCOMES:

- Upon completion of this course, the students can able to apply the Thermodynamic Principles to Mechanical Engineering Application.
- Apply mathematical fundamentals to study the properties of steam, gas and gas mixtures.

TEXT BOOKS :

1. Nag.P.K., "Engineering Thermodynamics", 4th Edition, Tata McGraw-Hill, New Delhi, 2008.
2. Natarajan E., "Engineering Thermodynamics: Fundamentals and Applications", Anuragam Publications, 2012.

REFERENCES :

1. Cengel. Y and M.Boles, "Thermodynamics - An Engineering Approach", 7th Edition, Tata McGraw Hill, 2010.
2. Holman.J.P., "Thermodynamics", 3rd Edition, McGraw-Hill, 1995.
3. Rathakrishnan. E., "Fundamentals of Engineering Thermodynamics", 2nd Edition, Prentice-Hall of India Pvt. Ltd, 2006
4. Chattopadhyay, P, "Engineering Thermodynamics", Oxford University Press, 2010.
5. Arora C.P, "Thermodynamics", Tata McGraw-Hill, New Delhi, 2003.
6. Van Wylen and Sonntag, "Classical Thermodynamics", Wiley Eastern, 1987
7. Venkatesh. A, "Basic Engineering Thermodynamics", Universities Press (India) Limited, 2007.
8. Kau-Fui Vincent Wong, "Thermodynamics for Engineers", CRC Press, 2010 Indian Reprint.
9. Prasanna Kumar: Thermodynamics "Engineering Thermodynamics" Pearson Education, 2013

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TO WHOM IT MAY CONCERN

This is to certify that Mr. K.HARIKARAN studying in third year Mechanical Engineering of NPR College of Engineering & Technology, Natham has undergone in-plant Training in our organization from 06.06.2016 to 10.06.2016.

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

With Regards

For THERMO SOLUTIONS (INDIA) PRIVATE LIMITED

Directors

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CE6306 **STRENGTH OF MATERIALS** **L T P C**
3 1 0 4

OBJECTIVES:
To understand the stresses developed in bars, compounds bars, beams, shafts, cylinders and spheres.

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 (L:45+T:15): 60 PERIODS

OUTCOMES:
- Upon completion of this course, the students can able to apply mathematical knowledge to calculate the deformation behavior of simple structures.
- Critically analyse problem and solve the problems related to mechanical elements and analyse the deformation behavior for different types of loads

TEXT BOOKS:

1. Bansal, R.K., "Strength of Materials", Laxmi Publications (P) Ltd., 2007
2. Jindal U.C., "Strength of Materials", Asian Books Pvt. Ltd., New Delhi, 2007

REFERENCES:

1. Egor. P.Popov "Engineering Mechanics of Solids" Prentice Hall of India, New Delhi, 2001
2. Subramanian R., "Strength of Materials", Oxford University Press, Oxford Higher Education Series, 2007.
3. Hibbeler, R.C., "Mechanics of Materials", Pearson Education, Low Price Edition, 2007
4. Ferdinand P. Been, Russell Johnson, J.r. and John J. Dewole "Mechanics of Materials", Tata McGraw Hill Publishing 'co. Ltd., New Delhi, 2005

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Osho Body builders

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MADURAI - 625 018

Date : 15.07.2015

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. M.AJITH KUMAR** of third year Mechanical Engineering of NPR College of Engineering & Technology, Natham ,Dindigul, has successfully completed six days Inplant Training from **10.07.2015 to 15.07.2015** in our organization. During the period of his training his work was satisfactory.

Authorized Signatory

For Osho Body Builders

Manager.

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CE6451 **FLUID MECHANICS AND MACHINERY** L T P C
3 0 0 3

OBJECTIVES:

- The applications of the conservation laws to flow through pipes and hydraulic machines are studied
- To understand the importance of dimensional analysis.
- To understand the importance of various types of flow in pumps and turbines.

UNIT I FLUID PROPERTIES AND FLOW CHARACTERISTICS 8

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 8

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 9

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

UNIT IV PUMPS 10

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 10

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: 45 PERIODS

OUTCOMES:

- Upon completion of this course, the students can able to apply mathematical knowledge to predict the properties and characteristics of a fluid.
- Can critically analyse the performance of pumps and turbines.

TEXT BOOK:

1. Modi P.N. and Seth, S.M. "Hydraulics and Fluid Mechanics", Standard Book House, New Delhi 2004.

REFERENCES:

1. Streeter, V. L. and Wylie E. B., "Fluid Mechanics", McGraw Hill Publishing Co. 2010
2. Kumar K. L., "Engineering Fluid Mechanics", Eurasia Publishing House(p) Ltd., New Delhi 2004
3. Robert W.Fox, Alan T. McDonald, Philip J.Pritchard, "Fluid Mechanics and Machinery", 2011.
4. Graebel. W.P, "Engineering Fluid Mechanics", Taylor & Francis, Indian Reprint, 2011

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E-mail : info@bnazrum.com
Website : www.bnazrum.com

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr, A. AHMED BAYAS MEERAN,** IV year Mechanical Engineering of NPR College of Engineering & Technology, Natham, Dindigul has completed 10 days Inplant Training from **04-05-2016 to 14-05-2016** in our organization. During this period, he was sincere, enthusiastic and hard working.

Date: 14.05.2016

For BNAZRUM AGRO EXPORTS (P) LTD.,

(A.M.Yusuf Ansari)
General Manager

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ME6302 **MANUFACTURING TECHNOLOGY – I** L T P C
3 0 0 3

OBJECTIVES:

- 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:

- Upon completion of this course, the students can able to apply the different manufacturing process and use this in industry for component production

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, 1997
2. Kalpakjian. S, "Manufacturing Engineering and Technology", Pearson Education India Edition, 2006

REFERENCES:

1. Gowri P. Hariharan, A.Suresh Babu, "Manufacturing Technology I", Pearson Education, 2008
2. Roy. A. Lindberg, "Processes and Materials of Manufacture", PHI / Pearson education, 2006
3. Paul Degarma E, Black J.T and Ronald A. Kosher, "Materials and Processes, in Manufacturing" Eight Edition, Prentice – Hall of India, 1997.
4. Sharma, P.C., "A Text book of production Technology", S.Chand and Co. Ltd., 2004
5. Rao, P.N. "Manufacturing Technology Foundry, Forming and Welding", 2nd Edition, TMH-2003

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Aiyanar Thunai

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Osho Body builders

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ISO CERTIFIED COMPANY

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

Date: 16.12.2015

TO WHOM IT MAY CONCERN

This is to certify that **Mr. P. SABARINATH** of third year Mechanical Engineering studying in NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed the internship programme from **25.11.2015 to 16.12.2015** in **OSHO BODY BUILDERS, MADURAI**. During this period he was found punctual, hardworking and inquisitive.

We wish him every success in life.

Authorized Signatory

For Osho Body Builders

Manager.

NPR COLLEGE OF ENGG. & TECHNOLOGY
NATHAM

Dr. J.SUNDARARAJAN,
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EE6351 **ELECTRICAL DRIVES AND CONTROL** 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

OUTCOMES:

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

TEXT BOOKS:

1. Vedam Subrahmaniam, "Electric Drives (Concepts and Applications", Tata McGraw-Hill, 2001
2. Nagrath .I.J. & Kothari .D.P, "Electrical Machines", Tata McGraw-Hill, 1998

REFERENCES:

1. Pillai.S.K "A First Course on Electric Drives", Wiley Eastern Limited, 1998
2. Singh. M.D., K.B.Khanchandani, "Power Electronics", Tata McGraw-Hill, 1998
3. Partab. H., "Art and Science and Utilisation of Electrical Energy", Dhanpat Rai and Sons, 1994

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EXPERIMENTAL INVESTIGATION AND TAGUCHI OPTIMIZATION OF TURNING PROCESS PARAMETERS FOR GFRP THROUGH CNC TURNING PROCESS

A PROJECT REPORT

Submitted by

1. **D.SAMARAESH** — **REG.NO.: 920812114085**
2. **P.J.VIDHYA SHANKAR** — **REG.NO.: 920812114105**
3. **S.YASAR ARAFATH** — **REG.NO.: 920812114115**
4. **K.MURALITHARAN** — **REG.NO.: 920812114308**

In partial fulfillment for the award of degree

of

BACHELOR OF ENGINEERING

in

MECHANICAL ENGINEERING

NPR COLLEGE OF ENGINEERING&TECHNOLOGY,NATHAM

ANNA UNIVERSITY: CHENNAI 600 025

APRIL 2016

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

Production and manufacturing process deals with conversation of raw materials inputs to finished products as per required dimensions specifications and efficiently using recent technology The metal cutting essential try for high metal removing rate and best product quality the major problem in achieving high productivity and best quality is short life span of tool To enhance the tool life many new materials are developed so has to meet the market demand and competitive price for this there should be proper control over various cost involved in machining named as material cost labour cost and tooling cost the material cost can be controlled by using special material which meet all required properties with reduced price. The present work is focused on the influence of cutting speed, feed rate and depth of cut on the de-lamination damage and surface roughness on Glass Fiber Reinforced Polymeric composite material (GFRP) during turning. Taguchi design method will be employed to investigate the machining characteristics of GFRP. In this work, experiments has to be carried out as per the Taguchi experimental design and an L9 orthogonal array will be used to study the influence of various combinations of process parameters on surface quality.

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CHAPTER-8

CONCLUSION AND RESULT

In this study, the Taugchi technique and ANOVA were used to obtain optimal Turning parameters in the Turning of GFRP under dry conditions. The experimental results were evaluated using Taguchi technique. The following conclusion can be drawn.

OPTIMAL CONTROL FACTOR

1.Surface Roughness-A1(Speed -1000)B3(Feed -0.07)C2(DOC-0.7)

2.Machining Timing-A2(Speed-1500)B1(Feed 0.03)C3(DOC 1)

3.Material Removal Rate- A3(Speed-2000)B2(Feed 0.05)C1(DOC 0.5)

Percentage of contribution of Process parameter

1.Surface Roughness- speed 28%

2.Machining Timing- Feed 65.5%

3. Material Removal –DOC-Rate-46%

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MA6452 **STATISTICS AND NUMERICAL METHODS** **L T P C 3 1 0 4**

OBJECTIVES:

- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.

UNIT I TESTING OF HYPOTHESIS **9+3**

Large sample test based on Normal distribution for single mean and difference of means - Tests based on t, χ^2 and F distributions for testing means and variances – Contingency table (Test for Independency) – Goodness of fit.

