Dharmsinh Desai University

Faculty of Technology

Department of Instrumentation and Control Engineering

Detailed Syllabi Book

Detailed Syllabi for Post Graduate Course of

Instrumentation & Control Engineering

Faculty of Technology

Dharmsinh Desai University, Nadiad

Department of Instrumentation & Control Engineering

Faculty of Technology,

Dharmsinh Desai University, Nadiad – 387 001,

Gujarat state, India.

Website: *http://www.ddu.ac.in*

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

M. Tech. Sem. I
SYLLABUS & SCHEME FOR THE SUBJECT
ADVANCED DIGITAL SIGNAL PROCESSING

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr 15 min)	Practical	T/W	Total
3	1	2	60	40	25	25	150

Syllabus Details:

Introduction, Discrete Signals, Discrete Time Systems,
Discrete Convolution, Analog Filters, Discrete-Time,
Fourier Transform, The DFT & FFT,
The Z-Transform Applications of z Transform,
IIR Digital Filters, FIR Digital Filters

Text Books:

i. Analog & Digital Signal Processing [Second Edition] by Ashok Ambardar Books/Cole Publishing Co.

Reference Books:

i. Distance Signal Matlab By Vinay Hingday & John Prokis Prentice Hall of India, New Delhi.

ii. Matlab Programming for Engineers By Chapman (second edition)

Dharmsinh Desai University
Faculty of Technology
Department of Instrumentation and Control Engineering

M. Tech. Sem. I
Elective 1
SYLLABUS & SCHEME FOR THE SUBJECT
MODERN CONTROL THEORY

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr)	Practical	T/W	Total
3	1	2	60	40	25	25	150

Introduction
Controller Modes & Control Actions, Digital Controllers, Control loop Characteristics,

Model Control
Controllable & Observable companion forms, Pole placement by state feedback, full order observers, Dead bit observers.

Optimal Control
Formation of Optimal Control Problem, Calculus of variations, minimum principle, Dynamic programming, Numerical solution of two point boundary value problem.

Optimal Feedback Control
Discrete time linear state regulator, time in-variant linear state regulators, Numerical solution of the Riccatie equation, Minimum time control of linear time in-variant system.

Stochastic Optimal Linear estimation & Control
Stochastic Processes and linear system, optimal estimation or linear discrete time system, Stochastic Optimal Linear regulator

Adaptive Control

Input adaptation, Model adaptive systems, Identifications requirement of an Ideal identification scheme, the functio n, decisi on functio n, Identificati on indic es tim e of performance, A stability of Adaptive control system, certain aspects of learning system.

Text Books:

i. Non linear Automatic Control by J.E. Gibson, McGraw Hill Publication.
ii. Modern Control System Theory by M. Gopal (2nd Edition), Wiley Eastern Publicaton.
iii. Process Control Instrumentation Technology by Curtis Johnson (4th Edition), PHI.

Reference books:

i. Modern Control System Theory By J.T. Tou, McGraw Hill Publication.
ii. Modern Control Engineering By Ogata (2nd Edition), Prentice-Hall India. **Note**: * indicate Lab Tutorial

M. Tech.
Sem.I
Elective 1

SYLLABUS & SCHEME FOR THE SUBJECT
VIRTUAL INSTRUMENTATION

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr)	Practical	T/W	Total
3	1	2	60	40	25	25	150

- **Virtual Instrumentation**: Historical perspective, advantages, blocks diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, comparison with conventional programming. Development of Virtual Instrument using GUI, Real-time systems
- **VI programming techniques**: VIS and sub-VIS, loops and charts, arrays, clusters and graphs, case and sequence structures, formula nodes, local and global variables, string and file I/O.
- **Data acquisition basics**: Introduction to data acquisition on PC, Sampling fundamentals, Input/output techniques and buses. ADC, DAC, Software and hardware installation, Calibration, Resolution, Data acquisition interface requirements.
- **LabVIEW Hardware**: VI Chassis requirements Common Instrument Interfaces: Current loop, RS 232, GPIB.PCI card communication, NI DAQ MAX
- **LabVIEW Control Design Toolbox:**

