Rayat Shikshan Sanstha's

Yashavantrao Chavan Institute of Science, Satara
(Autonomous Institute)

Department of Electronics

Syllabus and Scheme of Credit
for
M. Sc. Electronics

Under Choice Based Credit System (CBCS)
wef (June 2018-19)

- **OBJECTIVES:**

1. To create post-graduates with sound knowledge of fundamentals of Electronics, who can contribute towards advancing science and technology.
2. To create post-graduates with sufficient capabilities in Electronics who can become researchers and developers to satisfy the needs of the core Electronics industry.
3. To develop ability among students to formulate, analyze and solve real life problems faced in Electronics industry.
4. To provide opportunity to students to learn the latest trends in Electronics and make them ready for life-long learning process.
5. To make the students aware of professional ethics of the Industry, and prepare them with basic soft skills essential for working in community and professional teams.
6. To prepare the students for post graduate studies through competitive examinations, enabling them to reach higher echelons of excellence
7. To produce electronic professionals who can be directly employed or start his/her own work as Electronic circuit Designer, Electronics consultant, testing professional, Service engineer and even an entrepreneur in electronic industry.
8. Develop designing and analyzing attitude about networks and wireless communication

- **OUTCOMES:**

After completing this courses students shall be expert in following things:

1. Technologies involved in end to end Microwave Solutions
2. To learn suitable test procedures to electronic systems for measurement and testing in industrial Application.
3. Student should avail advanced microcontrollers knowledge
4. Students will demonstrate their ability of advanced programming to design and test C programs for various applications
5. Student will be able to work with various designs and simulation platforms.
6. Students will demonstrate their ability to respond the modern communication system.
7. Student will able to develop innovative electronics systems.

- **SCOPE:**

After Successful completion of Three years Integrated Advanced Diploma Course in Embedded System Design, we observed that the students have the ample opportunities in diversified areas such as:

1. Embedded System Design (Hardware and Software Industry)
2. Power Electronics and Industrial Instrumentation
3. Communication Electronics
4. Research Instrumentation
5. Agro Industries
6. Medical Instrumentation
7. Consumer Electronics

Course structure

Course Code	Title of the Course	Credits	Teaching Scheme (h/w)		Evaluation Scheme (marks)			
			L	P	CCE I	CCE II	ESE	Total
M.Sc. Part I - Semester I								
MET101	Signals and Systems	4	4	-	10	10	80	100
MET102	Foundations of Microwave Technology	4	4	-	10	10	80	100
MET103	Computer Organization	4	4	-	10	10	80	100
MET104	Foundations of Power Electronics	4	4	-	10	10	80	100
MEP105	Practicals – I	4	-	12	-	-	80	80
MEP106	Practicals – II	4	-	12	-	-	80	80
	Project Part I	1	-	4	-	-	40	40
	Total	**25**	**16**	**28**	**40**	**40**	**520**	**600**
M.Sc. Part I - Semester II								
MET201	Digital Communication	4	4	-	10	10	80	100
MET202	Advanced Microwave Technology	4	4	-	10	10	80	100
MET203	Advanced Power Electronics	4	4	-	10	10	80	100
MET204	Optoelectronics	4	4	-	10	10	80	100
MET205	Computer Networks	4	4	-	10	10	80	100
MEP206	Practicals – III	4	-	12	-	-	80	80
MEP207	Practicals – IV	4	-	12	-	-	80	80
	Project Part II	1	-	4	-	-	40	40
	Total	**29**	**20**	**28**	**50**	**50**	**600**	**700**
M.Sc. Part II - Semester III								
MET301	Control Theory	4	4	-	10	10	80	100
MET302	Analog and Digital Circuit Design	4	4	-	10	10	80	100
MET303	Digital Signal Processing	4	4	-	10	10	80	100
MET304	Elective I	4	12	-	10	10	80	100
MET305	Elective I	4	12	-	10	10	80	100
MEP306	Practicals – V	4	-	12	-	-	80	80
MEP307	Practicals – VI	4	-	12	-	-	80	80
	Project Part III	1	-	4	-	-	40	40
	Total	**29**	**36**	**28**	**50**	**50**	**600**	**700**
M.Sc. Part II - Semester IV								
MET401	Elective – II	4	12	-	10	10	80	100
MET402	Elective – II	4	12	-	10	10	80	100
	Project Part IV	5	-	12	-	-	100	100
	Internship	-	-	-	-	-	100	100
	Total	**13**	**24**	**-**	**20**	**20**	**360**	**400**
	Grand Total	**96**	**96**	**96**	**160**	**160**	**2080**	**2400**

Course Code	Elective -I	Course Code	Elective –II
MET30x	Microcontroller System Design and ARM Architecture	MET40x	ARM Programming and Embedded Communication Protocols
MET30x	Satellite Communications	MET40x	Advanced Microcontroller and RTOS
MET30x	Nanoelectronics		
MET30x	Electronic Fuzzy Systems	MET40x	Cellular Mobile Communications
MET30x	Instrumentation	MET40x	Electronic Neural Networks
MET30x	VHDL Programming	MET40x	Advanced Drives
MET30x	Antennas	MET40x	Mechatronics (Robotics)
MET30x	Industrial Automation	MET40x	FPGA Based Systems

Rayat Shikshan Sanstha's
Yashavantrao Chavan Institute of Science, Satara
Department of Electronics

Syllabus for Master of Science (Electronics) Part I

1. **SUBJECT: Electronics**

2. **YEAR OF IMPLEMENTATION:** New Syllabi for the M.Sc. I Electronics will be implemented from June 2018 onwards.

3. **PREAMBLE:**

Master of Science is an integrated academic degree in faculty of Science. The faculty is not ignoring the developments in the field of Electronics. The revision of existing syllabus of Electronics subject in science faculty is essential. This is a humble endeavor to initiate the process towards an era of knowledge. The students from science faculty should also be competent for this change in the technology.

In this year, a student will able to understand handling of laboratory equipments, build Electronics circuits with confidence. In the subject, the student will also get a basic and proper knowledge in the field of Embedded System design

4. **GENERAL OBJECTIVES OF THE COURSE:**

1. To create post-graduates with sound knowledge of fundamentals of Electronics, who can contribute towards advancing science and technology.
2. To create post-graduates with sufficient capabilities in Electronics who can become researchers and developers to satisfy the needs of the core Electronics industry.
3. To develop ability among students to formulate, analyze and solve real life problems faced in Electronics industry.
4. To provide opportunity to students to learn the latest trends in Electronics and make them ready for life-long learning process.
5. To make the students aware of professional ethics of the Industry, and prepare them with basic soft skills essential for working in community and professional teams.
6. To prepare the students for post graduate studies through competitive examinations, enabling them to reach higher echelons of excellence
7. To produce electronic professionals who can be directly employed or start his/her own work as Electronic circuit Designer, Electronics consultant, testing professional, Service engineer and even an entrepreneur in electronic industry.