UNIT II DESIGN OF EXPERIMENTS **9+3**

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design - 2^2 factorial design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS **9+3**

Newton Raphson method – Gauss elimination method – pivoting – Gauss Jordan methods – Iterative methods of Gauss Jacobi and Gauss Seidel – Matrix inversion by Gauss Jordan method – Eigen values of a matrix by power method.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION **9+3**

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS **9+3**

Taylor's series method – Euler's method – Modified Euler's method – Fourth order Runge-Kutta method for solving first order equations – Milne's predictor corrector methods for solving first order equations – Finite difference methods for solving second order equations.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES

- It helps the students to have a clear perception of the power of statistical and numerical techniques, ideas and would be able to demonstrate the applications of these techniques to problems drawn from industry, management and other engineering fields.

TEXT BOOKS

1. Johnson. R.A., and Gupta. C.B., "Miller and Freund's Probability and Statistics for Engineers", 11th Edition, Pearson Education, , Asia, 2011.
2. Grewal. B.S., and Grewal. J.S., "Numerical Methods in Engineering and Science", 9th Edition, Khanna Publishers, New Delhi, 2007.

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REFERENCES

1. Walpole. R.E., Myers. R.H., Myers. S.L., and Ye. K., "Probability and Statistics for Engineers and Scientists", 8th Edition, Pearson Education, Asia, 2007.
2. Spiegel. M.R., Schiller. J., and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics", Tata McGraw Hill Edition, 2004.
3. Chapra. S.C., and Canale. R.P, "Numerical Methods for Engineers", 5th Edition, Tata McGraw Hill, New Delhi, 2007.
4. Gerald. C.F., and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 2006.

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E-mail : info@bnazrum.com
Website : www.bnazrum.com

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. P. JEYASURYA,** II year Mechanical Engineering of NPR College of Engineering & Technology, Natham, Dindigul has completed 12 days Internship from **23-05-2016 to 03-06-2016** in our organization. During this period, he was sincere, enthusiastic and hard working.

Date: 03.06.2016

For BNAZRUM AGRO EXPORTS (P) LTD.,

(A.M.Yusuf Ansari)
General Manager

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Dr. J.SUNDARARAJAN,
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ME6401 **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

TEXT BOOKS:

1. Uicker, J.J., Pennock G.R and Shigley, J.E., "Theory of Machines and Mechanisms", 3rd Edition, Oxford University Press, 2009.
2. Rattan, S.S, "Theory of Machines", 3rd Edition, Tata McGraw-Hill, 2009.

REFERENCES:

1. Thomas Bevan, "Theory of Machines", 3rd Edition, CBS Publishers and Distributors, 2005.
2. Cleghorn. W. L, "Mechanisms of Machines", Oxford University Press, 2005
3. Robert L. Norton, "Kinematics and Dynamics of Machinery", Tata McGraw-Hill, 2009.
4. Allen S. Hall Jr., "Kinematics and Linkage Design", Prentice Hall, 1961
5. Ghosh. A and Mallick, A.K., "Theory of Mechanisms and Machines", Affiliated East-West Pvt. Ltd., New Delhi, 1988.
6. Rao.J.S. and Dukkipati.R.V. "Mechanisms and Machine Theory", Wiley-Eastern Ltd., New Delhi, 1992.
7. John Hannah and Stephens R.C., "Mechanics of Machines", Viva Low-Prices Student Edition,

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Ref: NPRCET/OFF/MECH/IV/2015-16

DATE: 03.8.2015

To

M/S Namakkal Transport Carriers,
1/244 Chennekothapalli Road,
Namakkal 637003.

Respected sir,

Sub: Seeking Permission for Industrial visit –reg...

Warm greetings,

NPR Group of Colleges, Natham, which is 27 kms away from Dindigul and 35 kms away from Madurai, Tamil Nadu. We are pleased to introduce ourselves as one of the premier group of colleges in the field of education. The campus is spread over 93 acres of lush green environment with lots of green cover and pristine surroundings. Our college recognizes the growing necessity to prepare the students from the rural and semi-urban sectors of India to be employable.

We are providing Undergraduate courses in Mechanical Engineering, Civil Engineering, Computer Science & Engineering, Electronics & Communication Engineering and Electrical & Electronics and Post Graduate courses Structural Engineering and Master of Business Administration and has a track record of outstanding performances of its pass-outs from different domains.

I would like to share that we suggest to have this visit with your organization on 18 and 19th August 2015, there would be a total of 120 students (IV year mechanical) accompanied by 4 faculty members from our college. The visit is aimed at enhancing their knowledge. We request you to permit us to take a round of the entire workshop and show the tasks handled in different departments to our students. I hope you allow us the opportunity to visit your industry and meet your skilled staff and anticipate a positive response from your end.

Thanking you,

With regards,

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APPROVAL EMAIL FROM THE INDUSTRY

3/6/2021 Gmail - Fwd: Re: One day training(I.V.) program for final year Mechanical Engineering students

Gmail

HOD MECHANICAL <hodmechnprcet@gmail.com>

Fwd: Re: One day training(I.V.) program for final year Mechanical Engineering students

2 messages

ravikumar.nk@ntcgroup.in <ravikumar.nk@ntcgroup.in> Thu, Aug 13, 2015 at 12:18 PM
To: "nprcetmech@nprcolleges.org" <hodmechnprcet@gmail.com>

Dear Sir,

Kindly confirm your program on 18th and 19th August 2015(Tuesday & Wednesday).

Pl. send the participants list (Students name & father's name) by soft before 17th of this month and the hard copy may bring with you on program day.

Thanks & Regards

RAVIKUMAR NK

Head - Training

NTC Institute of Driver Training & Research,

Namakkal

Mobile: 9345301155

HELP EVER! HURT NEVER!

HOD MECHANICAL <hodmechnprcet@gmail.com> Fri, Jan 29, 2016 at 10:49 AM
To: Sundar Rajan <sundaramadu@gmail.com>

[Quoted text hidden]

https://mail.google.com/mail/u/0?ik=e17a47fd7a&view=pt&search=all&permthid=thread-f%3A1509371193408537171&simpl=msg-f%3A1509371193340... 1/1

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INDUSTRIAL VISIT PARTICIPANTS LIST
M/S NAMAKKAL TRANSPORT CARRIERS
YEAR / BRANCH: IV / MECH

Date : 18.08.2015

Si. No	Register No.	Name	Attendance
1.	920812114001	S.ADHARSH MUTHIAH JOSHUA	/
2.	920812114002	A.AHMED BAYAS MEERAN	/
3.	920812114003	K.AJITH KUMAR	/
4.	920812114004	A.AJMEER RAJA	/
5.	920812114005	S.AKILAN	/
6.	920812114006	M.AMSAGANAPATHI	a
7.	920812114007	A.ANAND XAVIER RAJ	/
8.	920812114008	B.ANBARASAN	/
9.	920812114009	A.ANBURAJ	/
10.	920812114010	P.ANDISAMY	/
11.	920812114011	P.AROCKIA LAWRANCE	/
12.	920812114012	T.ARUN KUMAR	a
13.	920812114013	G.ARUN KUMAR	/
14.	920812114014	S.BABU	/
15.	920812114015	A.BASKARAN	/
16.	920812114016	S.BAYASDEEN	/
17.	920812114017	R.CHELLA PANDI	a
18.	920812114018	M.CHOCKALINGAM	/
19.	920812114019	P.DEEPAK LAKSHMANAN	/
20.	920812114020	R.DINESH KUMAR	/
21.	920812114021	M.DURAI RAJ	/
22.	920812114022	J.ENOCH FERDRICK	/
23.	920812114023	P.GOKULAKRISHNAN	/
24.	920812114024	S.K.GOWRI SANKAR	a
25.	920812114025	B.ILANGO	/
26.	920812114026	A.JAYA PRASATH	/
27.	920812114027	J.JEGADHEESH	/
28.	920812114028	I.JOE MICHEAL	/
29.	920812114029	S.JOHN BOSCO	/
30.	920812114030	A.JOTHI PRAKASH	/
31.	920812114031	K.KALAIVANAN	/
32.	920812114032	D.KANNAN	/
33.	920812114033	M.KANNAN	/
34.	920812114034	C.KAPIPKAN	/
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36.	920812114036	R.K.KARTHICK	/
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44.	920812114044	K.LENIN KUMAR	a
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46.	920812114046	S.MANGALARAJ	/
47.	920812114047	M.MANIKANDAN	/
48.	920812114048	N.MANIKANDAN	/
49.	920812114049	R.MANIKANDAN	/
50.	920812114050	S.MANIRAJ	a
51.	920812114051	K.MANOJ SANKAR	/
52.	920812114052	J.MARTIN AROCKIA RAJ	/
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54.	920812114054	M.MATHIYALAGAN	/
55.	920812114055	U.MOHAMED SULTHAN	/
56.	920812114056	M.MOHAN RAJ	/
57.	920812114057	S.MONESH BOOPALAN	/
58.	920812114301	G. ASHOK KUMAR	a
59.	920812114302	C.BALAMURUGAN	/
60.	920812114304	S.DINESH KUMAR	/
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64.	920812114701	A. NAVIN UDHAYAKUMAR	a
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67.	920812114311	S. RAJA SRIDHARAN	/
68.	920812114319	J.VIGNESH	/
69.	920812114318	T.VIGNESH	/
70.	920812114058	P.MOORTHI	–
71.	920812114059	K.MUNEESH PRAVEEN	–
72.	920812114060	J.MURAILDHARAN	–
73.	920812114061	V.MURUGA PANDI	–
74.	920812114062	K.MUTHUPANDI	–
75.	920812114063	B.NAGARAJAN	–
76.	920812114064	R.NAVEEN	–
77.	920812114065	P.NAVEEN BHARATHI	–
78.	920812114066	M.NAVEEN KUMAR	–
79.	920812114067	G.PALPANDI	–
80.	920812114068	S.PANDIARAJAN	–
81.	920812114069	G.PRABU	–
82.	920812114070	K.PRAKASH	–

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91.	920812114079	R.RAMKUMAR	
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108.	920812114096	J.SIVA PRATHEEN	
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111.	920812114099	P.SURESH KUMAR	
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126.	920812114114	B.WASIMAKRAM	
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131.	920812114313	S.RANJITH	—
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133.	920812114315	G.SRITHARAN	—
134.	920812114316	D.STALIN CHARLES	—
135.	920812114317	B.SURENDAR	—
136.	920812114320	N.VIGNESH KUMAR	—

No of Student Present: 60

No. of Students absent: 09

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2.	G.SETHURAJ	Assistant Professor
3.	K.VETRIVEL KUMAR	Assistant Professor
4.	G.SUNDARARAJAN	Assistant Professor

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INDUSTRIAL VISIT PARTICIPANTS LIST
M/S NAMAKKAL TRANSPORT CARRIERS
YEAR / BRANCH: IV / MECH