  Creating continuous-time (s-)transfer functions
  Creating discrete-time (z-)transfer functions
  Creating continuous-time state-space models
  Creating discrete-time state-space models
  Standard transfer functions
  PID controllers
  Writing models to file. Reading models from file
  Getting information about a model
  Converting Control Design models to/from Simulation Module models

- Calculating transfer functions from state-space models
- Discretizing continuous-time models
- Simulation (time responses)
- Frequency response Analysis

TEXTBOOKS:

1. Virtual Instrumentation using LabVIEW by Sanjeev Gupta
2. Introduction to LabVIEW Control Design Toolkit 1.0 by Finn Haugen
3. LabVIEW Basic 1 & Basic 2 course guide by National Instruments

REFERENCES**:**

1. LabVIEW 8 : Authors and Organization:Robert Bishop, University of Texas, Austin Publisher: Prentice Hall ISBN-13: 9780138004606
2. LabVIEW 2009:Authors and Organization:Robert Bishop, University ofTexas at Austin Publisher: Prentice HallISBN-13: 9780132141291
WEB RESOURCES:www.ni.com

M. Tech. Sem. I
SYLLABUS & SCHEME FOR THE SUBJECT
PROCESS SENSORS & CONTROLLERS

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr)	Practical	T/W	Total
3	1	2	60	40	25	25	150

Process Sensors
Sensors for Temperature, Pressure, Flow, Level, Stress, Strain, Phototubes, Photodiodes, Photovoltaic and photoconductive cells, Laser, Displacement transducers, Accelerometers, Smart Transmitter & SMART Sensors
Application of sensors: displacement, velocity, acceleration, force, stress, strain, pressure, temperature, flow, level and laser.

Process Controllers & Actuators
Multi-variable control systems, Pneumatic, Hydraulic & Electrical Actuators, Control Valves.

Process Control Networks
SCADA, DCS, Fieldbus, Foundation Fieldbus, wireless sensors

Text Books:

i. Process Control Instrumentation Technology by Curtis Johnson, 4th Edition, PHI.
ii. The Condensed Handbook of Measurement and Control by N. E. Battikha, 3rd Edition, ISA
iii. Fieldbuses for Process Control: Engineering, Operation and Maintenance, Jonas Berge, ISA
iv. Foundation field bus by Ian Verhappen and Augusto Pereira, 2nd Edition, ISA
v. SCADA: Supervisory Control and Data Acquisition, Stuart A. Boyer, 3rd Edition, ISA

Reference books:

i. Process Instrumentation and controls Handbook (3rd Edition) by Douglus M. Considine, McGraw Hill Book Company.
ii. Industrial Control Handbook Volume-I Transducers by E.A. Parre, Collins, London.
iii. A course in Mechanical measurement & Instrumentation by A.K. Sawhney, Dhanpat Rai & Sons, Delhi.
iv. Advanced PID Control, Karl J. Astrom and Tore Hagglund, ISA
v. Automation Network Selection by Dick Caro, 2nd Edition, ISA

M. Tech. Sem. I
SYLLABUS & SCHEME FOR THE SUBJECT
ADVANCED POWER ELECTRONICS

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr)	Practical	T/W	Total
3	1	2	60	40	25	25	150

Characteristics of modern power semiconductor devices
Characteristics of Power Semiconductor Devices (PSDs) like Thyristors, GTOs, MOSFETs, IGBTS, MCS and their static & switching characteristics., Device protection & Design of snubber circuits.

Converters
Principle of Inversion & Analysis of different Inverter circuits with various load.
Principle of choppers & Analysis of different Chopper circuits with various load.
Pulse width modulated Inverters
Resonant pulse Inverters & analysis.

DC-DC Switch mode converters
Analysis of various regulator circuits.

DC Drive
Single phase Drives
Three phase Drives
Chopper phase Drives
Closed loop control of DC device

AC Drive
Induction motor drives
Synchronous motor drives

Text Books:

i. Power Electronics, Circuits, Devices & Applications by Muhammad H. Rashid (2nd Edition), PHI publication.
ii. Power Electronics, Devices & Circuits by C.M. Pauddar, Jain brothers, New Delhi.

Reference books:

i. Power Electronics by P.C. Sen, Wheeler Publication Company, New
ii. Delhi.

Power Electronics, Converters, Applications & Design by Mohan, Undeland & Robbins, Wiley Eastern Ltd., New York.