5. **DURATION:**

02 Years (Full Time)

6. **PATTERN:**

SEMESTER EXAM (CBCS)

7. **MEDIUM OF INSTRUCTIONS:**

ENGLISH

8. STRUCTURE OF COURSE:

1. FIRST SEMESTER

Semester I									
	ESE	**Internal Exam**		**Practical-I**			**Submission**		**Total**
		CCE-I	**CCE-II (Online Test)**		**Exam**	**Journal**	**Project Part-I**	**Day to day perform-ance**	
Paper I	80	10	10	Lab-I	70	10	30	10	
Paper II	80	10	10						
Paper III	80	10	10	Lab-II	70	10			
Paper IV	80	10	10						
Total	**320**	**40**	**40**		**140**	**20**	**30**	**10**	**600**

2. SECOND SEMESTER

Semester II									
	ESE	**Internal Exam**		**Practical-II**			**Submission**		**Total**
		CCE-I	**CCE-II (Online Test)**		**Exam**	**Journal**	**Project Part-II**	**Day to day perform-ance**	
Paper V	80	10	10	Lab-III	70	10	30	10	
Paper VI	80	10	10						
Paper VII	80	10	10	Lab-IV	70	10			
Paper VIII	80	10	10						
Paper IX	80	10	10						
Total	**400**	**50**	**50**		**140**	**20**	**30**	**10**	**700**

3. Structure and Title of Papers of B. Sc. Course:

- **M. Sc. I Semester I**

Paper I: Signals and Systems
Paper II: Foundations of Microwave Technology
Paper III: Computer Organization
Paper IV: Foundations of Power Electronics

- **M. Sc. I Semester II**

Paper V: Digital Communication
Paper VI: Advanced Microwave Technology
Paper VII: Advanced Power Electronics
Paper VIII: Optoelectronics
Paper IX: Computer Networks

Ability Enhancement Skill development Core:

Course Code	Title of the Course	Credits	Teaching Scheme (h/w)		Evaluation Scheme (marks)		
			L	P	CCE	SE	Total
MET107#	Mathematical Techniques	2	2	-	10	40	50
MET208#	Technical Writing	2	2	-	10	40	50
	Total						100

#MET107 and MET208 is compulsory and non-creditable core.

MET/Pxyz –

M	M.Sc.
E	Electronics
T	Theory
P	Practical
X	1 to 4 : Semester number
yz	1 to 7 : course number

Rules and Regulations:

1. Core courses will be offered only to the students of M.Sc. Electronics.
2. The pre-requisites for electives courses will be decided by the departmental committee and Certificate and diploma program will be mandatory for all students.
3. Electives will be offered for minimum 08 and maximum 12 students in view of the infrastructure of the department. Electives to be offered or otherwise will be at the sole discretion of the departmental committee.
4. Minimum attendance required to appear for semester-end examination will be 75 % for each credit course.

4. OTHER FEATURES:

A. LIBRARY:

- **REFERENCE BOOKS**

1. Simon Haykin, Barry Van Veen- 'Signals & system'- IInd Edition Wiley publication
2. Michael J. Roberts.- 'Fundamentals of signals & systems'- Tata McGraw Hill, 2007.
3. Alan V. Oppenheim, Alan S. Wilsky, S. Hamid Nawab- 'Signals & system' - IInd Edition - Pearson Education.
4. Charles L. Philips, John M. Parr, Eve A. Rislein 'Signals, system & transform', IIIrd Edition, Pearson Education.
5. B.P. Lathi, "Linear Systems and Signals", 2nd Edition, Oxford University Press, 2004.
6. Charles Phillips, "Signals, Systems and Transforms", 3rd Edition, Pearson Education.
7. Nagoor Kani, Signal and Systems, Tata McGraw Hill Education Private Ltd, New Delhi, 3rd reprint, 2011
8. Edward C. Jordan, Electromagnetic waves and Radiating Systems. New Delhi: Prentice-Hall of India Pvt. Ltd., 200
9. Walter C. Johnson, Transmission lines and Networks. New Delhi: McGraw- Hill Book Comp., 1988
10. John D. Ryder, Networks Lines and Fields. New Delhi: PHI, 1983
11. Samuel Y. Liao, Microwave Devices and Circuits. New Delhi: PHI, 2001
12. H.R.L. Lamont, Waveguides. London : Methuen and Company Limited, 1963
13. Robert E. Collin, Foundations for Microwave Engineering. New Delhi: McGraw Hill Book Company,
14. Peter A. Rizzi, Microwave Engineering: Passive Circuits. New Delhi: PHI, 2001
15. F. E. Terman, Electronic and Radio Engineering. New York: McGraw Hill Book Comp. 1955.
16. D.M.Pazar, Microwave Engineering, Singapore: John Wiley and Sons (ASIA) Pte. Ltd., 2004
17. The Essentials of Computer Organization and Architecture, by Linda Null and Julia Lobur ISBN:076370444x, Jones and Bartlett Publishers © 2003
18. Computer Organization and Design, the Hardware/Software Interface, Third Edition (The Morgan Kaufmann Series in Computer Architecture and Design), By David A. Patterson, John L. Hennessy, Publisher: Morgan Kaufman, ISBN-10: 58606041.
19. Computer Organization and Embedded Systems, by Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian McGraw Hill Higher Education, Fifth Education
20. The Electronics Handbook Edited by Jerry C. Whitaker, Published by CRC Press and IEEE Press (1996), Section VII: Microelectronics and Section XIX: Computer Systems
21. Computer Organization by Stalling
22. Microprocessors and Interfacing, D.V. Hall, McGraw Hill (1986)

23. The Intel Microprocessors: Barry B. Brey, Prentice Hall Of India Ltd. (1997)
24. Power Electronics P.C. Sen
25. Power Electronics R.M. Jalnekar & N.B. Pasalkar
26. Thyristor power Controllers. C.K Dubey, S. R. Doradla, A. Joshi & R.M. Sinha
27. Power Electronics – By M. Rashid
28. Power Semiconductor drives- S. B. Dewan, G. R. Sleman, A. Strauphan (Wiley Int. Pub.-John Wiley Sons.)
29. Numerical Mathematical Analysis, J. B. Scarborough, Oxford and IBM Publishing Company (1979)
30. Analog and Digital Communication systems- M. S. Roden, 3rd Edition, Prentice Hall of India.
31. Modern Digital and Analog Communication Systems- B.P. Lathi.
32. Communication Techniques for digital and Analog signals – M. Kanefsky, John Wiley and Son.
33. Telecommunication – T.H. Brewster, McGraw Hill.
34. Principles of Digital communication, Das, Chatterjee and Mallick, Wiley Eastern Ltd.
35. Samuel Y. Liao, Microwave Devices and Circuits. New Delhi : Prentice-Hall of India, 2001
36. K.C. Gupta and Amarjit Singh, Ed., Microwave Integrated Circuits, Wiley Eastern Ltd. 1978
37. Carol G. Montgomery, Ed., Techniques of Microwave Measurement, Vol.1. New York : Dover Publications, Inc., 1966
38. Edward L. Ginzton, Microwave Measurements, New York: McGraw-Hill Book Company, Inc., 1957
39. A.Z. Fradin, Microwave Antennas. Oxford: Pergamon Press, 1961
40. F. E. Terman, Electronic and Radio Engineering, New York: McGraw Hill Book Company, 1955
41. Merill I Skolink, Introduction to Radar Systems, New Delhi: TMH Publishing Comp., 1997
42. Constantine A. Balanis, Antanna Theoty: Analysis and Design, Singapore: John Wiley and sons (ASIA) Pte. Ltd., 2002
43. Annapurna Das and Sisir K.Das, Microwave Engineering, New Delhi: Tata McGraw-Hill Publishing Company Ltd., 2000
44. Power Electronics – By M. Rashid
45. Electronic drives- Concept & Applications –Vedam Subrahmanyam (THM)
46. Power Semiconductor drives- S. B. Dewan, G. R. Sleman, A. Strauphan (Wiley Int. Publ.)
47. Power Electronics – By P. C. Sen.
48. Optical fiber communications, Principles and Practice: John M. Senior, PHI.
49. Optical fiber communications: Gerd Keiser, Mc-Graw Hill International Edition.
50. Optical fiber communication: J. Gower, PHI.
51. Optical communications: components and systems: Franz and Jain, Narosa Publishing House.
52. Optical fiber systems, Technology design and applications: Charles K Kao, Mc-Graw Hill Int. Ed.