Date: 19.08.2015

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2.	920812114002	A.AHMED BAYAS MEERAN	—
3.	920812114003	K.AJITH KUMAR	—
4.	920812114004	A.AJMEER RAJA	—
5.	920812114005	S.AKILAN	—
6.	920812114006	M.AMSAGANAPATHI	—
7.	920812114007	A.ANAND XAVIER RAJ	—
8.	920812114008	B.ANBARASAN	—
9.	920812114009	A.ANBURAJ	—
10.	920812114010	P.ANDISAMY	—
11.	920812114011	P.AROCKIA LAWRANCE	—
12.	920812114012	T.ARUN KUMAR	—
13.	920812114013	G.ARUN KUMAR	—
14.	920812114014	S.BABU	—
15.	920812114015	A.BASKARAN	—
16.	920812114016	S.BAYASDEEN	—
17.	920812114017	R.CHELLA PANDI	—
18.	920812114018	M.CHOCKALINGAM	—
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20.	920812114020	R.DINESH KUMAR	—
21.	920812114021	M.DURAI RAJ	—
22.	920812114022	J.ENOCH FERDRICK	—
23.	920812114023	P.GOKULAKRISHNAN	—
24.	920812114024	S.K.GOWRI SANKAR	—
25.	920812114025	B.ILANGO	—
26.	920812114026	A.JAYA PRASATH	—
27.	920812114027	J.JEGADHEESH	—
28.	920812114028	I.JOE MICHEAL	—
29.	920812114029	S.JOHN BOSCO	—
30.	920812114030	A.JOTHI PRAKASH	—
31.	920812114031	K.KALAIVANAN	—
32.	920812114032	D.KANNAN	—
33.	920812114033	M.KANNAN	—
34.	920812114034	C.KAPIPKAN	—
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42.	920812114042	U.KRISHNA KUMAR	—
43.	920812114043	S.KUMARESAN	—
44.	920812114044	K.LENIN KUMAR	—
45.	920812114045	R.LEO ARISTOK	—
46.	920812114046	S.MANGALARAJ	—
47.	920812114047	M.MANIKANDAN	—
48.	920812114048	N.MANIKANDAN	—
49.	920812114049	R.MANIKANDAN	—
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51.	920812114051	K.MANOJ SANKAR	—
52.	920812114052	J.MARTIN AROCKIA RAJ	—
53.	920812114053	P.MATCHARAJA	—
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55.	920812114055	U.MOHAMED SULTHAN	—
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59.	920812114302	C.BALAMURUGAN	—
60.	920812114304	S.DINESH KUMAR	—
61.	920812114303	K.DINESH	—
62.	920812114306	M.GOWTHAM	—
63.	920812114305	K. GOKUL KUMAR	—
64.	920812114701	A. NAVIN UDHAYAKUMAR	—
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71.	920812114059	K.MUNEESH PRAVEEN	/
72.	920812114060	J.MURAILDHARAN	/
73.	920812114061	V.MURUGA PANDI	/
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75.	920812114063	B.NAGARAJAN	/
76.	920812114064	R.NAVEEN	/
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78.	920812114066	M.NAVEEN KUMAR	/
79.	920812114067	G.PALPANDI	/
80.	920812114068	S.PANDIARAJAN	/
81.	920812114069	G.PRABU	/
82.	920812114070	K.PRAKASH	a

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129.	920812114308	K.MURALIDARAN	a
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131.	920812114313	S.RANJITH	1
132.	920812114314	P.SADAIYAN	1
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136.	920812114320	N.VIGNESH KUMAR	a

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No. of Students absent: 07

S. No	Name of Faculty	Designation
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2.	G.SETHURAJ	Assistant Professor
3.	K.VETRIVEL KUMAR	Assistant Professor
4.	G.SUNDARARAJAN	Assistant Professor

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PHOTO GALLERY

Students and faculty in Industrial visit at M/S Namakkal Transport Carriers, Nammakal on 18.08.2015

Bolero Chassis Demonstration by NTC Faculty on 19-08-2015

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Industrial visit Report

Industry and place of visit : Namakkal Transport Carriers - Namakkal

Date of visit : 18.08.2015 & 19.08.2015

Course related to the visit : Automotive systems , Thermodynamics, Thermal Engineering - I

Batch Students : IV Year -120 students

S.Akilan

S. Sri Arun

During Industrial visit, Students gained the knowledge on

1. Volvo, Man engine components, Lubrication system, cooling system
2. Fuel supply systems
3. Transmission system
4. Chassis and Suspension system
5. Steering system
6. Tyre construction
7. Auto Electrical systems
8. Safety precautions in transport vehicles
9. Over Dimension Vehicles demonstration
10. Drivers training video demonstration

Head of the Department

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ME6402 **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 – wafer machining micromachining –

TOTAL : 45 PERIODS

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TEXT BOOKS:

1. Hajra Choudhury, "Elements of Workshop Technology", Vol.II., Media Promoters
2. Rao. P.N "Manufacturing Technology - Metal Cutting and Machine Tools", Tata McGraw-Hill, New Delhi, 2003.

REFERENCES:

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

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Experimental Investigation of AA7075 Reinforced With SiC, TiC, B4C Metal Matrix Composites

A PROJECT REPORT

Submitted by

K.VISHNUKALIMUTHU	REG. NO.: 920812114112
K.JEYAPRAKASH	REG. NO.: 920812114307
D.STALINCHARLES	REG. NO.: 920812114316
D.YUVARAM	REG. NO.: 920812114321

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

APRIL 2016

NPR COLLEGE OF ENGG. & TECHNOLOGY NATHAM

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ABSTRACT

In automobile parts our manufacturers conventionally used weight alloy materials in car bodies (Aluminium + Silicon Carbide). Aluminium based metal has very low strength comparing to other metals. These metals only withstand for very less strength and malleability is low. It leads to breakage as soon as sudden force occur on it and aids sudden bending on it.

Our project is " Experimental investigation of AA7075 Reinforced with SiC, TiC, B4C Metal Matrix Composites. (i.e.) By adding Aluminium with Tic Titanium carbide, Sic- Silicon carbide, B4C-Boron carbide. By using this metal composites we can reduce the weight of the material this makes the car weight to reduce and makes the efficiency higher by verifying with various experimental tests like Structural Analysis (Scanning Electron Microscope), Tensile Testing, Hardness Testing, Impact Testing.

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CHAPTER 7

CONCLUSION

The AA7075-Silicon Carbide and Titanium Carbide Metal Matrix Composites with Various Percentage (2.5% & 2.5%,2% & 3%, 3% & 2%) have been Successfully Produced by Stir Casting Method. From the work the following conclusions are derived.The percentage increase of Silicon Carbide and Titanium Carbide in the Aluminium metal matrix composite produces a corresponding change in the value of the elongation. The tensile strength decreases and increase with percentage increase Silicon Carbide and Titanium Carbide. Minimum tensile strength was found for the Silicon Carbide and Titanium Carbide weight percentage of 2.5& 2.5 and the value was 68.45 MPa.

The Izod impact testing of AA7075-SiC-TiC composites was found to be same readings for all % of weight Silicon carbide (SiC) & titanium carbide (TiC) particles and the hardness value was 2 Joules. The images taken by the Scanning Electron Microscope show that the Silicon Carbide and Titanium Carbide particles are protruded above the surface of the AA7075 particles and the wear was minimum in the surface Silicon Carbide and Titanium Carbide particles. The SEM image reveals that dispersion of Silicon Carbide and Titanium Carbide particulates evenly distributed over the Aa7075 Matrix.The value of percentage increase of Silicon Carbide and Titanium Carbide in the Aluminium metal matrix composite produces a corresponding change in the Life of the component.The Aluminium Alloy 7075 Silicon Carbide and Titanium Carbide composite can be used in the automobile Bike frame and

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connecting rod presently in use. This would increase the hardness, tensile strength and the fatigue life of the shaft for various loading.

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ME6403 **ENGINEERING MATERIALS AND METALLURGY** **L T P C**
3 0 0 3

OBJECTIVES:

- 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 **10**

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 **8**

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 completion of this course, the students can able to apply the different materials, their processing, heat treatments in suitable application in mechanical engineering fields.

TEXT BOOKS:

1. Avner,, S.H., "Introduction to Physical Metallurgy", McGraw Hill Book Company,1994.
2. Williams D Callister, "Material Science and Engineering" Wiley India Pvt Ltd, Revised Indian Edition 2007

REFERENCES:

1. Raghavan.V, "Materials Science and Engineering", Prentice Hall of India Pvt. Ltd., 1999.
2. Kenneth G.Budinski and Michael K. Budinski, "Engineering Materials", Prentice Hall of India Private Limited, 4th Indian Reprint 2002.
3. Upadhyay. G.S. and Anish Upadhyay, "Materials Science and Engineering", Viva Books Pvt. Ltd., New Delhi, 2006.
4. U.C.Jindal : Material Science and Metallurgy, "Engineering Materials and Mettalurgy", First Edition, Dorling Kindersley, 2012

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Date : 15.07.2015

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. S.AJITH KUMAR** of third year Mechanical Engineering of NPR College of Engineering & Technology, Natham ,Dindigul, has successfully completed six days Inplant Training from **10.07.2015 to 15.07.2015** in our organization. During the period of his training his work was satisfactory.

Authorized Signatory

For Osho Body Builders

Manager.

Dr. J.SUNDARARAJAN,
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NPR COLLEGE OF ENGG. & TECHNOLOGY
NATHAM

ME6404 **THERMAL ENGINEERING** **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 POWER CYCLES **8**

Otto, Diesel, Dual, Brayton cycles, Calculation of mean effective pressure, and air standard efficiency - Comparison of cycles.

UNIT II INTERNAL COMBUSTION ENGINES **10**

Classification - Components and their function. Valve timing diagram and port timing diagram - actual and theoretical p-V diagram of four stroke and two stroke engines. Simple and complete Carburettor. MPFI, Diesel pump and injector system. Battery and Magneto Ignition System - Principles of Combustion and knocking in SI and CI Engines. Lubrication and Cooling systems. Performance calculation.

UNIT III STEAM NOZZLES AND TURBINES **9**

Flow of steam through nozzles, shapes of nozzles, effect of friction, critical pressure ratio, supersaturated flow. Impulse and Reaction principles, compounding, velocity diagram for simple and multi-stage turbines, speed regulations –Governors.

UNIT IV AIR COMPRESSOR **9**

Classification and working principle of various types of compressors, work of compression with and without clearance, Volumetric efficiency, Isothermal efficiency and Isentropic efficiency of reciprocating compressors, Multistage air compressor and inter cooling –work of multistage air compressor

UNIT V REFRIGERATION AND AIR CONDITIONING **9**

Refrigerants - Vapour compression refrigeration cycle- super heat, sub cooling – Performance calculations - working principle of vapour absorption system, Ammonia –Water, Lithium bromide – water systems (Description only) . Air conditioning system - Processes, Types and Working Principles. - Concept of RSHF, GSHF, ESHF- Cooling Load calculations.

TOTAL: 45 PERIOD

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Website : www.bnazrum.com

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. V. KARTHIKEYAN,** II year Mechanical Engineering of NPR College of Engineering & Technology, Natham, Dindigul has completed 12 days Internship from **23-05-2016 to 03-06-2016** in our organization. During this period, he was sincere, enthusiastic and hard working.

