



**VEL TECH MULTI TECH
Dr.RANGARAJAN Dr.SAKUNTHALA
ENGINEERING COLLEGE**

(An ISO 9001: 2008 Certified Institution)

(Owned by Vel Trust)

(Approved by Govt. of Tamil Nadu and affiliated to Anna University)



SYLLABUS

WEEKLY SCHEDULE

VII SEMESTER

2015 - 2016

**DEPARTMENT OF MECHANICAL
ENGINEERING**

IV YEAR DEGREE COURSE

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WEEK DETAILS

SL.NO.	WEEK	FROM	TO
1	WEEK1	24.06.2015	26.06.2015
2	WEEK2	29.06.2015	03.07.2015
3	WEEK3	06.07.2015	10.07.2015
4	WEEK4	13.07.2015	17.07.2015
5	WEEK5	20.07.2015	24.07.2015
6	WEEK6	27.07.2015	28.07.2015
7	WEEK7	03.08.2015	07.08.2015
8	WEEK8	10.08.2015	14.08.2015
9	WEEK9	17.08.2015	21.08.2015
10	WEEK10	24.08.2015	28.08.2015
11	WEEK11	31.08.2015	04.09.2015
12	WEEK12	07.09.2015	11.09.2015
13	WEEK13	14.09.2015	18.09.2015
14	WEEK14	21.09.2015	25.09.2015
15	WEEK15	28.09.2015	30.09.2015
16	WEEK16	05.10.2015	09.10.2015
17	WEEK17	12.10.2015	16.10.2015
18	WEEK18	19.10.2015	20.10.2015
19	WEEK19	27.10.2015	30.10.2015

SUBJECT CONTENTS

SL.NO	SUBJECT CODE	SUBJECT NAME
THEORY		
1	GE 2022	Total Quality Management
2	ME 2401	Mechatronics
3	ME 2402	Computer Integrated Manufacturing
4	ME 2403	Power Plant Engineering
5	ME2027	Process planning and cost estimation
6	ME2034	Nuclear Engineering
PRACTICAL		
7	ME2404	Computer Aided Simulation & Analysis Lab
8	ME2405	Mechatronics Lab

TEST / EXAM SCHEDULE

SL.NO	SUBJECT CODE	SUBJECT NAME	UNIT TEST I	UNIT TEST II	Pre Model Exam	UNIT TEST IV
1	GE 2022	Total Quality Management	13.07.2015	03.08.2015	21.08.2015	14.09.2015
2	ME 2401	Mechatronics	14.07.2015	04.08.2015	22.08.2015	15.09.2015
3	ME 2402	Computer Integrated Manufacturing	15.07.2015	05.08.2015	24.08.2015	16.09.2015
4	ME 2403	Power Plant Engineering	16.07.2015	06.08.2015	25.08.2015	18.09.2015
5	ME2027	Process planning and cost estimation	17.07.2015	07.08.2015	26.08.2015	21.09.2015
6	ME2034	Nuclear Engineering	20.07.2015	10.08.2015	27.08.2015	22.09.2015

SL.NO	SUBJECT CODE	SUBJECT NAME	MODEL EXAM
1	GE 2022	Total Quality Management	05.10.2015
2	ME 2401	Mechatronics	06.10.2015
3	ME 2402	Computer Integrated Manufacturing	07.10.2015
4	ME 2403	Power Plant Engineering	08.10.2015
5	ME2027	Process planning and cost estimation	09.10.2015
6	ME2034	Nuclear Engineering	12.10.2015

GE 2022 TOTAL QUALITY MANAGEMENT

WEEK: 1 –

UNIT I: INTRODUCTION

Introduction - Need for quality - Evolution of quality - Definition of quality

WEEK: 2

Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM

WEEK: 3

TQM Framework - Contributions of Deming, Juran and Crosby – Barriers to TQM

WEEK: 4 UNIT TEST-I

UNIT II: TQM PRINCIPLES

Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints retention - Employee involvement – Motivation, Empowerment, Team and Teamwork,

WEEK: 5

Customer Recognition and Reward Performance appraisal - Continuous process improvement PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating

WEEK: 6 UNIT TEST-II

WEEK: 7

UNIT III: TQM TOOLS & TECHNIQUES I

The seven traditional tools of quality – New management tools – Six-sigma: Concepts,

WEEK: 8

Methodology, applications to manufacturing, service sector including IT

WEEK: 9

Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages and Types

WEEK: 10 UNIT TEST-III

UNIT IV: TQM TOOLS & TECHNIQUES

Quality circles – Quality Function Deployment (QFD)