- **JOURNALS AND PERIODICALS**

1. Journal of Instrument Society of India
2. Express Computer
3. Embedded For You
4. Electronics Maker
5. Electronics For You
6. PCQUEST
7. Digit

B. SPECIFIC EQUIPMENTS:

Computers, Laptops, Printers, Scanners, LCD Projectors, E- Podium, Smart Board, Document Camera, Visualizer

C. LABORATORY EQUIPMENTS:

1. Digital storage Oscilloscope: 60 MHz
2. Signal generator
3. Microwave Test bench (Gunn Source)
4. Antenna Trainer
5. Arduino Development Board
6. CPLD development boards
7. Microcontroller Boards – 8051, MSP430, PIC18F, AVR MEGA32, ARDUINO NANO, UNO, MEGA
8. KEIL - IDE
9. Mikro C Compilers for 8051, PIC and ARM
10. Soft Computing Tools – SCILAB, MATLAB
11. PCB Designing Tool: DipTrace

Semester I
Paper I
MET101: Signals and Systems

- **Learning Objectives:**
  1. To learn basic concepts required for digital signal processing communication systems and networks
  2. To learn the principles of a signals and systems.
  3. To learn continuous time systems
  4. To study Fourier and Laplace transform and CT systems
  5. To study the MATLAB programming
  6. To study theory of digital filter

Unit I: Introduction to MATLAB Programming 12L

Introduction to MATLAB: Matrices, Working with matrices, basic Plotting, Example Programs: Representation of basic signals, Discrete convolution, stability test, Fast Fourier Transform, Butterworth analog filter: Low Pass filter, Butterworth digital IIR filter: Low pass filter FIR filter design using window technique, IIR filter design using bilinear transformation, Up sampling a sinusoidal signal, down sampling

Unit II: Signals and Continuous-time systems 12L

Introduction to signals, Classification of signals, Elementary signals, Signal operations, Signal implementation with MATLAB, Introduction to systems, Examples of systems, Classification of systems.

Continuous-time signals and systems, Time-domain analysis of LTIC system, Representation of LTIC systems, Impulse response of a system, Convolution integral, Graphical method for evaluating the convolution integral, Properties of the convolution integral, Impulse response of LTIC system.

Unit III: Fourier & Laplace Transforms and CT System 12L

Signal representation using Fourier series, Orthogonal, Properties of exponential CTFS, Application of Fourier series, Continuous-time Fourier transform, CTFT for aperiodic signals, Inverse Fourier transform, Properties of the CTFT, CTFT of periodic functions, LTIC systems analysis using CTFT, MATLAB exercises, Laplace transform, Inverse Laplace transform, Properties of the Laplace transform, Solution of differential equations, Characteristic equation, zeros, and poles, Stable and causal LTIC systems, LTIC systems analysis using Laplace transform, Block diagram representations.

Unit IV: Case Studies 12L

Continuous-time filters, Filter classification, Non-ideal filter characteristics, Design of CT low pass filters, Frequency transformations, Case studies for CT systems: Amplitude modulation of baseband signals, Mechanical spring damper system, Armature-controlled dc motor.

- **Reference Books:**

1. Alan V. Oppenheim , Alan S. Wilsky, S. Hamid Nawab – 'Signals and System'- 2nd edition – Pearson Education
   (Page No.: Unit I: 1-56, Unit II: 74-132, Unit III: 177-245, 284-296, 654-691**)**
2. Simon Haykin, Barry Van Veen- 'Signals and System'- 2nd edition Wiley Publication
   (Page No: Unit I: 1-80, Unit II: 97-167, Unit III: 195-254, Unit V: 508-538**)**
3. Nagoor Kani, – 'Signals and System' Tata McGraw hill Education Pvt. Ltd. New Delhi, 3rd reprint, 2011
   (Page No.: Unit I: 1.1-1.8, Unit II: 2.1-2.84, Unit III: 3.1-3. 33, 4.1-4.69**)**
4. Matlab Programming – Bansal, PHI (Unit -IV & V)
5. Michael J. Roberts.-'Fundamentals of signals & systems'- Tata McGraw Hill, 2007.
6. Charles L. Philips, John M. Parr, Eve A. Rislein 'Signals, system & transform', IIIrd Edition, Pearson Education.
7. B.P. Lathi, "Linear Systems and Signals", 2nd Edition, Oxford University Press, 2004.
8. Charles Phillips, "Signals, Systems and Transforms", 3rd Edition, Pearson Education.

- **Learning Outcomes:**

At the end of this course, students will be able to:

Unit 1. Work with matrices in MATLAB programming
Design digital filters using MATLAB

Unit 2. Classify signals and systems in its various types.
Analyses Continuous-time signals and Time-domain of LTIC system

Unit 3. Represent signal using Fourier series Fourier and LTIC systems analysis using Laplace transform

Unit 4. Design Continuous time filters.
Design different real time cases.

Semester I
Paper II
MET102: Foundations of Microwave Technology

- **Learning Objectives:**

1. To learn the principles of electromagnetism.
2. To study the propagation of Electromagnetic Waves
3. To learn operating principles of Transmission Lines
4. To learn Waveguides, cavity resonators and Passive Microwave Devices

Unit I: Electrostatics, steady magnetic field and Maxwell's Equations 12L

Vector analysis, physical interpretation of gradient, divergence and curl, Vector relations in other coordinate systems, Integral theorems, Fundamental relations of the electrostatic field, Gauss's law, Potential function, Field due to a continuous distribution of charge, Equipotential surfaces, Divergence theorem, Poisson's equation and Laplace's equation, electrostatic energy, magnetic induction and Faraday's law, Magnetic field strength and magneto motive force, Ampere's work law in differential vector form, Energy stored in a magnetic field, Ampere's law for current element, Ampere's force law, Maxwell's equations, Conditions at a boundary surface

Unit II: Electromagnetic Waves 12L

Electromagnetic waves in a homogeneous medium- solution for free-space conditions, uniform plane-wave propagation, uniform plane waves, Wave equations for a conducting medium, Sinusoidal time variations, conductors and dielectrics, polarization, Direction cosines, Reflection and Refraction of plane waves - Reflection by perfect conductor-normal incidence, Reflection by a perfect conductor-oblique incidence, Reflection by perfect dielectric-normal incidence, Reflection by perfect insulator-oblique incidence, Reflection at the surface of a conductive medium, Surface impedance, Poynting' theorem, Interpretation of E x H, Instantaneous, average and complex Poynting vector

Unit III: Transmission Lines 12L

Distributed constants of a line, A-C steady state solution for Uniform line, Variation of Zo, α and β with frequency, Various exponential forms of A-C steady state solution, hyperbolic form of the solution, Interference and standing wave patterns, insertion ratio and insertion loss, Half-wavelength and Quarter wavelength lines, short sections as circuit elements, measurement of standing waves, Smith chart, impedance matching, Coaxial connectors

Unit IV: Waveguides, cavity resonators and Passive Microwave Devices 12L

Solution of wave equations in rectangular and circular waveguides, TE and TM modes, power loss and power transmission, excitation of modes, field components of rectangular cavity resonators, expression for Q. Passive Microwave Devices Terminations, Attenuators, Phase changers, directional couplers, Hybrid Circuits, Corners, Bends, Twists, Faraday rotation, Gyrator, Isolator, circulator, S parameters