Date: 03.06.2016

For BNAZRUM AGRO EXPORTS (P) LTD.,

(A.M.Yusuf Ansari)
General Manager

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ME6501 **COMPUTER AIDED DESIGN** **L T P C**
3 0 0 3

OBJECTIVES:

- To provide an overview of how computers are being used in mechanical component design

UNIT I FUNDAMENTALS OF COMPUTER GRAPHICS **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

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 and B-rep

UNIT III VISUAL REALISM **9**

Hidden – Line-Surface-Solid removal algorithms – shading – colouring – computer animation.

UNIT IV ASSEMBLY OF PARTS **9**

Assembly modelling – interferences of positions and orientation – tolerance analysis-massproperty calculations – mechanism simulation and interference checking.

UNIT V CAD STANDARDS **9**

Standards for computer graphics- **Graphical Kernel System** (GKS) - standards for exchangeimages- **Open** Graphics Library **(OpenGL)** - Data exchange standards - IGES, STEP, CALSetc. - communication standards.

TOTAL : 45 PERIODS

OUTCOMES:

- Upon completion of this course, the students can able to use computer and CAD software's for modeling of mechanical components

TEXT BOOKS:

1. Ibrahim Zeid "Mastering CAD CAM" Tata McGraw-Hill Publishing Co.2007

REFERENCES:

1. Chris McMahon and Jimmie Browne "CAD/CAM Principles", "Practice and Manufacturing management " Second Edition, Pearson Education, 1999.
2. William M Neumann and Robert F.Sproul "Principles of Computer Graphics", McGraw Hill Book Co. Singapore, 1989.
3. Donald Hearn and M. Pauline Baker "Computer Graphics"'. Prentice Hall, Inc, 1992.
4. Foley, Wan Dam, Feiner and Hughes - "Computer graphics principles & practice" Pearson Education - 2003.

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ASIANS Motors

Passenger car service centre An ISO 9001-2008 certified company

C-3 & C-6, Sidco Industrial Estate, K. Pudur, Madurai-625 007.
Tel (0452) 4393677, Ph 9092262260
email asiansmotor@yahoo.com

Date: 20.12.2015

TO WHOM IT MAY CONCERN

This is to certify that Mr. **S.LALITHAMBIKESWARAN** of second year Mechanical Engineering has undergone In-plant training in our organization from 15.12.2015 to 20.12.2015. During the period of training his performance was good.

Authorized Signatory

Manager
ASIANS MOTORS
Passenger Car Service Centre
C-3 & C-6 Sidco Industrial Estate.
K.Pudur, Madurai-625 007.

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

ME6502 **HEAT AND MASS TRANSFER** **L T P C**
3 0 0 3

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**

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**

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**

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**

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

UNIT V MASS TRANSFER **9**

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 : 45 PERIODS

OUTCOMES:

- Upon completion of this course, the students can able to understand and apply different heat and mass transfer principles of different applications.

TEXT BOOK:

1. Yunus A. Cengel, "Heat Transfer A Practical Approach", Tata McGraw Hill, 2010

REFERENCE BOOKS:

1. Frank P. Incropera and David P. Dewitt, "Fundamentals of Heat and Mass Transfer", John Wiley & Sons, 1998.
2. Venkateshan. S.P., "Heat Transfer", Ane Books, New Delhi, 2004.
3. Ghoshdastidar, P.S, "Heat Transfer", Oxford, 2004,
4. Nag, P.K., "Heat Transfer", Tata McGraw Hill, New Delhi, 2002
5. Holman, J.P., "Heat and Mass Transfer", Tata McGraw Hill, 2000
6. Ozisik, M.N., "Heat Transfer", McGraw Hill Book Co., 1994.
7. Kothandaraman, C.P., "Fundamentals of Heat and Mass Transfer", New Age International, New Delhi, 1998.
8. Yadav, R., "Heat and Mass Transfer", Central Publishing House, 1995.
9. M.Thirumaleshwar : Fundamentals of Heat and Mass Transfer, "Heat and Mass Transfer", First Edition, Dorling Kindersley, 2009

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TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. M. BALAMURALIKRISHNAN,** II year Mechanical Engineering of NPR College of Engineering & Technology, Natham, Dindigul has completed 12 days Internship from **23-05-2016 to 03-06-2016** in our organization. During this period, he was sincere, enthusiastic and hard working.

Date: 03.06.2016

For BNAZRUM AGRO EXPORTS (P) LTD.,

(A.M.Yusuf Ansari)
General Manager

fssai

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ME6503 **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 **10**

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 **8**

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 completion of this course, the students can able to successfully design machine components

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TEXT BOOK:

1. Bhandari V, "Design of Machine Elements", 3rd Edition, Tata McGraw-Hill Book Co, 2010.
2. Joseph Shigley, Charles Mischke, Richard Budynas and Keith Nisbett "Mechanical Engineering Design", 8th Edition, Tata McGraw-Hill, 2008.

REFERENCES:

1. Sundararajamoorthy T. V. Shanmugam .N, "Machine Design", Anuradha Publications, Chennai, 2003.
2. Robert C. Juvinall and Kurt M. Marshek, "Fundamentals of Machine Design", 4th Edition, Wiley, 2005
3. Alfred Hall, Halowenko, A and Laughlin, H., "Machine Design", Tata McGraw-Hill BookCo.(Schaum's Outline), 2010
4. Bernard Hamrock, Steven Schmid,Bo Jacobson, "Fundamentals of Machine Elements",2nd Edition, Tata McGraw-Hill Book Co., 2006.
5. Orthwein W, "Machine Component Design", Jaico Publishing Co, 2003.
6. Ansel Ugural, "Mechanical Design – An Integral Approach", 1st Edition, Tata McGraw-Hill Book Co, 2003.
7. Merhyle F. Spotts, Terry E. Shoup and Lee E. Hornberger, "Design of Machine Elements" 8th Edition, Printice Hall, 2003.

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Date: 16.12.2015

TO WHOM IT MAY CONCERN

This is to certify that **Mr. W. SELVINRAJ** of third year Mechanical Engineering studying in NPR College of Engineering & Technology, Natham, Dindigul, has successfully completed the internship programme from **25.11.2015 to 16.12.2015** in **OSHO BODY BUILDERS, MADURAI.** During this period he was found punctual, hardworking and inquisitive.

We wish him every success in life.

Authorized Signatory

For Osho Body Builders

Manager.

NPR COLLEGE OF ENGG. & TECHNOLOGY ★ NATHAM

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ME6504 **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 **5**

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 **10**

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 **12**

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 **10**

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 **8**

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 completion of this course, the Students can demonstrate different measurement technologies and use of them in Industrial Components

TEXT BOOKS:

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

REFERENCES:

1. Charles Reginald Shotbolt, "Metrology for Engineers", 5th edition, Cengage Learning EMEA,1990.
2. Backwith, Marangoni, Lienhard, "Mechanical Measurements", Pearson Education , 2006

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MADURAI - 625 018

Date : 15.07.2015

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. P.DINESH KUMAR** of third year Mechanical Engineering of NPR College of Engineering & Technology, Natham ,Dindigul, has successfully completed six days Inplant Training from **10.07.2015 to 15.07.2015** in our organization. During the period of his training his work was satisfactory.

Authorized Signatory

For Osho Body Builders

Manager.

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ME6505 **DYNAMICS OF MACHINES** **L T P C**
3 0 0 3

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 **9**

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 **9**

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 SINGLE DEGREE FREE VIBRATION **9**

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 **9**

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 **9**

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.

TEXT BOOK:

1. Uicker, J.J., Pennock G.R and Shigley, J.E., "Theory of Machines and Mechanisms" ,3rd Edition, Oxford University Press, 2009.
2. Rattan, S.S, "Theory of Machines", 3rd Edition, Tata McGraw-Hill, 2009

REFERENCES:

1. Thomas Bevan, "Theory of Machines", 3rd Edition, CBS Publishers and Distributors, 2005.
2. Cleghorn. W. L, "Mechanisms of Machines", Oxford University Press, 2005
3. Benson H. Tongue, "Principles of Vibrations", Oxford University Press, 2nd Edition, 2007
4. Robert L. Norton, "Kinematics and Dynamics of Machinery", Tata McGraw-Hill, 2009.
5. Allen S. Hall Jr., "Kinematics and Linkage Design", Prentice Hall, 1961

TOTAL : 45 PERIODS

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DESIGN MODIFICATION AND ANALYSIS OF TWO WHEELER ALLOY WHEEL

A PROJECT REPORT

Submitted by

T. PRAVEENKUMAR	REG. NO.: 920812114071
P. PUVIYARASAN	REG. NO.: 920812114073
G. RAJKUMAR	REG. NO.: 920812114076
T. SAMYTHURAI	REG. NO.: 920812114087

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

APRIL 2016

Dr. J.SUNDARARAJAN,
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ABSTRACT

Alloy wheel is one of the important parts in the two wheeler which will transfer the total load of the vehicle with rider towards the ground. This alloy wheels are made by Aluminium alloy material which has high strength and durability with less weight ratio. This project is focused on the reduction of the alloy wheel weight. For this purpose we have modified the design of the spoke of the alloy wheel. By comparing the existing design with our modified new design we are going to prove that weight of the new design is less than existing design. This reduction in weight will reduce the material utilization and also reduce the fuel consumption. Here PRO-E software is used for modelling and Ansys workbench 14.5 is used for analysing the model.

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CONCLUSION

Analysis has been carried out on existing and our modified new model of alloy wheels. The value of total deformation and equivalent stress for each model are determined. Stress induced in the new model is 15.047MPa which is less than existing model's stress value of 17.973 MPa and total deformation of the new model is 0.088955 mm which is less than the existing model's 0.093274 mm for the load of bike with two persons. Also weight of the new model alloy wheel is reduced by 4.29%. Hence, the cost of the wheel and fuel consumption will be reduced. The objective was to reduce the weight of the alloy wheel has been achieved. From this we can conclude that this modified new model of motor cycle alloy wheel design is better than the existing design.

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ME6601 **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 completion of this course, the students can able to successfully design transmission components used in Engine and machines

TEXT BOOKS:

1. Bhandari V, "Design of Machine Elements", 3rd Edition, Tata McGraw-Hill Book Co, 2010.
2. Joseph Shigley, Charles Mischke, Richard Budynas and Keith Nisbett "Mechanical Engineering Design", 8th Edition, Tata McGraw-Hill, 2008.

REFERENCES:

1. Sundararajamoorthy T. V, Shanmugam .N, "Machine Design", Anuradha Publications, Chennai, 2003.
2. Gitin Maitra, L. Prasad "Hand book of Mechanical Design", 2nd Edition, Tata McGraw-Hill, 2001.
3. Prabhu. T.J., "Design of Transmission Elements", Mani Offset, Chennai, 2000.