M. Tech. Sem. I
SYLLABUS & SCHEME FOR THE SUBJECT
ADVANCED MICROPROCESSORS & MICRO CONTROLLERS

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr)	Practical	T/W	Total
3	1	2	60	40	25	25	150

Advanced Microprocessor & Micro controllers

Introduction to the microprocessor and computer. The microprocessor and its architecture.Addressing modes, Data movement Instructions. Arithmetic and logic Instructions. Program control Instructions, Programming the Microprocessor. 8086/8088 hardware specifications. Memory Interface. Basic I/O interface. Interrupts. Direct memory Access and DMA controlled I/O. The Arithmetic Co processor. Bus Interface. The 80186, 80188 and 80286 Microprocessors. the 80386 and 80486 Microprocessors. The Pentium and Pentium pro Microprocessors Introduction to PIC 16F84 microcontroller

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Text Books:

1. The Intel Microprocessors: 8086 / 8088, 80186 / 80188 , 80286 , 80386,80486, Pentium and Pentium Pro processor – Architecture , Programming , and Interfacing
   4th edition By: B. Brey.
2. Easy Micrcontrol'n (formerly Easy Pic'n) : By Davis Benson , From Square – 1, version 4.1.

Reference Books:

1. Fundamentals of Microprocessors and Micro Computers by B. Ram (4th Edition,1994) Dhanpatrai & Sons.
2. PIC Microcontrollers : by Di Jasio, Wilmshurst, Ibrahim, Morton, Bates, J. Smith, D.W. Smith, Hellebuyck, from Newnes

M. Tech. Sem. I
SYLLABUS & SCHEME FOR THE SUBJECT
SEMINAR-I

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr)	Practical	T/W	Total
-	2	-	-	-	-	50	50

Seminar I

Each student will be required to submit one term paper about the trends in the subject chosen in consultation with faculty. He/She has to present a seminar intermittently regarding the progress of his/her studies.

M. Tech. Sem. II
Elective 1
SYLLABUS & SCHEME FOR THE SUBJECT
BIOMEDICAL SYSTEMS AND CONTROL

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr)	Practical	T/W	Total
3	1	2	60	40	25	25	150

A. Introduction to Biomedical Instrumentation

1. Bio electric signals & their measurements
2. Pulmonary function analysers, Blood gas analysers & oximeters
3. Blood flow and Blood pressure measurement
4. Foetal monitoring instruments
5. Arrhythmia & ambulatory Monitoring instruments
6. Magnetic resonance imaging system
7. Cardiac pacemakers, Cardiac Defibrillators
8. Hemodialysis machine
9. Ultrasonic Imaging system
10. Surgical diathermy & various diathermy applications. LASER in bio medical

B. Biomedical systems and Control

1. Model and Analog study of Biological system
2. Resistive property, Compliance property,
3. System response, System stability
4. Feedback concept and control mathematics
5. Regulation of body temperature
6. Cardiovascular control system

Text and Ref books:

1. System approach to Biomedicine by W.B. Blessor, McGrawhill
2. Human Physiology by Vander, Shermon & Lucieno, Latest Eastern Edition
3. IEEE transcation on BME
4. Physiological control systems: Analysis, Simulation Estimation. By: Michael C.K.Khoo. Pub: Prentice Hall of India Pvt. Ltd. New Delhi.
5. Handbook of bio medical instrumentation by R.S. Khandpur, Tata McGraw Hill Book Publishing company, New Delhi
6. Biomedical Instrumentation & Measurements (2nd Edition) by leslie Cromwell, Fred J. Weibell & Erich A. Pfeiffer by PHI Editions, New Delhi

M. Tech. Sem. II
Elective 1
SYLLABUS & SCHEME FOR THE SUBJECT
ORTHOPAEDIC MECHANICS

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr)	Practical	T/W	Total
3	1	2	60	40	25	25	150

A. Introduction to Biomedical Instrumentation 1. Bio electric signals & their measurements

2. Pulmonary function analysers, Blood gas analysers & oximeters
3. Blood flow and Blood pressure measurement
4. Foetal monitoring instruments
5. Arrhythmia & ambulatory Monitoring instruments
6. Magnetic resonance imaging system
7. Cardiac pacemakers, Cardiac Defibrillators
8. Haemodialysis machine
9. Ultrasonic Imaging system
10. Surgical diathermy & various diathermy applications. LASER in bio medical