- **Reference Books:**

1. Edward C. Jordan, Electromagnetic waves and Radiating Systems. New Delhi :Prentice-Hall of India Pvt. Ltd., 2000 Second Edition

(Page No.: Unit I: 29-105, Unit II: 112-155, Unit III: 262-264**,** Unit IV: 177-273**)**
2. Samuel Y. Liao, Microwave Devices and Circuits. New Delhi : PHI, 2001Third Edition
(Page No.: Unit I: 16-28, Unit II: 29-58, Unit III: 61-98, Unit IV: 102-161**)**
3. D. M. Pazar, Microwave Engineering, Singapore- John Willey and Sons (ASIA) PVT. LTD 2004 Third Edition
(Page No.: Unit I: 1-40, Unit III: 48-87, Unit IV: 95-157**)**
4. Walter C. Johnson, Transmission lines and Networks. New Delhi : McGraw- Hill Book Comp., 1988
5. John D. Ryder, Networks Lines and Fields. New Delhi : PHI, 1983
6. H.R.L. Lamont, Waveguides. London : Methuen and Company Limited, 1963
7. Robert E. Collin, Foundations for Microwave Engineering. New Delhi : McGraw Hill Book Company,
8. Peter A. Rizzi, Microwave Engineering: Passive Circuits. New Delhi : PHI, 2001
9. F. E. Terman, Electronic and Radio Engineering. New York: McGraw Hill Book Comp. 1955.

- **Learning Outcomes:**

At the end of this course, students will be able to:

Unit 1. Analyze Vector relations in other coordinate systems.
Calculate Energy stored in a magnetic field
Unit 2. Demonstrate uniform plane-wave propagation
Unit 3. Find A-C steady state solution for Uniform line
Unit 4. Find power loss and power transmission

Semester I
Paper III
MET103: Computer Organization

- **Learning Objectives:**

1. To learn basics of the computer organization
2. To study fundamental architectures of computer organizations
3. To learn Parallel Processors concept in Computer Organizations
4. To learn implementation of functional blocks for computer organizations.

Unit I: Introduction **12L**

Computer system organization – hardware and software components, overview of Operating System, Computer booting process, Instruction set architectures, Chronology of Microprocessor Development w.r.t. CISC/RISC families, Timeline of POWER PC, Alpha SPARC families. Operating system case study: DOS, UNIX.

Unit II: Fundamental Architectures **12L**

Defining a Computer Architecture, Von Neumann and Harvard Architectures, bus topologies, pipelining, Superpipelining, Superscalar processors, Very Long Instruction Word (VLIW) architectures, multithreaded processors – superthreading, hyperthreading

Unit III: Parallel Processors **12L**

Flynn's taxonomy, SIMD, MIMD and multi-computer approaches. Implementation Considerations: memory technologies, Hierarchical Memory Systems, caches, prefetching techniques, virtual memory, pipelining, ternary logic, packaging considerations, wafer scale integration.

Unit IV: Implementation of Functional Units **12L**

Memory Management, Arithmetic Logic Unit, Floating Point Unit, Branch Unit, Vector Unit, Load/Store Unit. Development Tools: Microcomputer Development Systems (MDS), In Circuit Emulator (ICE), Assembler, Editors, Logic Analyses.

- **Reference Books:**

1. Computer Organization and Design, the Hardware/Software Interface, Third Edition (The Morgan Kaufmann Series in Computer Architecture and Design), By David A. Patterson, John L. Hennessy, Publisher: Morgan Kaufman, ISBN- 10: 58606041.
   (Page No: Unit I: 650, Unit II: 364, 443-461, 631-634, Unit III: 286-330,443-478, 515, 525, Unit IV: 364-374**)**
2. Computer Organization and Architecture, designing for performance, Eighth Edition, William Stalling
   (Page No: Unit I: 499-576, Unit II: 499-576, 631, Unit III: 128-169, 301, 646-701, Unit 4: 295-360, 735**)**
3. The Essentials of Computer Organization and Architecture, by Linda Null and Julia Labur ISBN:076370444x,Jones and Bartlett Publishers 2003
   (Page No: Unit I: 233, 294, 550, Unit II: 3-29, 40, 267-269, 316, 561, Unit III: 316, 347-386, Unit IV: 217**)**

4. Computer Organization and design, P. PAL CHAUDHURI, third Edition, PHI Learning PVT LTD
(Page No: Unit I: 197, 735, 746, Unit II: 498, 736, 803, Unit III: 18, 473, 474, 814**)**
5. Computer Organization and design, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, fifth Edition, Tata McGraw-Hill Edition
(Page No: Unit I: 16-17, 458, 487-493, 505, 578, Unit II: 4, Unit III: 18, 620**)**
6. The UNIX Programming Environment, Brian W. Kernighan, Rob Pike, PHI Learning PVT LTD
(**Page No:** Unit I: 1-39**)**
7. The Electronics Handbook Edited by Jerry C. Whitaker, Published by CRC Press and IEEE Press (1996), Section VII: Microelectronics and Section XIX: Computer Systems

8. Microprocessors and Interfacing, D.V. Hall, McGraw Hill (1986)
9. The Intel Microprocessors: Barry B. Brey, Prentice Hall Of India Ltd. (1997)

- **Learning Outcomes:**

At the end of this course, students will be able to:

Unit 1. Understand Computer system organization – hardware and software
Unit 2. Define Computer Architecture.
Unit 3. Use computer architecture classifications tools in designing of modern processors
Unit 4. Implement various blocks in

Semester I
Paper IV
MET104: Foundations of Power Electronics

- **Learning Objectives:**

1. To learn the fundamentals of power electronics.
2. To learn basics of electrical machines
3. To study power electrical converters and controllers
4. To study PSPICE and power circuit simulation

Unit I: Fundamental of Power Electronics **12L**

Important rules for finding Fourier Series, Expression for Voltage, Current and Power factor, Laplace Transform, Inverse Laplace Transform, Performance parameter of Rectifiers, Introduction to Discrete Fourier transform,

Unit II: Basics of Electrical machines **12L**

D.C. motors, Types of D.C. motors, torque speed characteristics. Induction motors, Types of Induction motors. Synchronous machines and stepper motors.

Unit III: Converters **12L**

Single phase and three phase converters, Series converters, Dual converters, Effect of source and leakage inductance on the performance, Power factor improvement, Single phase dual converter, three phase dual converter, three phase AC voltage controllers

Unit IV: PSPICE and power circuit simulation **12L**

a) introduction to PSPICE and its use in circuit simulation
b) Basic power circuit simulation using PSPICE.

- **Reference Books:**

1. P. C. Sen, Power Electronics–sixth Edition
   (Page No: Unit II: 883-955, Unit III: 957-1006**)**
2. C. K. Dubey, S. R. Doradla, A. Joshi & R. M. Sinha Thyristor Power Controllers –
   (Page No: Unit II: 88-136, Unit III: 88-136**)**
3. M. Rashid, Power Electronics-second edition
   (Page No: Unit II: 497-537, Unit III: 541-588, Unit IV: 32, 124, 256, 296**)**
4. M. Rashid, Power Electronics, Third Edition
   (Page No: Unit I: 821, 223, 683, 72, 214, 230, 491-495**)**
5. Power Electronics R.M. Jalnekar & N.B. Pasalkar

- **Learning Outcomes:**

At the end of this course, students will be able to:

Unit 1. Understand important rules for finding Fourier series.
Unit 2. Practice Electrical machines and drives
Unit 3. Design various Single phase and three phase converters
Unit 4. Design power electronic circuits using PSPICE and makes power circuit simulation.