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4. C.S.Sharma, Kamlesh Purohit, "Design of Machine Elements", Prentice Hall of India, Pvt. Ltd., 2003.
5. Bernard Hamrock, Steven Schmid, Bo Jacobson, "Fundamentals of Machine Elements", 2nd Edition, Tata McGraw-Hill Book Co., 2006.
6. Robert C. Juvinall and Kurt M. Marshek, "Fundamentals of Machine Design", 4th Edition, Wiley, 2005
7. Alfred Hall, Halowenko, A and Laughlin, H., "Machine Design", Tata McGraw-Hill BookCo.(Schaum's Outline), 2010
8. Orthwein W, "Machine Component Design", Jaico Publishing Co, 2003.
9. Ansel Ugural, "Mechanical Design – An Integral Approach", 1st Edition, Tata McGraw-Hill Book Co, 2003.
10. Merhyle F. Spotts, Terry E. Shoup and Lee E. Hornberger, "Design of Machine Elements" 8th Edition, Printice Hall, 2003.
11. U.C.Jindal : Machine Design, "Design of Transmission System", Dorling Kindersley, 2010

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Rajappa Nagar
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MADURAI - 625 018

Date : 15.07.2015

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. P.DINESH KUMAR** of third year Mechanical Engineering of NPR College of Engineering & Technology, Natham ,Dindigul, has successfully completed six days Inplant Training from **10.07.2015 to 15.07.2015** in our organization. During the period of his training his work was satisfactory.

Authorized Signatory

For Osho Body Builders

Manager.

NPR COLLEGE OF ENGG. & TECHNOLOGY * NATHAM

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ME6602 **AUTOMOBILE ENGINEERING** 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 VEHICLE STRUCTURE AND ENGINES 9

Types of automobiles, vehicle construction and different layouts, chassis, frame and body, Vehicle aerodynamics (various resistances and moments involved), IC engines –components-functions and materials, variable valve timing (VVT).

UNIT II ENGINE AUXILIARY SYSTEMS 9

Electronically controlled gasoline injection system for SI engines, Electronically controlled diesel injection system (Unit injector system, Rotary distributor type and common rail direct injection system), Electronic ignition system (Transistorized coil ignition system, capacitive discharge ignition system), Turbo chargers (WGT, VGT), Engine emission control by three way catalytic converter system, Emission norms (Euro and BS).

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 ,Differential and rear axle, Hotchkiss Drive and Torque Tube Drive.

UNIT IV STEERING, BRAKES AND SUSPENSION SYSTEMS 9

Steering geometry and types of steering gear box-Power Steering, Types of Front Axle, Types of Suspension Systems, Pneumatic and Hydraulic Braking Systems, Antilock Braking System (ABS), electronic brake force distribution (EBD) and Traction Control.

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 Hybrid Vehicles, Fuel Cell 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. Kirpal Singh, "Automobile Engineering", Vol 1 & 2, Seventh Edition, Standard Publishers, New Delhi, 1997.
2. Jain K.K. and Asthana .R.B, "Automobile Engineering" Tata McGraw Hill Publishers, New Delhi, 2002.

REFERENCES:

1. Newton ,Steeds and Garet, "Motor Vehicles", Butterworth Publishers,1989.
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. Heinz Heisler, "Advanced Engine Technology," SAE International Publications USA, 1998.
5. Ganesan V. "Internal Combustion Engines", Third Edition, Tata McGraw-Hill, 2007.

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

MATERIAL OPTIMIZATION OF FLYWHEEL IN IC ENGINE

A PROJECT REPORT

Submitted by

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S. RAMACHANDRAN	REG. NO.: 920812114077
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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

APRIL 2016

NPR COLLEGE OF ENGG. & TECHNOLOGY NATHAM

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ABSTRACT

Flywheel is a mechanical device with a significant moment of inertia used as a storage device for rotational energy. Flywheels resist changes in their rotational speed, which helps to steady the rotation of the shaft when a fluctuating torque is exerted on it by its power source for engine. In this project, we have planned to do material optimization of flywheel in an internal combustion engine. In this project the 3D model of the flywheel and is do designed the analysis is do be done with different materials of the flywheel using software. Presently fly wheels are made up of cast iron which has high mass and low moment of inertia. In this project we are going to analyze four materials which are Duralumin, Gray cast iron GCI20, High modulus carbon fiber and Matrix composite to reduce the mass increase moment of inertia of the fly wheel and velocity.

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CHAPTER 9

CONCLUSION

The analysis of flywheel we found that the CARBON FIBRE material have good physical properties and has less deformation under the moment and velocity than the other four materials selected and finally the deformation, stress, strain of the CARBON FIBRE is final lower compared to the other materials.

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ME6603 **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 – RitzTechnique – 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:

- Upon completion of this course, the students can able to understand different mathematical Techniques used in FEM analysis and use of them in Structural and thermal problem

TEXT BOOK:

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. Rao, S.S., "The Finite Element Method in Engineering", 3rd Edition, Butterworth Heinemann, 2004
2. Logan, D.L., "A first course in Finite Element Method", Thomson Asia Pvt. Ltd., 2002
3. 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.
4. Chandrupatla & Belagundu, "Introduction to Finite Elements in Engineering", 3rd Edition, Prentice Hall College Div, 1990
5. Bhatti Asghar M, "Fundamental Finite Element Analysis and Applications", John Wiley & Sons, 2005 (Indian Reprint 2013

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LOAD ANALYSIS OF ALUMINIUM ADHESIVE BONDED JOINT BY FINITE ELEMENT METHOD

A PROJECT REPORT

Submitted by

MARTIN AROCKIA RAJ.J	920812114052
LENIN KUMAR.K	920812114044
MANIKANDAN.N	920812114048
MANIKANDAN.R	920812114049

In partial fulfillment for the award of the degree

Of

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IN

MECHANICAL ENGINEERING

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April 2016

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ABSTRACT

Aluminum single lap bonded joints are mainly used for automobile and aerospace application. The objective of this project is to study the influence of adhesive thickness and overlap length on the strength of aluminum single lap joint. The adhesive strength of the joint was determined by utilizing the single lap shear test. The influence of the adhesive thickness and overlap length on stress distribution within the adhesive was also analyzed by finite element method (FEM).The joint fail in cohesive mode due to the high stress level generated in the adhesive, which indicates that the adhesion to the metal surface is stronger than that of the interior part of the adhesive. The experimental results obtained are compared with theoretical and numerical results.

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CHAPTER 8

CONCLUSION

In this Project, Aluminium single lap bonded joints were fabricated using araldite adhesive and the results were analysed experimentally for varying adhesive thickness and overlap length. The experimental results were compared with the Theoretical and Numerical results. The results show that the adhesion strength decreases with the increase in adhesive thickness and increases with the Increase in overlap length of the bonded joints. Further investigation can be done on the variation of adhesive bond strength by using Epoxy LY556 resin as the adhesive for aluminium in the future.

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ME6604 **GAS DYNAMICS AND JET PROPULSION** **L T P C**
3 0 0 3

OBJECTIVES:

- To understand the basic difference between incompressible and compressible flow.
- To understand the phenomenon of shock waves and its effect on flow. To gain some basic knowledge about jet propulsion and Rocket Propulsion.
(Use of Standard Gas Tables permitted)

UNIT I BASIC CONCEPTS AND ISENTROPIC FLOWS **6**

Energy and momentum equations of compressible fluid flows – Stagnation states, Mach waves and Mach cone – Effect of Mach number on compressibility – Isentropic flow through variable ducts – Nozzle and Diffusers

UNIT II FLOW THROUGH DUCTS **9**

Flows through constant area ducts with heat transfer (Rayleigh flow) and Friction (Fanno flow) – variation of flow properties.

UNIT III NORMAL AND OBLIQUE SHOCKS **10**

Governing equations – Variation of flow parameters across the normal and oblique shocks – Prandtl – Meyer relations – Applications.

UNIT IV JET PROPULSION **10**

Theory of jet propulsion – Thrust equation – Thrust power and propulsive efficiency – Operating principle, cycle analysis and use of stagnation state performance of ram jet, turbojet, turbofan and turbo prop engines.

UNIT V SPACE PROPULSION **10**

Types of rocket engines – Propellants-feeding systems – Ignition and combustion – Theory of rocket propulsion – Performance study – Staging – Terminal and characteristic velocity – Applications – space flights.

TOTAL: 45 PERIODS

OUTCOMES:

- Upon completion of this course, the students can able to successfully apply gas dynamics principles in the Jet and Space Propulsion

TEXT BOOKS:

1. Anderson, J.D., "Modern Compressible flow", 3rd Edition, McGraw Hill, 2003.
2. Yahya, S.M. "Fundamentals of Compressible Flow", New Age International (P) Limited, New Delhi, 1996.

REFERENCES:

1. Hill. P. and C. Peterson, "Mechanics and Thermodynamics of Propulsion", Addison – Wesley Publishing company, 1992.
2. Zucrow. N.J., "Aircraft and Missile Propulsion", Vol.1 & II, John Wiley, 1975.
3. Zucrow. N.J., "Principles of Jet Propulsion and Gas Turbines", John Wiley, New York, 1970.
4. Sutton. G.P., "Rocket Propulsion Elements", John wiley, New York,1986,.
5. Shapiro. A.H.," Dynamics and Thermodynamics of Compressible fluid Flow", John wiley, New York, 1953.
6. Ganesan. V., "Gas Turbines", Tata McGraw Hill Publishing Co., New Delhi, 1999.
7. Somasundaram. PR.S.L., "Gas Dynamics and Jet Propulsions", New Age International Publishers, 1996.
8. Babu. V., "Fundamentals of Gas Dynamics", ANE Books India, 2008.
9. Cohen. H., G.E.C. Rogers and Saravanamutto, "Gas Turbine Theory", Longman Group Ltd., 1980

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Date: 10.06.2016

TO WHOM IT MAY CONCERN

This is to certify that Mr. S.JEGADESWARAN studying in third year Mechanical Engineering of NPR College of Engineering & Technology, Natham has undergone in-plant Training in our organization from 06.06.2016 to 10.06.2016

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

With Regards

For THERMO SOLUTIONS (INDIA) PRIVATE LIMITED

(For Thermo Solutions (INDIA) Pvt. Ltd)

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ME6004 **UNCONVENTIONAL MACHINING PROCESSES** **L T P C**

3 0 0 3

OBJECTIVES:

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

UNIT I INTRODUCTION **6**

Unconventional machining Process – Need – classification – Brief overview .

UNIT II MECHANICAL ENERGY BASED PROCESSES **9**

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 III ELECTRICAL ENERGY BASED PROCESSES **9**

Electric Discharge Machining (EDM)- working Principle-equipments-Process Parameters-Surface Finish and MRR- electrode / Tool – Power and control Circuits-Tool Wear – Dielectric – Flushing – Wire cut EDM – Applications.

