BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI – 620 024

M.Phil. ELECTRONICS (FT/PT) PROGRAMME

(For the candidates admitted from the academic year 2015-2016 onwards)

Eligibility : The candidate with the M.Sc. degree in the following subjects may be considered for admission:
Electronics / Industrial Electronics / Electronic Science / Applied Physics (Instrumentation) / Applied Physics (Computer Electronics) /Applied Electronics / Photonics

Semester I	**Title of the Course**	**Marks**			**Credits**
		IA	**UE**	**Total**	
Course -I	Research Methodology	40	60	100	4
Course - II	Advanced Electronics	40	60	100	4
Course- III	Paper on Topic of Research (Guide will prepare the syllabus and it will be sent to the COE)	40	60	100	4
Course – IV	Teaching and Learning skills (Common Paper)	40	60	100	4
Total				**400**	**16**
Semester II	Dissertation and Viva-Voce Viva Voce 50 marks Dissertation 150 marks	--	--	200	8
Grand Total				**600**	**24**

For each Course other than the Dissertation

Continuous Internal Assessment – 40 Marks
End Semester Examination – 60 Marks
Total – 100 Marks

Question paper pattern for Course I – III

10 questions compulsory - 10 x 01 = 10 Marks (2 from each unit)
05 questions - 05 x 04 = 20 Marks (either or type, one from each unit)
03 questions from 5 - 03 x 10 = 30 Marks (one question from each unit)

Total 60 Marks

Question paper pattern for Course IV

05 Questions - 05 x 12 = 60 Marks (either or type, one from each unit)

CIA components
Tests (2x10) - 20 Marks
Term Paper – 10 Marks
Seminar - 10 Marks

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COURSE-I: RESEARCH METHODOLOGY

UNIT I : RESEARCH METHODOLOGY

Meaning of Research - Objectives of Research - Motivations in Research - Types of Research - Research Approaches - Significance of Research - Research Methods v/s Methodology - Research and Scientific Methods - Research Process - Criteria of Good Research. **Defining the Research Problem:** Research Problem - Selecting the Problem - Necessity of Techniques in defining the Problem.

UNIT II: RESEARCH DESIGN

Meaning – Need - Features of Good Design – Concepts – Types - Basic Principles of Experimental Design, Developing a Research Plan. **Sample Design:** Implication – Steps - Criteria for selecting a sample procedure - Characteristics of Good sampling Procedure - Types of Sample Design - Selecting Random Samples - Complex random sampling Design.

UNIT III: MEASUREMENT AND SCALING TECHNIQUES

Measurement in Research - Measurement Scales - Sources of Errors in measurement - Tests of Sound measurement - Technique of developing Measurement Tools, **Scaling:** Meaning of Scaling- Scale Classification Bases - Important Scaling Techniques - Scale Construction Techniques.

UNIT IV: INTERPRETATION AND REPORT WRITING

Meaning of Interpretation - Technique of Interpretation - Precaution of Interpretation, Significance of report writing - Different steps in writing report - Layout of the research report - Layout of the research report – Types of reports - Publishing in scientific journals - Scientific presentations - Oral presentation - Poster presentation – Mechanics of writing a research report – Precautions for writing research reports.

UNIT V: CHARACTERIZATION OF MATERIALS

Morphology: Scanning Electron Microscopy, Transmission Electron Microscopy, Atomic Force Microscope, Structural: X-Ray Diffraction, Optical Measurements: UV-VIS-IR, Infrared and Raman vibrational spectroscopy, Resistivity: Two and Four Probe method.

Reference Books

1. C. R. Kothari, “Research Methodology Methods and Techniques”, New Age International Pvt. Ltd., Publishers, 2nd revised edition, 2009.
2. Martha Davis, “Scientific Papers and Presentations”, Academic Press, 1997.
3. Robert W. Kelsall, Ian W. Hamley and Mark Geoghegan, “Nanoscale Science and Technology”, John Wiley & Sons Ltd, 2005.
4. Dieter K. Schroder, Semiconductor Material and Device Characterization, John Wiley & Sons Ltd, 2005.