Semester I
Paper VII
MET107: Mathematical Techniques

- **Learning Objectives:**

1. To learn the basic applied mathematics concepts.
2. To study advance mathematics concepts for analysis of signals

Unit I: Functions, Limits and Continuity **04L**
Real functions and their graph, concept of limit of function, concept of continuous function

Unit II: Differentiation **04L**
Derivative at a point, interpretation of a Derivative at a point, derivative of a function, Differentiability, product rule, quotient rule, derivative of implicit and logarithmic function

Unit III: Integration **04L**
Infinite integrals, geometrical interpretation, properties of indefinite integrals, Integration by parts, Partial fraction, substitution

Unit IV: Fourier Series **05L**
Definition of Fourier Series, calculation of coefficients in easy cases, elementary proportion, Fourier series exponential term, Fourier analysis of half, full wave rectifiers, sweep circuits

Unit V Laplace Transform **05L**
Laplace Transform and its existence, Laplace Transform of standard functions, properties of Laplace Transform, Laplace Transform of periodic functions, Laplace Transform of some special functions, inverse Laplace Transform, circuit analysis using Laplace Transform (R, RC, LC, RLC circuits).

- **Reference Books:**

1. Bikas Chandra Bhui & D. Chatarjee, Textbook of Engineering maths - vikas publishing house pvt. Ltd. Volume -1
   (Page No: Unit I: 55-70, Unit II: 71-99, Unit III: 245-288**)**
2. B. L. & A. K. Theraja, A Textbook of electrical technology - S. Chand & company Ltd. Volume -1
   (Page No: Unit IV: 779-814**)**
3. V. A. & V. U. Bakshi, Control System Engineering- 1st edition, Technical Publication Pune.
   (Page No: Unit V: 2.1-2.17**)**
4. S. S. Sastry, Engineering mathematics Vol- 1, Prentice Hall of India pvt. Ltd. 3rd edition
   (Page No: Unit I: 499-520, Unit II: 304-419, Unit III: 420-498**)**
5. Numerical Mathematical Analysis, J. B. Scarborough, Oxford and IBM Publishing Company (1979)

- **Learning Outcomes:**

  At the end of this course, students will be able to:

  1. Find limits and continuity of any function.
  2. Solve differentiation and integration of any function
  3. Find fourier and laplace transform
  4. Analyze electronics signal using fourier and laplace transform

Semester I
LAB –I
MEP105: C Programming Lab I

- **Learning Objectives:**

1. To develop programming logic and algorithm writing.
2. To develop skills for writing programs using C.

Exercise 1: Programming in C - I

1.1. The print f () function
1.2. The scan f () function
1.3. The 'get_char ()' and 'put_char()' functions
1.4. The functions 'gets ()' and 'puts()'
1.5. The 'enum' data type
1.6. 'typedef'- user defined data type
1.7. Formatting integer output
1.8. Formatting real number output
1.9. Formatting signal character output
1.10. Formatting string output
1.11. Formatting integer input
1.12. Formatting real number input
1.13. Formatting character and string input

Exercise 2: Programming in C - II

2.1. The simple 'if' statement
2.2. The 'if else' statement
2.3. Nested if else statement
2.4. The 'else if' ladder
2.5. The switch statement
2.6. The conditional operator(?:)
2.7. The 'goto' statement
2.8. The 'while' loop
2.9. The 'dowhile loop'
2.10. The 'for' loop
2.11. The 'continue' statement
2.12. The 'break' statement

- **Reference Books:**

1. Yashavant Kanetkar, Let Us C , BPB Publications
2. Programming in ANSI C, Balagurusamy, 2nd edition, TMH
3. Brian W. Kernighan, Dennis M. Ritchie, The C Programming Language, Prentice Hall

- **Learning Outcomes:**

  1. To be able to implement programs using C language.
  2. To be able to do simple programs to complex programs.
  3. To be able to process programs and execution of program.
  4. To be able to develop simple applications of real life using structures and files.

Semester I
LAB –II
MET106: General Electronics Lab

- **Learning Objectives:**

1. To study various antenna types and their radiation, power pattern.
2. To learn PSIM simulators software's for designing of electronic circuits.
3. To learn various signals and their analysis by using various transform.
4. To learn architecture of 8051 microcontroller.
5. To study transducer and their response.

1. **Transmission Line Impedance**
    1. Two-wire transmission line
    2. Co-axial cable
2. **EM Wave Propagation**
    1. To study the propagation of an Electromagnetic wave
3. **Yagi Antenna**
    1. To plot the directional pattern for Yagi antenna in rectangular co-ordinates.
    2. To find the beam width of Yagi antenna
4. **Signals and System**
    1. Signal flow graph.
    2. Analysis of first order System
    3. Analysis of Second order System
5. **AC Voltage Control**
    1. To simulate AC voltage control using simulator
6. **PSIM-I Circuit Simulation**
    1. To simulate half wave rectifier using simulator
7. **PCB Design**
    1. To study PCB Designing
8. **SCR Firing Circuit**
    1. To simulate SCR firing circuit simulator
9. **DOS File System & Commands**
10. **8051 Addressing Modes**
11. **8051 Arithmetic Instructions**
12. **8051 Logical Instructions**
13. **Fundamentals of MATLAB**
    1. Introduction to matrices and matrix algebra
14. **Study Of Transducer:**
    1. To study transducer (Thermistor & Thermocouple) and plot necessary graph.
15. **Study of Transducer:**
    1. Study of transducer (Inductive Transducer) and plot necessary graph.

- **Reference Books:**

1. Samuel Y. Liao, Microwave Devices and Circuits. New Delhi : Prentice-Hall of India, 2001
2. Power Electronics – By M. Rashid
3. Mathews, J.H. and K.D. Fink, Numerical Methods Using MATLAB - Third Edition, Prentice Hall, Upper Saddle River, New Jersey
4. Kenneth J Ayala, The 8051 Microcontroller & Embedded Systems Using Assembly and C (With CD) 1st Edition, Delmar Cengage Learning (2010).
5. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, The 8051

- **Learning Outcomes:**

1. To avail the skill of antenna's design and radiation pattern.
2. To acquire circuit simulation software skills.
3. To get signal analysis skill in various domains.
4. To develop 8051 embedded system for various applications.

Semester II
Paper V
MET201: Digital Communication

- **Learning Objectives:**

1. To learn the principles of a semiconductor materials.
2. To learn I-V characteristics & applications of Semiconductor devices.

Unit I: Signals Analysis **12L**

Complex Fourier spectrum, Fourier transform, Properties of F.T, sampling theorem, random signals and noise, correlation and power spectrum

Unit II: Digital Communication Systems **12L**

A/D and D/A converter, Coded communication, AM, PWM, PPM, PCM, delta modulation, adaptive delta modulation, quantization and noise consideration. Digital Transmission and Reception: Timing, base band systems, ASK, FSK, PSK, QAM.

Unit III: Error detection and coding **12L**

Parity check, CRC, Hamming distance, Hamming codes, cyclic codes, line synchronization codes, Manchester code, NRZ coding, Walsh codes.