UNIT IV CHEMICAL AND ELECTRO-CHEMICAL ENERGY BASED PROCESSES **11**

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 V THERMAL ENERGY BASED PROCESSES **10**

Laser Beam machining and drilling (LBM), plasma Arc machining (PAM) and Electron Beam Machining (EBM). Principles – Equipment –Types - Beam control techniques – Applications.

TOTAL: 45 PERIODS

OUTCOMES:

- Upon completion of this course, the students can able to demonstrate different unconventional machining processes and know the influence of difference process parameters on the performance and their applications.

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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Fax : + 91 451 2470061
E-mail : info@bnazrum.com
Website : www.bnazrum.com

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr, M. CHOCKALINGAM,** IV year Mechanical Engineering of NPR College of Engineering & Technology, Natham, Dindigul has completed 10 days Inplant Training from **04-05-2016 to 14-05-2016** in our organization. During this period, he was sincere, enthusiastic and hard working.

Date: 14.05.2016

For BNAZRUM AGRO EXPORTS (P) LTD.,

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General Manager

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GE2022 **TOTAL QUALITY MANAGEMENT** L T P C
3 0 0 3

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM – TQM Framework - Contributions of Deming, Juran and Crosby – Barriers to TQM.

UNIT II TQM PRINCIPLES 9

Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS & TECHNIQUES I 9

The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types.

UNIT IV TQM TOOLS & TECHNIQUES II 9

Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Cost of Quality – Performance measures.

UNIT V QUALITY SYSTEMS 9

Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – Case studies of TQM implementation in manufacturing and service sectors including IT.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Dale H.Besterfiled, et at., "Total Quality Management", Pearson Education Asia, Third Edition, Indian Reprint (2006).

REFERENCES:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 6th Edition, South-Western (Thomson Learning), 2005.
2. Oakland, J.S. "TQM – Text with Cases", Butterworth – Heinemann Ltd., Oxford, 3rd Edition, 2003.
3. Suganthi,L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd.,2006.
4. Janakiraman,B and Gopal, R.K, "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

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Ref:NPRCET/OFF/MECH/IV/2015-16 Date: 06.01.2016

To

The Head office,

TNSTC Reconditioning unit,

Dindigul.

Respected sir,

Sub: Seeking Permission for Industrial visit –reg...

Warm greetings,

NPR Group of Colleges, Natham, which is 27 kms away from Dindigul and 35 kms away from Madurai, Tamil Nadu.We are pleased to introduce ourselves as one of the premier group of colleges in the field of education. The campus is spread over 93 acres of lush green environment with lots of green cover and pristine surroundings. Our college recognizes the growing necessity to prepare the students from the rural and semi-urban sectors of India to be employable.

We are providing Undergraduate courses in Mechanical Engineering, Civil Engineering, Computer Science & Engineering, Electronics & Communication Engineering and Electrical & Electronics and Post Graduate courses Structural Engineering and Master of Business Administration and has a track record of outstanding performances of its pass-outs from different domains.

I would like to share that we suggest to have this visit with your organization on 22nd January 2016, there would be a total of 110 students (II year Mechanical) accompanied by 4 faculty member from our college. The visit is aimed at enhancing their knowledge. We request you to permit us to take a round of the entire Reconditioning unit and show the tasks handled in different departments to our students. I hope you allow us the opportunity to visit your Unit and meet your skilled staff and anticipate a positive response from your end.

Thanking you,

With Regards

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INDUSTRIAL VISIT PARTICIPANTS LIST
TNSTC – DINDIGUL.
YEAR / BRANCH: II / MECH

Date: 21.01.2016

Si. No	Register No.	Name	Attendance
1.	920815114001	AAKASH ALAGARSAMY.S	/
2.	920815114002	AAKASH KUMAR.R	/
3.	920815114003	AJAYKUMAR.M	/
4.	920815114006	AJITH KUMAR.R	/
5.	920815114007	AJITH KUMAR.R	/
6.	920815114008	ALAGESAN.M	/
7.	920815114009	ALEXANDER.E	/
8.	920815114010	ALLENPAUL.J	/
9.	920815114011	ANAND.R	/
10.	920815114013	ARAVINTH.T	/
11.	920815114014	ARSHAD NISAAR.A	/
12.	920815114015	ARUNACHALAM.K	a
13.	920815114016	ARUN KARTHICK.B.B	/
14.	920815114019	ARUN PANDI.M	/
15.	920815114020	ASIR VIVEK.A	/
16.	920815114021	BALAJI.V	/
17.	920815114022	BALAJI SURYA.M	/
18.	920815114023	BALASUBRAMANIAN.V	/
19.	920815114024	BARATHIRAJA.J	/
20.	920815114025	BOOBALAN.M	a
21.	920815114026	CHANDRASEKAR.V	/
22.	920815114027	CHARLES AUGASTIAN.P	/
23.	920815114028	CHELLAPPANDI.R	/
24.	920815114029	CHRISTHURAJAN.J	/
25.	920815114031	DHILIP KUMAR.N	/
26.	920815114032	DHURAI MURUGAN.G	/
27.	920815114033	DINESH.S	/
28.	920815114034	DINESHKUMAR.P	a
29.	920815114035	DIWAGAR.V	/
30.	920815114036	GANESAN.L	/
31.	920815114037	GANESH MOHAN.D	/
32.	920815114039	GOKUL.D	/
33.	920815114041	GOKUL PANDIYARAJAN.T	/
34.	920815114042	GOWTHAM.S	/
35.	920815114043	GURUMANIKANDAN.B	/
36.	920815114044	HARISHKANNA.P	a
37.	920815114045	HEMANTH.M	/

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38.	920815114046	KANNAN.P	/
39.	920815114047	KARANPANDI.T	/
40.	920815114049	KARTHICK S	/
41.	920815114051	KARTHIKEYAN.T	/
42.	920815114052	KARTHICK RAM.R	/
43.	920815114053	KATHIRESAN.S.V	/
44.	920815114054	KATHIRVELAN.V	/
45.	920815114055	KAVIARASAN.P	a
46.	920815114056	KAVIRAJ.M	/
47.	920815114057	KESAVARAJ.S	/
48.	920815114058	KRISHNA KUMAR.S	/
49.	920815114059	MAHABOOB JAHIR.S	/
50.	920815114060	MAHESH KUMAR.K	/
51.	920815114061	MANIKANDAN.S	/
52.	920815114062	MANIKANDAN.V	/
53.	920815114063	MEENAKSHI SUNDARAM.S	/
54.	920815114064	MOHAMED IRSHAD.M	a
55.	920815114301	AFRITH GOUSER BASHAN.N	/
56.	920815114302	ARUN R.A.K	/
57.	920815114303	BALAJI.J	/
58.	920815114304	BALAKRISHNAN.M	/
59.	920815114305	GOUTHAM.R	/
60.	920815114307	KANNAN.R	a
61.	920815114066	MOSES PRAVIN.J	/
62.	920815114067	MUKILAN.G	/
63.	920815114068	MURALIDHARAN.R	/
64.	920815114069	MUTHUGOPALAKRISHNAN.T	/
65.	920815114070	MUTHUMANI.K	a
66.	920815114071	MUTHURAMAN.A	/
67.	920815114072	MUTHUVIJAYAN.R	/
68.	920815114073	NAVANEETHAKRISHNAN.R	/
69.	920815114074	NAVEEN KUMAR.C	/
70.	920815114076	NITHYASIVA.K	/
71.	920815114077	PERUMAL.N	a
72.	920815114078	PONRAGHUL.K	/
73.	920815114079	PRABHUKANNA.S	/
74.	920815114080	PRADEEP.M	/
75.	920815114081	PRAKASH PANDIAN.P	/
76.	920815114082	PRAVEEN.R	/
77.	920815114083	PREMKUMAR.M	/
78.	920815114084	PREMRAJ.A	/
79.	920815114085	PUSPHARAJ.S	/
80.	920815114086	RAMKUMAR.P (25.12.1997)	a
81.	920815114087	RAMKUMAR.P (06.05.1998)	/
82.	920815114088	RAM THILAK.R	/

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83.	920815114090	SANTHOSHKUMAR.M	/
84.	920815114091	SARAN.M	/
85.	920815114092	SARATHY.V	/
86.	920815114093	SASIKUMAR.R	/
87.	920815114094	SATHEESHKUMAR.N	/
88.	920815114095	SATHISHKUMAR.R	/
89.	920815114096	SATHYAMOORTHY.P	/
90.	920815114097	SELVAGOWTHAM.S	/
91.	920815114098	SELVAKUMAR.M	/
92.	920815114099	SHEIK MOHAMED.J	/
93.	920815114100	SHREYA SUDHAN.G	/
94.	920815114101	SIVAKUMAR.M	/
95.	920815114102	SIVAKUMAR.V	/
96.	920815114103	SIVAMURUGAN.AR	a
97.	920815114105	SUDHAKARAN.C	/
98.	920815114106	SUNDARRAJ.D	/
99.	920815114107	SURESH KUMAR.K	/
100.	920815114108	SURESH KUMAR.S	/
101.	920815114109	SWAMINATHAN.S	/
102.	920815114110	THANGAPANDI.A	/
103.	920815114111	UDHAYAKUMAR.R	/
104.	920815114112	UMASANKAR.K	/
105.	920815114113	VEDHAGURU.K	a
106.	920815114114	VETRISELVAN.L	/
107.	920815114115	VIGNESH .P	/
108.	920815114116	VIJAYAGANESH.B	/
109.	920815114117	VIKASH.M	/
110.	920815114118	VIMALKUMAR.M	a
111.	920815114119	VINITH.R	/
112.	920815114120	VINOTH.R	/
113.	920815114121	VISHNURAJ.T	/
114.	920815114122	YASARARAFATH.K	/
115.	920815114123	YOGA JEBASINGH.J	a
116.	920815114125	YOGESHKUMAR.C	/
117.	920815114308	KARUPPUSAMY.S	/
118.	920815114309	KUMARAN. R	/
119.	920815114310	MARIA PRABAKARAN. D	/
120.	920815114311	J.MURUGESAN	/
121.	920815114313	PANDIPRABHU.D	/
122.	920815114314	PRASANTH.G	/
123.	920815114315	RANJITH.S	/
124.	920815114316	P. TAMIL SELVAN	/
125.	920815114317	VIGNESH.R	a

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No of Student Present: 110

No. of Students absent: 15

S. No	Name of Faculty	Designation
1.	S.JOSHUA	Assistant Professor
2.	G.SETHURAJ	Assistant Professor
3.	P.THANGAMUNIYAPPAN	Assistant Professor
4.	G.SUNDARARAJAN	Assistant Professor

HoD/MECH

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

PRINCIPAL

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PHOTO GALLERY

Engine dismantling by our students at R C Unit Dindigul on22.01.2016

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Industrial visit Report

Industry and place of visit: TNSTC R.C. Unit , Dindigul

Date of visit: 22.01.2016

Course related to the visit: Thermodynamics, Thermal Engineering-I

Batch Students: II – 110 students

M.Hemanth

M.Pradeep

During Industrial visit, Students gained the knowledge on

1. TATA & Ashok Leyland engine components, Lubrication system, cooling system
2. Fuel supply systems (Fuel pump reconditioning & Nozzle pressure testing)
3. Transmission system (Clutch, Gear box reconditioning)
4. Chassis and Suspension system
5. Axle reconditioning & Steering system
6. Safety precautions in transport vehicles
7. Body building works

Head of the Department

Head of the Department
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Principal

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ME2401

MECHATRONICS

L T P C
3 0 0 3

OBJECTIVE:

- To understand the interdisciplinary applications of Electronics, Electrical, Mechanical and Computer Systems for the Control of Mechanical and Electronic Systems.