WEEK: 11

Taguchi quality loss function - TPM – Concepts, improvement needs

WEEK: 12

Cost of Quality - Performance measures

WEEK: 13 –UNIT TEST-IV**WEEK: 14 REVISION 1- 4 UNITS****WEEK: 15****UNIT V: QUALITY SYSTEMS**

Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, and Quality auditing - QS 9000 – ISO 14000 – Concepts, Requirements and Benefits

WEEK 16

Case studies of TQM implementation in manufacturing - Service sectors including IT

WEEK-17- UNIT TEST V**WEEK-18- MODEL EXAM****TEXT BOOK:**

1. Dale H.Besterfield, et al., “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

ME 2401 MECHATRONICS

WEEK: I

UNIT I: MECHATRONICS, SENSORS AND TRANSDUCERS

Mechatronics Systems – Measurement Systems – Control Systems – Microprocessor based Controllers

WEEK: 2

Sensors and Transducers – Performance Terminology – Sensors for Displacement, Position and Proximity

WEEK: 3

Velocity, Motion, Force, Fluid Pressure, Liquid Flow, Liquid Level, Temperature, Light Sensors – Selection of Sensors

WEEK: 4 UNIT TEST-I

UNIT II: ACTUATION SYSTEMS

Building blocks of Mechanical, Electrical, Fluid and Thermal Systems, Rotational – Transnational Systems, Electromechanical Systems – Hydraulic – Mechanical Systems. Continuous and discrete process Controllers – Control Mode

WEEK: 5

Two – Step mode – Proportional Mode – Derivative Mode – Integral Mode – PID Controllers – Digital Controllers – Velocity Control – Adaptive Control – Digital Logic Control – Micro Processors Control.

WEEK: 6 UNIT TEST-II

WEEK: 7

UNIT III SYSTEM MODELS AND CONTROLLERS

Building blocks of Mechanical, Electrical, Fluid and Thermal Systems, Rotational – Transnational Systems, Electromechanical

WEEK 8

Systems – Hydraulic – Mechanical Systems. Continuous and discrete process Controllers

WEEK: 9

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.

WEEK: 10 UNIT TEST-III

UNIT IV PROGRAMMING LOGIC CONTROLLERS

Programmable Logic Controllers – Basic Structure – Input / Output Processing

WEEK: 11

Programming – Mnemonics – Timers, Internal relays and counters – Shift Registers – Master and Jump Controls –

WEEK: 12

Data Handling – Analogs Input / Output – Selection of a PLC.

WEEK: 13 UNIT TEST-IV

WEEK: 14 REVISION 1-4 UNITS

WEEK: 15

UNIT V: DESIGN OF MECHATRONICS SYSTEM

Stages in designing Mechatronics Systems – Traditional and Mechatronic Design -Possible Design Solutions, Case studies of Mechatronics systems- Pick and place

WEEK: 16

Robot- Autonomous mobile robot-Wireless surviellance balloon- Engine Management system- Automatic car park barrier

WEEK-17- UNIT TEST V

WEEK-18- MODEL EXAM

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
2. Michael B. Histan 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

ME2402 COMPUTER INTEGRATED MANUFACTURING

WEEK 1

UNIT I: COMPUTER AIDED DESIGN

Concept of CAD as drafting and designing facility, desirable features of CAD package, drawing features in CAD – Scaling, rotation, translation, editing, dimensioning, labeling

WEEK 2

Zoom, pan, redraw and regenerate, typical CAD command structure, wire frame modeling

WEEK 3

Surface modeling and solid modeling (concepts only) in relation to popular CAD packages

WEEK 4 UNIT TEST-I

UNIT II: COMPONENTS OF CIM

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 – serial, parallel, asynchronous, synchronous, modulation, demodulation, simplex and duplex

WEEK 5

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

WEEK 6 - UNIT TEST-II

WEEK 7

UNIT III: GROUP TECHNOLOGY AND COMPUTER AIDED PROCESS PLANNING

History Of Group Technology – role of G.T in CAD/CAM Integration – part families' classification and coding

WEEK 8

DCLASS and MCLASS and OPTIZ coding systems – facility design using G.T – benefits of G.T – cellular manufacturing,

WEEK 9

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.

WEEK 10 UNIT TEST-III

UNIT IV: SHOP FLOOR CONTROL AND INTRODUCTION TO FMS

Shop floor control – phases – factory data collection system – automatic identification methods – Bar code technology – automated data collection system.