Unit IV: Case studies **12L**

Paging system, cellular telephone, global positioning satellite, Facsimile, Videotext

- **Reference Books:**

1. M. S. Roden, Analog & Digital communication systems, Fifth Edition, Shroff publishers & distributers
   (Page No: Unit I: 19-33, 471-477, 486-489, 536-552, Unit II: 34-47, 95-103,106-110, 145-152, 215-235, 346-350, 354-356, 416-421, 455-457, Unit IV: 310-312**)**
2. B. P. Lathi, Zhi Ding, Modern Digital & analog communication system
   (Page No: Unit I: 62-122, 251-267, Unit II: 6-8, 268-278, 295-300, Unit III: 802-854**)**
3. Das, Chatterjee and Mallock, Principles of Digital communication, Weley Eastern Ltd
   (Page No: Unit I: 44-130, Unit II: 187-208, Unit III: 399-506**)**
4. T. H. Brewster, Telecommunication –McGraw Hill.

- **Learning Outcomes:**

At the end of this course, students will be able to:

1. Analyze the characteristics of semiconductor devices.
2. Understand the performance wise application areas of semiconductor devices.

Semester II
Paper VI
MET202: Advanced Microwave Technology

- **Learning Objectives:**

1. To learn the principles of microwave tubes and solid state devices.
2. To study the strip lines and MICs
3. To avail the knowledge of microwave measurements
4. To study the various microwave antennas, Radar and Radio Aids to Navigation

Unit I: Microwave Tubes and Solid state Devices **12L**

Limitations of conventional tubes at microwave frequencies, Klystrons-Reentrant Cavities, velocity-modulation process, bunching process, output current and output power of two-cavity klystron, Reflex Klystrons-velocity modulation, power output and efficiency, electronic admittance, Helix Traveling-wave tubes (TWTs)- slow wave structures, amplification process, convection current, axial electric field, Magnetron Oscillators- cylindrical magnetron

Microwave solid state devices - Tunnel diode, GaAs diode, LSA diode, InP diode, CdTe diode, Read diode, IMPATT diode, TRAPATT diode a d BARITT diode.

Unit II: Strip lines and MICs **12L**

Microstrip Lines-characteristic impedance, losses, Quality factor Q, Parallel Strip Lines-distributed parameters, characteristic impedance, attenuation losses, Coplanar Strip Lines, Shielded Strip Lines

Technology of Hybrid MICs - dielectric substrates, thick film technology and materials, thin film technology and materials, methods of testing, encapsulation, mounting of active devices, Lumped elements for MICs - design of lumped elements, fabrication of lumped elements, circuits using lumped elements, comparison with distributed circuits

Unit III: Microwave Measurements **12L**

Detection of microwave power, Measurement of microwave power - bridge circuit, thermistor parameters, waveguide thermistor mounts, barretters, theory of operation of barretters, direct reading barretter bridges, Measurement of wavelength

single line cavity coupling system, transmission through two line cavity coupling system, Frequency pulling by reactive load, Typical wave meters, measurement of VSWR, measurement of attenuation – Definition of Attenuation, Methods of Measurement

Unit IV: Microwave Antennas, Radar and Radio Aids to Navigation **12L**

Classification of microwave antennas, General characteristics of microwave antennas, E plane and H plane sectoral horns, Pyramidal horn, design of paraboloid of revolution by aperture method, exciters for paraboloids of revolution, Cassegrain Reflectors

Radar equation, Pulse radar, Duplexer, Doppler Effect, CW radar, FMCW radar, MTI radar, conical-scan tracking radar, Loran, Radio Range, Aircraft landing systems, Radio Direction Finding

- **Reference Books:**

1. Samuel Y. Liao, Microwave Devices and Circuits. New Delhi : Prentice-Hall of India, 2001
   (Page No: Unit I: 335- 419, 420-467, Unit II: 472-492, 495-504**)**
2. Carol G. Montgomery, Ed., Techniques of Microwave Measurements, Vol.1. First Edition , New York: Dover Publications, Inc., 1966
   (Page No: Unit I: 24-30, Unit III: 84-191, 285-398, 343-375**)**
3. Microwave Engineering , Annapurna Das and Sisir K. Das, nine Edition, New Delhi: Tata McGraw-Hill Publishing company Ltd., 2000
   (Page No: Unit I: 321-360, 362-413, Unit III: 451-510, Unit IV: 415-443**)**
4. K.C. Gupta and Amarjit Singh, Ed., Microwave Integrated Circuits, Wiley Eastern Ltd. 1978
5. Edward L. Ginzton, Microwave Measurements, New York : McGraw-Hill Book Company, Inc., 1957
6. A. Z. Fradin, Microwave Antennas. Oxford: Pergamon Press, 1961
7. F. E. Terman, Electronic and Radio Engineering, New York : McGraw Hill Book Company, 1955
8. Merill I Skolink, Introduction to Radar Systems, New Delhi : TMH Publishing Comp., 1997
9. Constantine A. Balanis, Antanna Theory: Analysis and Design, Singapore: John Wiley and sons (ASIA) Pte. Ltd., 2002

- **Learning Outcomes:**

At the end of this course, students will be able to:

1. Calculate power output and efficiency of microwave tubes
2. Make use of various microwave devices with proper characteristics
3. Find Microstrip Lines-characteristics
4. Measure Microwave parameters.
5. Use microwave antennas.

Semester II
Paper VII
MET203: Advanced Power Electronics

- **Learning Objectives:**
  - To learn the advanced power electronics circuits.
  - To study the designing of Inverters
  - To study the designing of converters

Unit I: Choppers **12L**

Introduction, classification of choppers, control strategies 1) Pulse width modulation 2) Constant pulse width variable frequency 3) Current limit control 4) Variable pulse width & frequency Chopper configurations, Single quadrant chopper, Four- quadrant chopper, Step down type & chopper with resistive load, Step up chopper impulse comm. Chopper impulse comm. Three thyrister choppers, resonant pulse chopper.

Unit II: Transistorized Inverter **12L**

Half Bridge Inverter: Square Wave half bridge inverter, Quasi-square wave inverter, PWM, inverter, thyristorised half bridge inverter, Device utilization factor, basic device isolation etc. Push pull inverter, Single-phase bridge inverter with resistive and inductive load, PWM bridge inverter, three phase inverters, CSI and variable dc link inverter. b)Voltage control of single phase inverter. SPWM, MPWM, Sinusoidal PWM, Modified Sinusoidal pulse width modulation and Phase displacement control. Voltage control of three phase inverters

Unit III: Thyristorised Inverters **12L**

Forced commutated thyrister inverters. i.e. Auxillary commutated inverters, Mc Murray commutated inverter, Complementary commutated inverters/ Mc Murray Bedford inverter, Current source inverter, Series resonant inverter with unidirectional and bi-directional switches, Parallel resonant inverters, Resonant DC link inverter. Cycloconverter: Single phase to single phase, three phase to single, Three phase to three phase Cycloconverters.

Unit IV: PWM Converters **12L**

Introduction, topologies and applications, linear regulator, buck regulator, boost regulator, Buck-Boost regulator and Link regulator, advantages & disadvantages ofthese topologies, Voltage regulators. Applications of Power Electronics: Electronic ballast, Power factor correction, Induction heating, Dielectric heating.

- **Reference Books:**

1. M. Rashid, Power Electronics, Second Edition
   (Page No: Unit I: 303-353), Unit II: 356-412, Unit III: 414-462**)**
2. P. C. Sen, Power Electronics, sixth Edition
   (Page No: Unit I: 833-871, Unit II: 727-769, Unit III: 770-833**)**
3. Vedam Subrahmanyam, Electronic drives- Concept & Applications – (THM)
4. S. B. Dewan, G. R. Sleman, A. Strauphan, Power Semiconductor drives- (Wiley Int. Publ.)