UNIT I MECHATRONICS, SENSORS AND TRANSDUCERS 9

Introduction to Mechatronics Systems – Measurement Systems – Control Systems – Microprocessor based Controllers. Sensors and Transducers – Performance Terminology – Sensors for Displacement, Position and Proximity; Velocity, Motion, Force, Fluid Pressure, Liquid Flow, Liquid Level, Temperature,Light Sensors – Selection of Sensors

UNIT II ACTUATION SYSTEMS 9

Pneumatic and Hydraulic Systems – Directional Control Valves – Rotary Actuators. Mechanical Actuation Systems – Cams – Gear Trains – Ratchet and pawl – Belt and Chain Drives – Bearings. Electrical Actuation Systems – Mechanical Switches – Solid State Switches – Solenoids – Construction and working principle of DC and AC Motors – speed control of AC and DC drives, Stepper Motors-switching circuitries for stepper motor – AC & DC Servo motors

UNIT III SYSTEM MODELS AND CONTROLLERS 9

Building blocks of Mechanical, Electrical, Fluid and Thermal Systems, Rotational – Transnational Systems, Electromechanical Systems – Hydraulic – Mechanical Systems. Continuous and discrete process Controllers – Control Mode – Two – Step mode – Proportional Mode – Derivative Mode – Integral Mode – PID Controllers – Digital Controllers – Velocity Control – Adaptive Control – Digital Logic Control – Micro Processors Control.

UNIT IV PROGRAMMING LOGIC CONTROLLERS 9

Programmable Logic Controllers – Basic Structure – Input / Output Processing – Programming – Mnemonics – Timers, Internal relays and counters – Shift Registers – Master and Jump Controls – Data Handling – Analogs Input / Output – Selection of a PLC.

UNIT V DESIGN OF MECHATRONICS SYSTEM 9

Stages in designing Mechatronics Systems – Traditional and Mechatronic Design - Possible Design Solutions. Case studies of Mechatronics systems- Pick and place Robot- Autonomous mobile robot-Wireless suriviellance balloon- Engine Management system- Automatic car park barrier.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Bolton,W, "Mechatronics" , Pearson education, second edition, fifth Indian Reprint, 2003
2. Smaili.A and Mrad.F , "Mechatronics integrated technologies for intelligent machines", Oxford university press, 2008

REFERENCES:

1. Rajput. R.K, A textbook of mechatronics, S. Chand & Co, 2007

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2. Michael B. Histand and David G. Alciatore, " Introduction to Mechatronics and Measurement Systems", McGraw-Hill International Editions, 2000.
3. Bradley D. A., Dawson D., Buru N.C. and. Loader A.J, "Mechatronics", Chapman and Hall, 1993.
4. Dan Necsulesu, "Mechatronics", Pearson Education Asia, 2002 (Indian Reprint).
5. Lawrence J. Kamm, "Understanding Electro – Mechanical Engineering", An Introduction to Mechatronics, Prentice – Hall of India Pvt., Ltd., 2000.
6. Nitaigour Premchand Mahadik, "Mechatronics", Tata McGraw-Hill publishing Company Ltd, 2003

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Fax : + 91 451 2470061
E-mail : info@bnazrum.com
Website : www.bnazrum.com

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. M.B .HARI KUMAR,** II year Mechanical Engineering of NPR College of Engineering & Technology, Natham, Dindigul has completed 12 days Internship from **23-05-2016 to 03-06-2016** in our organization. During this period, he was sincere, enthusiastic and hard working.

Date: 03.06.2016

For BNAZRUM AGRO EXPORTS (P) LTD.,

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General Manager

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ME2402 **COMPUTER INTEGRATED MANUFACTURING** **L T P C**
3 0 0 3

OBJECTIVE:

- This course will enable the student
- To gain knowledge about the basic fundamental of CAD.
- To gain knowledge on how computers are integrated at various levels of planning and manufacturing understand computer aided planning and control and computer monitoring.

UNIT I COMPUTER AIDED DESIGN **9**

Concept of CAD as drafting and designing facility, desirable features of CAD package, drawing features in CAD – Scaling, rotation, translation, editing, dimensioning, labeling, Zoom, pan, redraw and regenerate, typical CAD command structure, wire frame modeling, surface modeling and solid modeling (concepts only) in relation to popular CAD packages.

UNIT II COMPONENTS OF CIM **9**

CIM as a concept and a technology, CASA/Sme model of CIM, CIM II, benefits of CIM, communication matrix in CIM, fundamentals of computer communication in CIM – CIM data transmission methods – seriel, parallel, asynchronous, synchronous, modulation, demodulation, simplex and duplex. Types of communication in CIM – point to point (PTP), star and multiplexing. Computer networking in CIM – the seven layer OSI model, LAN model, MAP model, network topologies – star, ring and bus, advantages of networks in CIM

UNIT III GROUP TECHNOLOGY AND COMPUTER AIDED PROCESS PLANNING **9**

History Of Group Technology – role of G.T in CAD/CAM Integration – part families-classification and coding – DCLASS and MCLASS and OPTIZ coding systems – facility design using G.T – benefits of G.T – cellular manufacturing.Process planning - role of process planning in CAD/CAM Integration – approaches to computer aided process planning – variant approach and generative approaches – CAPP and CMPP systems.

UNIT IV SHOP FLOOR CONTROL AND INTRODUCTION TO FMS **9**

shop floor control – phases – factory data collection system – automatic identification methods – Bar code technology – automated data collection system.
FMS – components of FMS – types – FMS workstation – material handling and storage system –FMS layout- computer control systems – applications and benefits.

UNIT V COMPUTER AIDED PLANNING AND CONTROL AND COMPUTER MONITORING **9**

Production planning and control – cost planning and control – inventory management – material requirements planning (MRP) – shop floor control. Lean and Agile Manufacturing. Types of production monitoring systems – structure model of manufacturing – process control and strategies – direct digital control.

TOTAL: 45 PERIODS

TEXT BOOK:

COLLEGE OF ENGG. & TECH. NATHAM

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1. Mikell. P. Groover "Automation, Production Systems and Computer Integrated Manufacturing", Pearson Education 2001.

REFERENCES:

1. Mikell. P. Groover and Emory Zimmers Jr.,"CAD/CAM", Prentice hall of India Pvt. Ltd., 1998.
2. James A. Regh and Henry W. Kreabber, "Computer Integrated Manufacturing", Pearson Education second edition, 2005.
3. Chris McMahon and Jimmie Browne, "CAD CAM Principles, Practice and Manufacturing Management", Pearson Education second edition, 2005.
4. Ranky, Paul G., "Computer Integrated Manufacturing", Prentice hall of India Pvt. Ltd., 2005.
5. Yorem Koren, " Computer Integrated Manufacturing", McGraw Hill, 2005.
6. P N Rao, " CAD/CAM Principles and Applications", TMH Publications, 2007.

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CIN: U28131TZ2009PTC015549

Date: 10.06.2016

TO WHOM IT MAY CONCERN

This is to certify that Mr. N.KARTHICK BOOPATHI studying in third year Mechanical Engineering of NPR College of Engineering & Technology, Natham has undergone in-plant Training in our organization from 06.06.2016 to 10.06.2016

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

With Regards

For THERMO SOLUTIONS (INDIA) PRIVATE LIMITED

(For Thermo Solutions (INDIA) Pvt. Ltd)

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ME2403 **POWER PLANT ENGINEERING** L T P C
3 0 0 3

OBJECTIVE:

- To understand the various components , operations and applications of different types of power plants

UNIT I INTRODUCTION TO POWER PLANTS AND BOILERS 9

Layout of Steam , Hydel , Diesel , MHD, Nuclear and Gas turbine Power Plants Combined Power cycles – comparison and selection , Load duration Curves Steam boilers and cycles – High pressure and Super Critical Boilers – Fluidised Bed Boilers

UNIT II STEAM POWER PLANT 9

Fuel and ash handling ,Combustion Equipment for burning coal, Mechanical Stokers. Pulveriser, Electrostatic Precipitator, Draught- Different Types, Surface condenser types, cooling Towers

UNIT III NUCLEAR AND HYDEL POWER PLANTS 9

Nuclear Energy-Fission , Fusion Reaction, Types of Reactors, Pressurized water reactor ,Boiling water reactor, Waste disposal and safety Hydel Power plant- Essential elements, Selection of turbines, governing of Turbines- Micro hydel developments

UNIT IV DIESEL AND GAS TURBINE POWER PLANT 9

Types of diesel plants, components , Selection of Engine type, applications-Gas turbine power plant- Fuels- Gas turbine material – open and closed cycles- reheating – Regeneration and intercooling – combines cycle

UNIT V OTHER POWER PLANTS AND ECONOMICS OF POWER PLANTS 9

Geo thermal- OTEC- tidel- Pumped storage –Solar central receiver system Cost of electric Energy- Fixed and operating costs-Energy rates- Types tariffs- Economics of load sharing, comparison of various power plants.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Arora S.C and Domkundwar S, "A Course in Power Plant Engineering", Dhanpat Rai, 2001
2. Nag P.K ,"Power Plant Engineering". Third edition Tata McGraw- Hill ,2007

REFERENCES:

1. El-Wakil M.M ,Power "Plant Technology," Tata McGraw-Hill 1984
2. K.K.Ramalingam , " Power Plant Engineering ", Scitech Publications, 2002
3. G.R,Nagpal , "Power Plant Engineering", Khanna Publishers 1998
4. G.D.Rai, "Introduction to Power Plant technology" Khanna Publishers, 1995

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DESIGN AND ANALYSIS

OF

TURBOCHARGER TURBINE IMPELLER

A PROJECT REPORT

Submitted by

KRISHNA KUMAR S.	**920812114041**
JAYAPRASATH A.	**920812114026**
DEEPAK LAKSHM[illegible] P.	**920812114019**
MANIKANDAN M.	**920812114047**

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

April 2016

Dr. J.SUNDARARAJAN,
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ABSTRACT

The main objective of this study is to analyse the turbocharger turbine wheel impeller. The study deals with structural and transient thermal analysis. A proper model is developed using PRO-E. In this project we are doing the design with 11 and 12 blades and material optimization in the turbocharger turbine impeller. In this project we designed the 3D model of the turbocharger turbine wheel by using pro-e software and the analysis taken by different materials and the analysis taken by the ansys software. This project we are analyzing the pressure acting on the turbocharger impeller turbine wheel by the three materials namely inconel alloy 740, inconel alloy 783 and wrought aluminium 2219. Then the thermal analysis is done to determine the total heat flux in the 11 and 12 blades for the given temperature conditions. The temperature acting on the surface of the turbocharger impeller turbine wheel is applied. The results were also used to determine the total heat flux for a particular material.As a result the best design and the most efficient material is selected and implemented.