B. Orthopaedic Mechanics

2. Structure and properties of bone, tendon, ligaments, cartilage as a composite material, forces at joints, redius, ulnar and elbow joint force, muscle force, ligament force, fatigue ness of bone
3. Spinal biomechanics, deformity, analysis, correction procedure, quantization, accident investigation, FEM analysis
4. Biomechanics of the knee joint, anatomy, forces at knee in standing, kinetics, prosthetic knee
5. Mechanics of the upper and lower limb, hand and foot anatomy, functions, estimation of grip forces, muscle involved, problems of foot, quantization , correction
6. Gait analysis- locomotion, math modelling, work done forces, energy studies, instrumentation for locomotion
7. Prosthesis- above knee prosthesis, below knee prosthesis, component materials, prosthesis, orthosis, , hip prosthesis design, EMG analysis, signal processing
8. Biomechanics of head & neck injuries, anatomy, modelling, , FEM Analysis,, restraint system, Protective system, injury index
9. Dental mechanics
10. Sports mechanics

Text and Ref books:

1. Biomechanics of medical devices- Ghista D.N.
2. Human body mechanics- Ghista
3. Introduction to biomechanics of joint & joint replacement – Dowcon & Wright
4. Clinical Biomechanics of spine by Punjabi and white
5. Biomechanics of the knee- Paul Macquet
6. Biomechanics of hand- E.Y.S. Chao
7. Prosthetics and Orthotics, 2nd Edition By: Donald G. Shurr et al.
8. Rehabilitation Engineering,1995, By Robinson C.J. Pub.: CRC Press
9. Basic Biomechanics 3rd Edition By: Susan J Hall .Pub:McGraw Hill
10. GAIT analysis – Normal and pathological function, Jacquelin Perry, Pub: Slack Inc, New Jersy
11. Handbook of bio medical instrumentation by R.S. Khandpur, Tata McGraw Hill Book Publishing company, New Delhi
12. Bio medical Instrumentation & measurements (2nd editio n) by Lesl ie cromwell, Fred J. Weibell & Erich A. Pfeiffer by PHI Publications, (2nd edition), New Delhi.

M. Tech. Sem. II
SYLLABUS & SCHEME FOR THE SUBJECT
DIGITAL CONTROL SYSTEMS

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr)	Practical	T/W	Total
3	1	2	60	40	25	25	150

- Introduction to discrete Time control system
- The Z transform
- Z plane analysis of discrete Time control system
- Design of discrete Time control system by conventional Methods
- Polynomial Equations Approach to control System Design: Using MATLAB
- Principles of signal conversion
- Optimum control through digital compensation

Text Book:

Discrete – Time Control Systems, Second Edition.
Author: Katsuhiko ogata

Digital & Sampled Data Control Systems by J.T. Tou, McGraw Hill Book company, New York.

Reference books:

i. Analysis & Synthesis of sampled-data control system by B.C. Kuo, Printice-Hall, Englewood Cliffs, New Jersey.
ii. Control Engineers Handbook by J.G. Truxal, McGraw Hill Book Company Inc., New York.
iii. Theory of Sampled Data Control system by D.P. Lindorff, John Wiely, New York.
iv. Control Systems Engineering Third Edition by I.J.Nagrath & M.Gopal

M. Tech. Sem. II
SYLLABUS & SCHEME FOR THE SUBJECT
ADVANCED PROCESS INSTRUMENTAION

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr)	Practical	T/W	Total
3	1	2	60	40	25	25	150

Process Instrumentation

Effects of Measurement lag, Process Disturbance, Magnitude of Process Load, cascade Control Loop, Batch Process Control, Continues Process Control, Optimizing or computing machine control.

Sinusoidal Analysis

Sinusoidal Disturbance and response, Operation with complex Numbers, Plotting Sinusoidal or frequency response, Sinusoidal response of dynamic elements, Dead time, Distributed Parameter and exothermic elements, Limiting, Dead zone and Hysteresis Elements, Testing sinusoidal response.

Stability Analysis

Transfer function, Transfer locus, Nyquiest stability criteria, Bode method of analysis.