- **Learning Outcomes:**

At the end of this course, students will be able to:

1. Design a Chopper as per end users requirement.
2. Design a Transistorized inverter as per end users requirement.
3. Design a Thyristorized inverter as per end users requirement.
4. Design PWM converters

Semester II
Paper VIII
MET204: Optoelectronics

- **Learning Objectives:**

1. To learn the principles of optoelectronics
2. To study transmission characteristics of optical fibers
3. To learn Optical fiber connection
4. To study optical detectors

Unit I: Introduction **12L**

Historical developments, Optical fiber communication system, Principle of optical communication, Advantages of optical fiber communication, Total internal reflection, Acceptance angle, Numerical aperture, Skew rays, cylindrical fiber.

Structure and types of optical cable: Structure of optical fibers, Single and multimode fibers, Step index and graded index optical fiber.

Unit II: Transmission characteristics of optical fibers **12L**

Mid-infrared and Far-infrared transmission, Inter-modal and Intra-modal dispersion, Overall fiber dispersion, Polarization

Losses in optical fibers: Attenuation, Material absorption losses, Linear scattering losses, Non-linear scattering losses and Fiber bends loss and Joint loss.

Preparation methods of optical fibers: Liquid phase (melting) and Vapour phase deposition techniques.

Unit III: Optical fiber connection **12L**

Joints, Fiber alignment, Splices, Connectors, Couplers Optical sources: Absorption and emission of radiation, Einstein's relation, Population inversion, Optical emission from semiconductors, Semiconductor LASER, LED power and efficiency characteristics. Optical transmitter and receiver

Unit IV: Optical detectors **12L**

Optical detection principles, Absorption and emission, Quantum efficiency, Responsivity, Long wavelength cutoff, p-n photodiode, p-i-n photo diode, photo transistors

Optical fiber measurements: Fiber attenuation measurements, Dispersion measurements, Refractive index profile measurements, Cut-off wavelength measurements, Numerical aperture measurements.

- **Reference Books:**

1. John M. Senior, Optical fiber communication, Principles and Practice –PHI.
   (Page No: Unit I: 1-20, 36-47, Unit II: 84-145, 161-175, Unit III: 210-274, 281-322, 374, Unit IV: 419-439**)**
2. Gerd Keiser, Optical fiber communication –Mc-Graw Hill International Edition.
   (Page No: Unit I: 51-55, Unit II: 86-93, Unit III: 130-175, Unit IV: 234-258**)**
3. Franz and Jain, Optical communication: components and system- Narosa Publication
   (Page No: Unit III: 11-23, Unit IV: 209-215**)**
4. J. Gower, Optical fiber communication: PHI.
5. Charles K Kao, Optical fiber systems, Technology design and applications: Mc-Graw Hill Int. Ed.

- **Learning Outcomes:**

At the end of this course, students will be able to:

1. Analyze the characteristics of optical fiber communication
2. Find the Losses in optical fibers
3. Preparation methods of optical fibers
4. Do Optical fiber measurements

Semester II
Paper IX
MET205: Computer Networks

- **Learning Objectives:**

1. To learn the principles of Linux operating Systems
2. To study computer networking topologies
3. To learn OSI reference model
4. To study internet address

Unit I: UNIX Operating System **12L**

Introduction, applications Unix Shell, Kernel and Application layer, file system features and benefits, File Management in utilities: pwd, cd, ls, cat, mv, ln, rm, rmdir, find, cut and paste etc., Internal file structure, Directory and directories used by Unix system, The Shell: Shell commands, I/O redirection, pipes and filters, pipe fitting, wildcard, matching background processing, shell script shell variables, shell as programming language, Unix vi editor..

Unit II: Computer Networking **12L**

LAN, Cabling and Topologies: Various transmission media, Twisted and untwisted pairs, coaxial cables, fiber-optic cables and characteristics, wireless LAN, Cabling Topologies: hierarchical, bus, ring, star, collapsed star, mesh. Origin and definition of LAN, types and uses of LAN, LAN components: NIC N/W cables, hubs, and OS, LAN types: MAP, ARCnet, Apple Talk etc., MAN and WAN, repeaters, Bridges, Routers, Gateways, Backbones etc.

Unit III: The O.S.I. reference model **12L**

N/W architecture, OSI reference model, data transmission, FDM, TDM, circuit switching, message switching, packet switching, hybrid switching, LAN static and dynamic channel allocation, LAN protocols, IEEE standard 802 for LAN, comprises of LAN's, The Internet: Introduction, Architecture.

Unit IV: Internet addresses **12L**

Three primary classes of IP addresses, Dotted decimal notation, network, broadcast and loopback address. Internet Protocol (IP) – Connectionless Datagram Delivery, Routing, Error and Control Messages. User Datagram Protocol (UDP): Introduction, Format of UDP Messages, UDP encapsulation, UDP port numbers. Transmission Control Protocol (TCP): Reliability of transmission, ports, connections and endpoints, Concept of sliding windows, TCP segment format, Establishing, closing and resetting a TCP connection, TCP port numbers, ATM Network. Applications: Remote Login (TELNET), File transfer (FTP), Electronic Mail, (SMTP), Future of TCP/IP – Ipv6 (introduction)

.

- **Reference Books:**

1. Andrew S. Tanenbaum, Computer Networks, Fourth Edition
   (Page No: Unit II: 16-20, 68-71, 90-99, Unit 3: 37-41, 50-59, 68-71, 137-143, 146-151, 246-251, 256-270, Unit 4: 255-555, 433-461**)**
2. Behrouz A Forouzan, TCP/IP Proticol Suite, McGraw-hill
   (Page No: Unit II: 48-80, Unit III: 19-32, Unit IV: 30-40, 149, 282-288**)**

3. Brian W. Kernighan, Rob Pike,The UNIX Programming Environment, PHI Learning PVT LTD
   (Page No: Unit I: 11-26, 41-48, 71-86, 133-162, 208-214**)**
4. Pramod Koparkar, UNIX for You, Tata McGraw-Hill
   (Unit 1)

- **Learning Outcomes:**

At the end of this course, students will be able to:

1. Work with Linux operating System and perform shell scripting
2. Understand various network topologies and Local area network
3. Know network architecture and importance OSI reference model
4. Learn various internet protocols.

Semester II
LAB –III
MEP206: C Programming Lab II

- **Learning Objectives:**

1. To develop the programming logic and algorithm writing.
2. To develop skills for writing programs using C.

Exercise-1: Programming in C-III

1.1. Declaration of one dimentional array
1.2. Initialization of one dimentional array
1.3. Declaration of two dimentional array
1.4. Initialization of two dimentional array
1.5. Declaration and initialization of string
1.6. Declaring string from keyboard using 'getchar' function
1.7. The function a to i ()
1.8. The function 'streat()'
1.9. The function 'streamp()'
1.10. The function has the following form strepy () (target-string, source-string)
1.11. The function 'strlen()'

Exercise-2: Programming in C-IV

2.1. The functions abs(i) and fabs (d)
2.2. The functions 'ceil (d)' & 'floor(d)'
2.3. The functions 'exp(d)'
2.4. The functions 'log(d)' and 'log 10(d)'
2.5. The functions 'sin(d)','cos(d)' and 'tan(d)'
2.6. The functions 'sqt(d)'
2.7. Functions with no argument & return values
2.8. Functions with argument & no return values
2.9. Functions with argument & return values
2.10. Function prototypes
2.11. Recurtion
2.12. Passing an argument to a function
2.13. Passing an array to a function