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COURSE-II: ADVANCED ELECTRONICS

UNIT - I: SENSORS AND SIGNAL CONDITIONERS

Introduction to measurement – Direct and indirect measuring methods – Accuracy – Errors – Transducers – Resistive transducers – Potentiometers – Non-linear potentiometers function generators – Strain gauges – Types of strain gauges – Resistance thermometers – Variable inductance transducers – Linear variable differential transformer – Capacitive transducers – Piezo electric transducers – Hall Effect transducers – Magneto resistors.

Signal conditioning – Op-amp circuit used in instrumentation – Differential amplifier – Voltage follower – Instrumentation amplifier – Filters – Wheatstone bridge – AC bridges.

UNIT – II: EMBEDDED SYSTEMS

Introduction – 8051 Architecture, Instruction Set, interrupts, Timers, Serial Communication, Assembly language programming, Memory types, Functions and ISRs, Control Directives, Embedded C programming, Hardware interfacing.
ATmega microcontrollers: hardware-memory map-Architectures-I/O ports-programmable timers and input captures-interrupts-serial communication-programming
ARM microcontroller-Architecture-I/O ports-peripherals-programming.

UNIT – III: DIGITAL SIGNAL PROCESSING:

Frequency analysis of discrete-time signal – Properties of DFT– Problems. IDFT: Definition – Problems, IIR, FIR filters, Multirate Signal Processing: Introduction, decimation by a factor D, Interpolation by a factor I, sampling rate conversion by a rational I/D, Multistage Implementation of Sampling rate conversion, applications of Multirate signal processing.
dsPIC33F-Programming-filter design-convolution-correlation-FFT.

UNIT – IV: VLSI DESIGN

The characteristics of Digital electronics design and representation issues, Basic MOS transistor – enhancement and depletion mode transistor action – NMOS fabrication – CMOS fabrication – BICMOS technology – pass transistor – nMOS inverter, CMOS and BICMOS inverter, RTL level, Floor planning, Programmable Logic Arrays and finite state machines, design of ALU's, memories and registers. Subsystem design principle, combination shifters, adders, Programmable Logic Devices - FPGA, PLA, PLD, CPLD.

UNIT – V: VHDL PROGRAMMING

VHDL Terms - Describing Hardware in VHDL - Entity - Architectures - Concurrent Signal Assignment - Event Scheduling - Statement Concurrency - Structural Designs - Sequential Behavior - Architecture Selection - Configuration Statements - Power of Configurations - behavioral modeling– transport versus inertial delay – simulation deltas – drivers – generics – block statements – sequential processing – process statement – signal assignment Vs variable assignment – sequential statement.

BOOKS FOR STUDY:

1. A.K. Sawhney, "A course in Electrical and Electronic Measurements and Instrumentation", Dhanpat Rai & Co. publishers.
2. N.Mathivanan, PC Based Instrumentation: Concepts and Practice, PHI, 2007.
3. Muhammad Ali Mazidi, Janice Gillispie Mazidi., "The 8051 Microcontroller and Embedded systems", Person Education, 2004.
4. Steven F. Barrett, Daniel J. Pack, "Atmel AVR Microcontroller Primer: Programming and Interfacing", Second Edition Morgan & Claypool Publishers, 2012.
5. Stephen Bo Furber, "ARM System-on-chip Architecture", Addison-Wesley, 2000.
6. Salivahanan S, Vallavaraj A, Gnanapriya C, "Digital Signal Processing", Tata McGraw Hill Publishing, 2003.
7. Douglas A. Pucknell & Kamran Eshraghian, "Basic VLSI Design", 3rd edition, Prentice hall of India pvt Ltd. New Delhi
8. Douglas L. Perry, "VHDL programming by example", 4th edition, Tata McGraw hill. New Delhi.