Logic devices and PLC's

Computer and Distributed Control

Text Books:

i. Instrument Engineer's Handbook (Process Control) by Bela G. Liptak (Revised Edition) Clinton Book Company.
ii. Automatic Process Control, by Donald P. Eckman (7th Edition), Wiley Eastern Ltd.

Reference books:

i. Computer Based Industrial Control, by Krishnakant (1997 Edition), PHI, New Delhi.
ii. Control System Design, by Graham C. Goodwin, Stefan F. Graebe and Mario E. Salgado (2002 Edition), PHI, New Delhi.

M. Tech. Sem. II
Elective 2
SYLLABUS & SCHEME FOR THE SUBJECT
POWER ELECTRONICS SYSTEM DESIGN

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr)	Practical	T/W	Total
3	1	2	60	40	25	25	150

Design of various inverters – like parallel capacitor commutated inverter, series inverter, Mc Murray Bedford Inverter, Design of class A,B,C,D and E choppers, Jone's Choppers & Morgan's Chopper, Design of Switch Mode Power Supply, Resonant Converter, Design of Device drivers circuits, Synchronized control circuits and free running control circuits, Dual converter analysis & Design. Design of various device protection circuits

Text Books:

i. Modern Power Electronics by P.C. Sen, Wheeler Publication Company, New Delhi.

ii. Power Electronics Devices & Circuits by C.M. Pauddar, Jain Brothers, New Delhi.

Reference books:

i. Power Electronics by Mohan, Undeland and Robbins, Wiley Publication, New York.

ii. Power Electronics by M.H. Rashid, PHI Publications, New Delhi

M. Tech. Sem. II
Elective 2
SYLLABUS & SCHEME FOR THE SUBJECT
NANOTECHNOLOGY AND NANO SENSORS

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr)	Practical	T/W	Total
3	1	2	60	40	25	25	150

[A] Introduction to Nanotechnology
Essence of Nanotechnology, Nano in daily life, Brief account of nano applications, Properties of nano materials, Metal nano clusters, Semiconductor nano particles.

[B] Nano Materials
Nano composites, Nanofying electronics, Sensing the environment, Mechanising the micro world, Energy and cleaner environment with nano technology.

[C]Carbon Nano Structures:
Introduction, Carbon molecules, Carbon clusters, Carbon nano tubes, Applications of carbon nano tubes.

[D] Diagnosing Personal Health and Medical Applications:
Lab on a chip, Super X-ray vision, Mapping the genes, Understanding how pharmaceutical company develops drugs, Delivering a new drug the Nanotech way, Cooking cancer with nano cells, Biomimetics.

[E]Nano sensors & Nanodevices
Micro and nano-sensors, Fundamentals of sensors, biosensor, micro fluids, MEMS and NEMS,Packaging and characterization of sensors, Sensors for aerospace and defense: Accelerometer,Pressure Sensor, Night Vision System, , Integration of sensor with actuators and electroniccircuitry, Sensor for biomedical applications: Cardiology, Neurology and as diagnostic tool,Biosensors. Clinical Diagnostics, generation of biosensors, immobilization, characteristics,
applications, conducting Polymer based sensor, DNA Biosensors, optical sensors. Biochips. MetalInsulator Semiconductor devices, Transistors, MOSFET and Nano FET.

[F] Instruments for Nano particle properties measurements
Equilibrium surface tension, dynamic surface tension, contacts angle and Ultra violet- visible spectroscopy.

Textbooks

1. Nanotechnology by Richard Booker, Earl Boysen, Wiley Publishing Inc., 2006.
2. Introduction to Nanotechnology by Charles P. Poole Jr., Frank J. Owens, John Wiley & Sons
Publications, 2003.
3. MEMS & MOEMS Technology and Applications- P. Rai Choudhury
4.HANDBOOK OF APPLIED SURFACE AND COLLOID CHEMISTRY,Volume 2 Edited by Krister Holmberg Chalmers University of Technology, Goteborg, Sweden, Dinesh O. Shah, University of Florida, USA,Milan J. Schwuger, Forschungszentrum Jtilich GmbH,Germany, JOHN WILEY & SONS, LTD

Reference Books:

1. Nano Materials- A.K.Bandyopadhyay New Age Publishers. India.
2. Nano Essentials- T.Pradeep TMH, India.
3. Sensors: Micro & Nano sensors, Sensor Market trends (Part 1&2) by H. Meixner.
4. Between Technology & Science : Exploring an emerging field knowledge flows & networking
on the nanoscale by Martin S. Meyer.
5. Nano science & Technology: Novel structure and phenomena by Ping Sheng (Editor)
6. Nano Engineering in Science & Technology : An introduction to the world of nano design by
Michael Rieth.
7. Enabling Technology for MEMS and nano devices -Balles, Brand, Fedder, Hierold.
8 OptimalSynthesis Methods for MEMS- G. K. Ananthasuresh
From Atom to Transistor- Supriyo Datta

M. Tech. Sem. II
SYLLABUS & SCHEME FOR THE SUBJECT
NEURAL NETWORKS AND FUZZY LOGIC CONTROLS

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr)	Practical	T/W	Total
3	1	2	60	40	25	25	150

Introduction, sets, Boolean logic and algebra. Fuzzy sets, Fuzzy logic algebra. Fuzzy control. Electronic neural networks. Fuzzy neural networks.

Artificial Neural systems: Preliminaries, Fundamental concepts and modes of artificial Neural systems, Single Layer perceptron classifiers, single layer feedback networks, applications of neural algorithms.

Text Books:

i. Introduction to applied fuzzy electronics, by Ahmad M. Ibrahim, PHI, New Delhi.

ii. Introduction to Artificial Neural systems by Jacek M. Zurada, Jaico Publishing House, (3rd Jaico Impression).

Reference books:

i. Fundamental of Artificial Neural Networks, by Mohamad H. Hassoun, PHI, New Delhi.

ii. Fuzzy-Neural Control: Principles, Algorithms & Applications by Nie & Libnkens, PHI, New Delhi.

Note: * Indicate Lab-Tutorial

M. Tech. Sem. II
SYLLABUS & SCHEME FOR THE SUBJECT
SEMINAR-II

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr)	Practical	T/W	Total
-	2	-	-	-	-	50	50

Seminar II

Each student will be required to submit one term paper about the trends in the subject chosen in consultation with faculty. He/She has to present a seminar intermittently regarding the progress of his/her studies.

M. Tech. Sem. III
SYLLABUS & SCHEME FOR THE SUBJECT
PROJECT (Phase-I)

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr)	Practical	T/W	Total
-	-	6	-	-	225	125	350

The student will undertake project work for the period of two semesters, out of which this is the first phase of the project. They should design/develop & fabricate the project.

They are supposed to prepared and submit a project report as a part of their term-work for Phase-I of the project and give seminars on their project work. The students may be sent to the industry for their project and they are to timely report to the department regarding monitoring and necessary guidance.

They should arrange for demonstration of the project work at the time of examination (which may be partly). They are to be examined based on viva and/or demonstration. The project is to be continued and to be completed in the forth semester.

M. Tech. Sem. III
SYLLABUS & SCHEME FOR THE SUBJECT
SEMINAR-III

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr)	Practical	T/W	Total
-	-	2	-	-	-	50	50

Seminar III

The students are required to present Seminar on Project/given topic at every week.

M. Tech. Sem. IV
SYLLABUS & SCHEME FOR THE SUBJECT
PROJECT (Phase-II)

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr)	Practical	T/W	Total
-	24	-	-	-	300	150	450

The student will undertake project work for the period of one semester and this is the second phase of the project. They should design/develop & fabricate the project for Phase-II.

They are supposed to prepared and submit a project report as a part of their term-work for Phase-II of the project and give seminars on their project work. The students may be sent to the industry for their project and they are to timely report to the department regarding monitoring and necessary guidance.

They should arrange for demonstration of the project work at the time of examination. They are to be examined based on viva and/or demonstration.

The students should complete the project and should be completed the moderation at the time of final examinations.

M. Tech. Sem. IV
SYLLABUS & SCHEME FOR THE SUBJECT
SEMINAR-IV

Teaching Scheme (H/W)			Exam Scheme (Marks)				
Lectures	Tutorial	Practical	Theory (3 hrs)	Sessional (1 hr)	Practical	T/W	Total
-	6	-	-	-	-	50	50

Seminar IV

The students are required to present Seminar on Project/given topic at every week.