Exercise-3: Programming in C-V

3.1. Declaration and initialization of pointers
3.2. Pointer expressions
3.3. Accessing array element using the pointers
3.4. Accessing string element using the pointers
3.5. Pointers as function arguments
3.6. Passing an entire array to a function
3.7. Using pointers to two dimentional array
3.8. Array of pointers

Exercise-4: Programming in C-VI

4.1. The ‘put-pixel’,’line’ and ‘out text xy’ functions
4.2. The ‘rectangle () ‘and ’circle()’
4.3. The ‘elepse()’ and ‘arc()’ function
4.4. The ‘setfillsyte’,’bar’,’bar3d’, ‘drawpoly’, ‘fillpoly()’ functions
4.5. The function ‘getmaxx(), ’ ‘getmaxy()’, ‘moveto()’, ‘getx()’, ‘gety()’
4.6. The ‘setbkcolor()’, ‘setcolor()’, ‘getbkcolor()’ and ‘getcolor()’ functions
4.7. ‘Imagesize()’, ‘getimage()’ and ‘putimage()’ functions
4.8. Creating buttons ,bars, boxes
4.9. Initializing and showing mouse pointer
4.10. Setting horizontal & vertical limits for mouse pointer
4.11. Getting mouse position & mouse button status
4.12. Drawing with mouse
4.13. Shooting button with mouse

- **Reference Books:**

1. Yashavant Kanetkar, Let Us C , BPB Publications
2. Programming in ANSI C, Balagurusamy, 2nd edition, TMH
3. Brian W. Kernighan, Dennis M. Ritchie, The C Programming Language, Prentice Hall

- **Learning Outcomes:**

1. To be able to implement programs using C language.
2. To be able to do simple programs to complex programs.
3. To be able to process programs and execution of program.
4. To be able to develop simple applications of real life using structures and files.

Semester II
LAB –IV
MEP207: Core Electronics Lab

- **Learning Objectives:**

1. To study transmission line patterns using smith chart.
2. To learn MATLAB for analysis of basic electronic circuits.
3. To study an optical fiber parameters and measuring techniques.

1. **Smith chart**
    1. Find out the solution using smith chart for the following transmission line problems
2. **EM Wave Polarization**
3. **MATLAB : RC & LC circuit**
    1. To study the Transient response of RC & LC circuit using MATLAB
4. **MATLAB: Diode Char & analysis**
    1. To study the diode characteristics using analysis
5. **Auto & cross correlation in MATLAB**
    1. To study auto- correlation & cross correlation in MATLAB
6. **Convolution using MATLAB**
    1. To study the convolution method using MATLAB
7. **Optoelectronics-I**
    1. To study an optical fiber experimental process and carried out the following measurements from given data.
        a) Attenuation Measurements
        b) Cut –off wavelength
        c) Numerical Aperture
8. **Optoelectronics-II**
    1. To study an optical fiber experiment process for dispersion measurements and carried out it for given data
9. **Keil -I**
    1. Data types
10. **Keil -II**
    1. Integer types
11. **Keil -III**
    1. Input-Output ports
12. **Design of series voltage regulator**
    1. To study and design series voltage regulator using PSIM software
13. **Design BUCK regulator**
    1. To simulate BUCK regulator circuit using PSIM
14. **PCB design**
    1. TO study and design PCB of IC 555 using PROTEL
15. **DC motor control using chopper**

1. To study DC motor using chopper

16. ON/OFF control using RTD

1. To study the ON/OFF using RTD

- **Reference Books:**

1. Samuel Y. Liao, Microwave Devices and Circuits. New Delhi : Prentice-Hall of India, 2001
2. Mathews, J.H. and K.D. Fink, Numerical Methods Using MATLAB - Third Edition, Prentice Hall, Upper Saddle River, New Jersey
3. Optical fiber communication, Principles and Practice –John M. Senior, PHI.
4. Kenneth J Ayala, The 8051 Microcontroller & Embedded Systems Using Assembly and C (With CD) 1st Edition, Delmar Cengage Learning (2010).
5. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, The 8051
6. Power Electronics, M. Rashid, Second Edition

- **Learning Outcomes:**

1. Student will be able to design printed circuit boards.
2. Student will be able to design embedded systems based on 8 bit microcontroller.
3. Students will get knowledge of various measuring techniques optical fibers.

Semester II
Paper X
MET208: Technical Writing

- **Learning Objectives:**

1. To learn the principles of project report writing
2. To learn journal/conference paper writing

Unit I: Project Report Writing **12L**
Selection of font, document formatting, citation styles, bibliography insertion, ethics in research documentation

Unit II: Journal/Conference Paper Writing **12L**
Literature survey, visualization of data using graphs and tables, review of research articles Patent Processing.

- **Reference Books:**

- **Learning Outcomes:**

At the end of this course, students will be able to:

1. Write research projects.
2. Write journal/conference papers.

Nature of Question Paper:

1. **CCE-I : Marks =10:**
   Unit 1&2: Descriptive short questions (2X5)
2. **CCE-II: Marks =10:**
   Unit 3 & 4: Multiple choice questions: Online Examination: (1X10)
3. **ESE: Marks =80+20=100:**
   Unit 1 to 5:

Q.1. Multiple choice questions (16).		(16)
Q.2.		(16)
	OR	
Q.2.		(16)
Q.3.		(16)
	OR	
Q.3.		(16)
Q.4.		(16)
	OR	
Q.4.		(16)
Q.5.		(16)
	OR	
Q.5.		(16)

(**CCE**- Comprehensive Continuous Evaluation, **ESE** – End Semester Examination)

1. STRUCTURE OF COURSE:

1. THIRD SEMESTER

Semester III									
	ESE	**Internal Exam**		**Practical-III**			**Submission**		**Total**
		CCE-I	**CCE-II (Online Test)**		**Exam**	**Journal**	**Project Part-III**	**Day to day perform-ance**	
Paper X	80	10	10	Lab-V	70	10	30	10	
Paper XI	80	10	10						
Paper XII	80	10	10	Lab-VI	70	10			
Paper XIII	80	10	10						
Paper XIV	80	10	10						
Total	**400**	**50**	**50**		**140**	**20**	**30**	**10**	**700**

2. FOURTH SEMESTER

Semester IV							
	ESE	**Internal Exam**		**Submission**			**Total**
		CCE-I	**CCE-II (Online Test)**	**Internship**	**Project Part-IV**	**Day to day perform-ance**	
Paper XVI	80	10	10	100	80	20	
Paper XVII	80	10	10				
Total	**160**	**20**	**20**	**100**	**80**	**20**	**400**

3. Structure and Title of Papers of B. Sc. Course:

- **M. Sc. II Semester IV**

Paper X: Control Theory
Paper XI: Analog and Digital Circuit Design
Paper XII: Digital Signal Processing
Paper XIII: Elective I
Paper XIV: Elective I

- **M. Sc. II Semester V**

Paper XV: Elective II
Paper VI: Elective II

Course Code	Elective -I	Course Code	Elective –II
MET30x	Microcontroller System Design and ARM Architecture	MET40x	ARM Programming and Embedded Communication Protocols
MET30x	Satellite Communications	MET40x	Advanced Microcontroller and RTOS
MET30x	Nanoelectronics		
MET30x	Electronic Fuzzy Systems	MET40x	Cellular Mobile Communications
MET30x	Instrumentation	MET40x	Electronic Neural Networks
MET30x	VHDL Programming	MET40x	Advanced Drives
MET30x	Antennas	MET40x	Mechatronics (Robotics)
MET30x	Industrial Automation	MET40x	FPGA Based Systems

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