BOOKS FOR REFERENCE:

1. H. S. Kalsi, "Electronic Instrumentation", Tata McGraw-Hill publishers. 3rd edition, 2010.
2. John G. Proakis, Dimitris G. Manolakis, "Digital Signal Processing Principles, Algorithm and Applications", 4th Edition, PHI, 2007.
3. Ramesh Babu P., "Digital Signal Processing", 4th Edition, Scitech Publication Pvt. Ltd, 2007.
4. Ayala, Kenneth, "The 8051 Microcontroller", Upper Saddle iver, New Jersey Prentice Hall, 2000.
5. Wayne Wolf, "Modern VLSI design", 4th edition, PHI, 2009
6. Sudhakar Yalamanchili, "VHDL Starters Guide", PHI, 2005

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COURSE –IV TEACHING AND LEARNING SKILLS

Objectives:

- acquaint different parts of computer system and their functions
- understand the operations and use of computers and common accessories
- develop skills of ICT and apply them in teaching learning context and Research
- appreciate the role of ICT in teaching, learning and Research
- acquire the knowledge of communication skill with special reference to its elements, types, development and styles
- understand the terms communication Technology and Computer mediated teaching and develop multimedia / e-content in their respective subject
- understand the communication process through the web
- acquire the knowledge of Instructional Technology and its Applications
- develop different teaching skills for putting the content across to targeted audience

Unit I – Computer Application Skills

Computer system: Characteristics, Parts and their functions – Different generations of Computer – Operation of Computer: switching on / off / restart, Mouse control, Use of key board and some functions of key – Information and Communication Technology (ICT): Definition, Meaning, Features, Trends – Integration of ICT in teaching and learning – ICT applications: Using word processors, spread sheets, Power point slides in the classroom – ICT for Research: On-line journals, e-books, Courseware, Tutorials, Technical reports, Theses and Dissertations

Unit II – Communication Skills

Communication: Definitions – Elements of Communication: Sender, Message, Channel, Receiver, Feedback and Noise – Types of Communication: Spoken and written; Non-verbal communication – Intrapersonal, Interpersonal, Group and Mass communication – Barriers to communication: Mechanical, Physical, Linguistic & Cultural – Skills of communication: Listening, Speaking, Reading and writing – Methods of developing fluency in oral and written communication – style, Diction and Vocabulary – Classroom communication and dynamics

Unit III – Communication Technology

Communication Technology: Bases, Trends and Developments – Skills of using Communication Technology – Computer Mediated Teaching: Multimedia, E-content – Satellite-based communication: EDUSAT and ETV channels, Communication through web: Audio and Video applications on the Internet, interpersonal communication through the web.

Unit IV – Pedagogy

Instructional Technology: Definition, Objectives and Types – Difference between Teaching and Instruction – Lecture Technique: Steps, Planning of a Lecture, Delivery of a lecture – Narration in tune with the nature of different disciplines – Lecture with power point presentation – Versatility of lecture technique – Demonstration, Characteristics, Principles, Planning Implementation and Evaluation – Teaching – Learning Techniques: Team Teaching, Group discussion, Seminar, Workshop, Symposium and Panel Discussion – Models of teaching: CAI, CMI and WBI

Unit V – Teaching Skills

Teaching skill: Definition, Meaning and Nature – Types of Teaching skills: Skill of Set Induction, Skill of Stimulus Variation, Skill of Explaining, Skill of Probing Questions, Skill of Black Board writing and Skill of Closure – Integration of Teaching Skills – Evaluation of Teaching Skills

References:

1. Bela Rani Sharma (2007), Curriculum Reforms and Teaching Methods, Sarup and sons, New Delhi
2. Don Skinner (2005), Teacher Training, Edinburgh University Press Ltd., Edinburgh
3. Information and Communication Technology in Education: A Curriculum for Schools and programme of Teacher development, Jonathan Anderson and Tom Van Weart, UNESCO, 2002
4. Kumar K.I (2008) Educational Technology, New Age International Publishers, New Delhi
5. Mangal, S.K. (2002) Essential of Teaching – Learning and Information Technology, Tandon Publications, Ludhiana
6. Michael D. and William (2000), Integrating Technology into Teaching and Learning: Concepts and Applications, Prentice Hall, New York
7. Pandey S.K. (2005) Teaching Communication, Commonwealth Publishers, New Delhi
8. Ram Babu A. and Dandapani S (2006) Microteaching (Vol.1&2) Neelakamal Publications, Hyderabad
9. Singh V.K. and Sudarshan K.N. (1996) Computer Education, Discovery Publishing Company, New York
10. Sharma R. A. (2006) Fundamentals of Educational Technology, Surya Publications, Meerut
11. Vanaja. M. and Rajasekar S. (2006) Computer Education, Neelkamal Publications, Hyderabad.

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