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CONCLUSION

Analyzing results for turbocharger turbine wheel under pressure and temperature are listed in the Table. Analysis has been carried out by two designs (11, 12 plates) and three materials (Inconel 740, Inconel 783 and wrought aluminium 2219). The results such as total deformation, equivalent elastic strain, equivalent stress, total heat flux and directional heat flux (x,y and z axis) for each material are determined. Comparing the three materials 12 plates' inconel alloy740 turbine wheel has the low values of total deformation and also the heat flux values high over inconel alloy 783 and low compared to wrought aluminum 2219. Wrought aluminium 2219 has high heat flux values and deformation values. Because of its high deformation values it cannot be used for turbine. Hence it is concluded that 12 plates' inconel alloy740 material can be used for turbine wheel.

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MG2451 **ENGINEERING ECONOMICS AND COST ANALYSIS** **L T P C**
3 0 0 3

OBJECTIVES:

To learn about the basics of economics and cost analysis related to engineering so as to take economically sound decisions.

UNIT I INTRODUCTION TO ECONOMICS **8**

Introduction to Economics- Flow in an economy, Law of supply and demand, Concept of Engineering Economics – Engineering efficiency, Economic efficiency, Scope of engineering economics- Element of costs, Marginal cost, Marginal Revenue, Sunk cost, Opportunity cost, Break-even analysis- V ratio, Elementary economic Analysis – Material selection for product Design selection for a product, Process planning.

UNIT II VALUE ENGINEERING **10**

Make or buy decision, Value engineering – Function, aims, Value engineering procedure. Interest formulae and their applications –Time value of money, Single payment compound amount factor, Single payment present worth factor, Equal payment series sinking fund factor, Equal payment series payment Present worth factor- equal payment series capital recovery factor-Uniform gradient series annual equivalent factor, Effective interest rate, Examples in all the methods.

UNIT III CASH FLOW **9**

Methods of comparison of alternatives – present worth method (Revenue dominated cash flow diagram), Future worth method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), Annual equivalent method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), rate of return method, Examples in all the methods.

UNIT IV REPLACEMENT AND MAINTENANCE ANALYSIS **9**

Replacement and Maintenance analysis – Types of maintenance, types of replacement problem, determination of economic life of an asset, Replacement of an asset with a new asset – capital recovery with return and concept of challenger and defender, Simple probabilistic model for items which fail completely.

UNIT V DEPRECIATION **9**

Depreciation- Introduction, Straight line method of depreciation, declining balance method of depreciation-Sum of the years digits method of depreciation, sinking fund method of depreciation/ Annuity method of depreciation, service output method of depreciation-Evaluation of public alternatives- introduction, Examples, Inflation adjusted decisions – procedure to adjust inflation, Examples on comparison of alternatives and determination of economic life of asset.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Panneer Selvam, R, "Engineering Economics", Prentice Hall of India Ltd, New Delhi, 2001.
2. Suma Damodaran, " Managerial economics", Oxford university press 2006.

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REFERENCES:

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EXPERIMENTAL INVESTIGATION AND TAGUCHI OPTIMIZATION OF TURNING PROCESS PARAMETERS FOR GFRP THROUGH CNC TURNING PROCESS

A PROJECT REPORT

Submitted by

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In partial fulfillment for the award of degree

of

BACHELOR OF ENGINEERING

in

MECHANICAL ENGINEERING

NPR COLLEGE OF ENGINEERING&TECHNOLOGY,NATHAM

ANNA UNIVERSITY: CHENNAI 600 025

APRIL 2016

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ABSTRACT

Production and manufacturing process deals with conversation of raw materials inputs to finished products as per required dimensions specifications and efficiently using recent technology The metal cutting essential try for high metal removing rate and best product quality the major problem in achieving high productivity and best quality is short life span of tool To enhance the tool life many new materials are developed so has to meet the market demand and competitive price for this there should be proper control over various cost involved in machining named as material cost labour cost and tooling cost the material cost can be controlled by using special material which meet all required properties with reduced price. The present work is focused on the influence of cutting speed, feed rate and depth of cut on the de-lamination damage and surface roughness on Glass Fiber Reinforced Polymeric composite material (GFRP) during turning. Taguchi design method will be employed to investigate the machining characteristics of GFRP. In this work, experiments has to be carried out as per the Taguchi experimental design and an L9 orthogonal array will be used to study the influence of various combinations of process parameters on surface quality.

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CHAPTER-8

CONCLUSION AND RESULT

In this study, the Taugchi technique and ANOVA were used to obtain optimal Turning parameters in the Turning of GFRP under dry conditions. The experimental results were evaluated using Taguchi technique. The following conclusion can be drawn.

OPTIMAL CONTROL FACTOR

1.Surface Roughness-A1(Speed -1000)B3(Feed -0.07)C2(DOC-0.7)

2.Machining Timing-A2(Speed-1500)B1(Feed 0.03)C3(DOC 1)

3.Material Removal Rate- A3(Speed-2000)B2(Feed 0.05)C1(DOC 0.5)

Percentage of contribution of Process parameter

1.Surface Roughness- speed 28%

2.Machining Timing- Feed 65.5%

3. Material Removal –DOC-Rate-46%

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ME2036 **PRODUCTION PLANNING AND CONTROL** **L T P C**
3 0 0 3

OBJECTIVE:

- 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

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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

TEXT BOOK:

1. Martand Telsang, "Industrial Engineering and Production Management", S. Chand and Company, First edition, 2000.
2. James.B.Dilworth,"Operations management – Design, Planning and Control for manufacturing and services" Mcgraw Hill International edition1992.

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TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. J. HARI VIGNESH,** II year Mechanical Engineering of NPR College of Engineering & Technology, Natham, Dindigul has completed 12 days Internship from **23-05-2016 to 03-06-2016** in our organization. During this period, he was sincere, enthusiastic and hard working.

Date: 03.06.2016

For BNAZRUM AGRO EXPORTS (P) LTD.,

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General Manager

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ME2041	ADVANCED I.C. ENGINES	L T P C 3 0 0 3

OBJECTIVES:

- To update the knowledge in engine exhaust emission control and alternate fuels
- To enable the students to understand the recent developments in IC Engines

UNIT I SPARK IGNITION ENGINES 9

Air-fuel ratio requirements, Design of carburetor –fuel jet size and venture size, Stages of combustion-normal and abnormal combustion, Factors affecting knock, Combustion chambers, Introduction to thermodynamic analysis of SI Engine combustion process.

UNIT II COMPRESSION IGNITION ENGINES 9

Stages of combustion-normal and abnormal combustion – Factors affecting knock, Direct and Indirect injection systems, Combustion chambers, Turbo charging, Introduction to Thermodynamic Analysis of CI Engine Combustion process.

UNIT III ENGINE EXHAUST EMISSION CONTROL 9

Formation of NO_x , HC/CO mechanism , Smoke and Particulate emissions, Green House Effect , Methods of controlling emissions , Three way catalytic converter and Particulate Trap, Emission (HC,CO, NO and NO_x) measuring equipments, Smoke and Particulate measurement, Indian Driving Cycles and emission norms

UNIT IV ALTERNATE FUELS 9

Alcohols , Vegetable oils and bio-diesel, Bio-gas, Natural Gas , Liquefied Petroleum Gas ,Hydrogen , Properties , Suitability, Engine Modifications, Performance , Combustion and Emission Characteristics of SI and CI Engines using these alternate fuels.

UNIT V RECENT TRENDS 9

Homogeneous Charge Compression Ignition Engine, Lean Burn Engine, Stratified Charge Engine, Surface Ignition Engine, Four Valve and Overhead cam Engines, Electronic Engine Management, Common Rail Direct Injection Diesel Engine, Gasoline Direct Injection Engine, Data Acquisition System –pressure pick up, charge amplifier PC for Combustion and Heat release analysis in Engines.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Heinz Heisler, 'Advanced Engine Technology," SAE International Publications, USA,1998
2. Ganesan V.." Internal Combustion Engines" , Third Edition, Tata Mcgraw-Hill ,2007

REFERENCES:

1. John B Heywood," Internal Combustion Engine Fundamentals", Tata McGraw-Hill 1988
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Date : 15.07.2015

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This is to certify that **Mr.M.HARI PRASANTH** of third year Mechanical Engineering of NPR College of Engineering & Technology, Natham ,Dindigul, has successfully completed six days Inplant Training from **10.07.2015 to 15.07.2015** in our organization. During the period of his training his work was satisfactory.

Authorized Signatory
For Osho Body Builders

Manager.

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ME2453 **PROJECT WORK** **L T P C**
0 0 12 6

OBJECTIVES:

- The objective of the project work is to enable the students in convenient groups of not more than 4 members on a project involving theoretical and experimental studies related to the branch of study.
- Every project work shall have a guide who is the member of the faculty of the institution.
- Six periods per week shall be allotted in the time table and this time shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars on the progress made in the project.
- The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design and manufacture of a device, a research investigation, a computer or management project or a design problem.
- 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.
- Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusion.
- This final report shall be typewritten form as specified in the guidelines.
- The continuous assessment shall be made as prescribed in the regulations (vide clause 10.3 of Regulations 2004 for B.E., B.Tech. programmes)

Electives

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MATERIAL OPTIMIZATION OF FLYWHEEL IN IC ENGINE

A PROJECT REPORT

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ABSTRACT

Flywheel is a mechanical device with a significant moment of inertia used as a storage device for rotational energy. Flywheels resist changes in their rotational speed, which helps to steady the rotation of the shaft when a fluctuating torque is exerted on it by its power source for engine. In this project, we have planned to do material optimization of flywheel in an internal combustion engine. In this project the 3D model of the flywheel and is do designed the analysis is do be done with different materials of the flywheel using software. Presently fly wheels are made up of cast iron which has high mass and low moment of inertia. In this project we are going to analyze four materials which are Duralumin, Gray cast iron GCI20, High modulus carbon fiber and Matrix composite to reduce the mass increase moment of inertia of the fly wheel and velocity.

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CHAPTER 9

CONCLUSION

The analysis of flywheel we found that the CARBON FIBRE material have good physical properties and has less deformation under the moment and velocity than the other four materials selected and finally the deformation, stress, strain of the CARBON FIBRE is final lower compared to the other materials.

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