WEEK 11

FMS – components of FMS – types – FMS workstation – material handling and storage system

WEEK 12

FMS layout- computer control systems, applications and benefits

WEEK 13 UNIT TEST-IV

WEEK 14 REVISION 1-4 UNITS

WEEK 15

UNIT V: COMPUTER AIDED PLANNING AND CONTROL AND COMPUTER MONITORING

Production planning and control – cost planning and control – inventory management material requirements planning (MRP) – shop floor control. Lean and Agile Manufacturing

WEEK 16

Types of production monitoring systems – structure model of manufacturing – process control and strategies – direct digital control

WEEK-17- UNIT TEST V

WEEK-18- MODEL EXAM

TEXT BOOK:

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.

ME2403 POWER PLANT ENGINEERING

WEEK 1

UNIT I: INTRODUCTION TO POWER PLANTS AND BOILERS

Layout of Steam, Hydel , Diesel , MHD, Nuclear and Gas turbine Power Plants

WEEK 2

Combined Power cycles – comparison and selection , Load duration Curves, Steam

WEEK 3

Boilers and cycles – High pressure and Super Critical Boilers – Fluidised Bed Boilers

WEEK 4 UNIT TEST -1

UNIT II : STEAM POWER PLANT

Fuel and ash handling, Combustion Equipment for burning coal, Mechanical Stokers.

WEEK 5

Pulveriser, Electrostatic Precipitator, Draught-

WEEK 6 – Different Types, Surface condenser types, cooling Towers

WEEK 7 - UNIT TEST -2

WEEK 8

UNIT III: NUCLEAR AND HYDEL POWER PLANTS

Nuclear Energy-Fission, Fusion Reaction, Types of Reactors, Pressurized water reactor, Boiling water reactor, Waste disposal and safety Hydel Power plant

WEEK 9

Essential elements, Selection of turbines, governing of Turbines- Micro hydel developments

WEEK 10 UNIT TEST -3

UNIT IV: DIESEL AND GAS TURBINE POWER PLANTS

Types of diesel plants, components, Selection of Engine type, applications

WEEK 11

Gas turbine power plant- Fuels- Gas turbine material

Open and closed cycles- reheating

WEEK 12

Regeneration and intercooling – combines cycle

WEEK 13 - UNIT TEST -4

WEEK 14 REVISION 1-4 UNITS

WEEK 15

UNIT V: OTHER POWER PLANTS AND ECONOMICS OF POWER PLANTS

Geo thermal- OTEC- tidal- Pumped storage –Solar central receiver system Cost of electric Energy fixed and operating costs

WEEK 16

Energy rates- Types tariffs - Economics of load sharing, comparison of various power plants

WEEK-17- UNIT TEST V

WEEK-18- MODEL EXAM

TEXT BOOKS:

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

REFERENCES:

1. EI-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

ME2027 PROCESS PLANNING AND COST ESTIMATION

WEEK 1

UNIT I: WORK STUDY AND ERGONOMICS

Method study – Definition – Objectives

WEEK 2

Motion economy - Principles – Tools and Techniques-Applications –

WEEK 3

Work measurements- purpose – use – procedure - Tools and techniques- Standard time –Ergonomics – principles – applications

WEEK 4 UNIT TEST-1

UNIT II: PROCESS PLANNING

Definition – Objective – Scope – approaches to process planning-
Process planning activities - Finished part requirements- operating
sequences

WEEK 5

Machine selection – material selection parameters- Set of documents
for process planning -

WEEK6 Developing manufacturing logic and knowledge-
production time calculation – selection of cost optimal processes

WEEK 7- UNIT TEST-2

WEEK 8 –

UNIT III: INTRODUCTION TO COST ESTIMATION

Objective of cost estimation- costing – cost accounting

WEEK 9

Classification of cost - Elements of cost

WEEK 10 UNIT TEST-3

UNIT IV: COST ESTIMATION

Types of estimates – methods of estimates

WEEK 11

Data requirements and sources

WEEK 12

Collection of cost- allowances in estimation

WEEK13 - UNIT TEST-4

WEEK 14: REVISION 1-4 UNITS

WEEK 15

UNIT V: PRODUCTION COST ESTIMATION

Estimation of material cost, labour cost and over heads

WEEK 16

Allocation of overheads - Estimation for different types of jobs

WEEK-17- UNIT TEST V

WEEK-18- MODEL EXAM

TEXT BOOKS:

1. Sinha.B.P., "Mechanical Estimating and Costing", Tata McGraw-
Hill, Publishing Co., 1995

REFERENCES:

1. Phillip.F Ostwalal and Jairo Munez, "Manufacturing Processes and
systems", John Wiley, 9th Edition, 1998

2. Russell.R.S and Tailor, B.W, "Operations Management", PHI, 4th Edition, 2003.
3. Chitale.A.V. and Gupta.R.C., "Product Design and Manufacturing", PHI, 2nd Edition, 2002.

ME2034 NUCLEAR ENGINEERING

WEEK 1 –

UNIT I: NUCLEAR PHYSICS

Nuclear model of an atom-Equivalence of mass and energy

WEEK 2

Binding- radio activity-half

WEEK 3

Life - neutron interactions-cross sections

WEEK 4 – UNIT TEST-1

UNIT II: NUCLEAR REACTIONS AND REACTION MATERIALS

Mechanism of nuclear fission and fusion- radio activity- chain reactions

WEEK 5

Critical mass and composition-nuclear fuel cycles and its characteristics-

WEEK 6 Uranium production and purification-Zirconium, thorium, beryllium

WEEK 7- UNIT TEST-2

WEEK 8

UNIT III: REPROCESSING

Reprocessing: nuclear fuel cycles-spent fuel characteristics

WEEK 9

Role of solvent extraction in reprocessing - Solvent extraction equipment

WEEK 10 UNIT TEST-3

UNIT IV: NUCLEAR REACTOR

Nuclear reactors: types of fast breeding reactors

WEEK 11 -

Design and construction of fast breeding reactors-heat transfer techniques in nuclear reactors

WEEK 12

Reactor shielding. Fusion reactors

WEEK 13 UNIT TEST-4

WEEK 14 REVISION 1-4 UNITS

WEEK 15 –

UNIT V: SAFETY AND DISPOSAL

Safety and disposal: Nuclear plant safety-safety systems-changes and consequences of accident

WEEK 16

Criteria for safety-nuclear waste-types of waste and its disposal-radiation hazards and their prevention-weapons proliferation

WEEK-17- UNIT TEST V

WEEK-18- MODEL EXAM

TEXT BOOKS:

1. Thomas J.Cannoly, “Fundamentals of nuclear Engineering”
John Wiley 1978.

REFERENCES:

1. Collier J.G., and Hewitt G.F, “Introduction to Nuclear power”, Hemisphere publishing, New York. 1987
2. Wakil M.M.El., “Power Plant Technology” – McGraw-Hill International, 1984

ME2404 COMPUTER AIDED SIMULATION AND ANALYSIS LABORATORY

LIST OF EXPERIMENTS

A. SIMULATION

Simulation of Air conditioning system with condenser temperature and evaporator temperatures as input to get COP using C /MAT Lab.
Simulation of Hydraulic / Pneumatic cylinder using C / MAT Lab.
Simulation of cam and follower mechanism using C / MAT Lab

B. ANALYSIS (SIMPLE TREATMENT ONLY)

1. Stress analysis of a plate with a circular hole.

2. Stress analysis of rectangular L bracket
3. Stress analysis of an axi-symmetric component
4. Stress analysis of beams (Cantilever, Simply supported, Fixed ends)
5. Mode frequency analysis of a 2 D component
6. Mode frequency analysis of beams (Cantilever, Simply supported, fixed ends)
7. Harmonic analysis of a 2D component
8. Thermal stress analysis of a 2D component
9. Conductive heat transfer analysis of a 2D component
10. Convective heat transfer analysis of a 2D component

ME2405 MECHATRONICS LABORATORY

LIST OF EXPERIMENTS

1. Design and testing of fluid power circuits to control
(i) velocity (ii) direction and (iii) force of single and double acting actuators
2. Design of circuits with logic sequence using Electro pneumatic trainer kits.
3. Simulation of basic Hydraulic, Pneumatic and Electric circuits using software
4. Circuits with multiple cylinder sequences in Electro pneumatic using PLC
5. Speed Control of AC & DC drives
6. Servo controller interfacing for DC motor
7. PID controller interfacing
8. Stepper motor interfacing with 8051 Micro controller
(i) full step resolution (ii) half step resolution
9. Modeling and analysis of basic electrical, hydraulic and pneumatic systems using LAB VIEW
10. Computerized data logging system with control for process variables like pressure flow and temperature.
