



M.Phil. ELECTRONICS (FT / PT) PROGRAMME

(For the candidates to be admitted from the academic year 2018-19 onwards)

Eligibility : M.Sc. (Electronics / Electronics and Communication / Electronics science / Industrial Electronics / Electronics Instrumentation / Instrumentation / Applied Physics and Computer Electronics / Material Science / Applied Physics).

PROGRAMME OBJECTIVES :

Technical Proficiency:

Victorious in getting employment in different areas, such as Electronics industries, service and maintenance, Research laboratories, ICT in Banking sectors, Computer Hardware and software, Educational/Research institutions, Administrative positions, since the impact of the subject concerned is very wide.

Professional Growth:

Keep on discovering new possibilities in the chosen field and exploring areas that remain conducive for research and development.

Management Skills:

Encourage personality development skills like time management, crisis and stress management, interviews and working as a team.

PROGRAMME STRUCTURE

Sem-ester	Course	Title of the Course	Exam. Hours	Credits	Marks		
					IA	UE	Total
I	Course - I	Research Methodology	3	4	25	75	100
	Course - II	Advanced Electronics	3	4	25	75	100
	Course – III	Teaching and Learning skills (Common Paper)	3	4	25	75	100
	Course - IV	Paper on Topic of Research (The syllabus will be prepared by the Guide and the examination will be conducted by the COE)	3	4	25	75	100
II	---	Dissertation and Viva-Voce Viva Voce 50 marks Dissertation 150 marks	--	8	--	--	200
Total				24	--	--	600

PROGRAMME OUTCOMES :

Technical Skill:

Student will have good exposure in various electronics circuits and simulation software.

Research Skill:

The candidate will have wider knowledge in research and development and also they can easily find out the research area in various domains related to core.

Professional skill:

Victorious is getting more academic and administrative skill with industrial exposure

Employment Skill:

Successful Student is getting employment in different domains, such as industries, laboratories, ICT, Educational/Research institutions, Administrative positions, since the impact of the subject concerned is very wide.

COURSE I

RESEARCH METHODOLOGY

Course Objective:

- To develop understanding of the basic framework of research process.
- To develop an understanding of various research designs and techniques.
- To identify various sources of information for literature review and data collection.
- To develop an understanding of the ethical dimensions of conducting applied research.
- Appreciate the components of scholarly writing and evaluate its quality.

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 THIN FILMS AND SOLAR CELL

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.

Solar Cell: Types of Solar Cells, their fabrication & characterization.

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.
5. Solar Photovoltaics – "Fundamentals, Technologies & Applications" – by Chetan Singh Solanki – Prentice Hall of India Publication 3rd Edition, 2011.

Course Outcome:

- Understand the various types of research method
- Understand the scientific research
- Identifying the problem
- Understand the concepts of design
- Recognize the concept of sampling method
- Realize the measuring technique
- Well-known the Scale classification methods
- Understand the various techniques in interpretation
- Realize writing methods.
- Understand the concepts of solar panel
- XRD , UV ,EDX can be studied

COURSE II

ADVANCED ELECTRONICS

Course Objective:

- Be able to describe signals mathematically and understand how to perform mathematical operations on signals. The operations should include operations on the dependent as well as independent variables.
- Be familiar with commonly used signals such as the unit step, ramp, impulse function, sinusoidal signals and complex exponentials.
- Discuss the major components that constitute an embedded system.
- Implement small programs to solve well-defined problems on an embedded platform.
- Develop familiarity with tools used to develop in an embedded environment.
- Digital Signal Processing (DSP) continues to evolve and play a central role in modern electronics
- Digital signal processing including basic principles governing the analysis and design of discrete-time systems as signal processing devices. Review of discrete-time linear, time-invariant systems, Fourier transforms and z-transforms
- Digital Design using VHDL is to enable Electronics students to specify, design, develop and test digital systems in VHDL.
- This course offers to bridge the gap in competencies required to design digital systems in VHDL in an industry.

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 Behaviour - Architecture Selection - Configuration Statements - Power of Configurations - behavioural modelling-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”, DhanpatRai& Co. publishers.
2. N.Mathivanan, PC Based Instrumentation: Concepts and Practice, PHI, 2007.
3. Muhammad Ali Mazidi, Janice GillispieMazidi., “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 River, New Jersey Prentice Hall, 2000.
5. Wayne Wolf, "Modern VLSI design", 4th edition, PHI, 2009
6. Sudhakar Yalamanchili, "VHDL Starters Guide", PHI, 2005

Course Outcome:

- Understand the intuitive meaning of frequency domain and the importance of analysing and processing signals in the frequency domain.
- Understand the application of Fourier analysis to ideal filtering.
- Understand the Nyquist sampling theorem and the process of reconstructing a continuous-time signal from its samples
- Understand what is a microcontroller, microcomputer, embedded system.
- Understand different components of a micro-controller and their interactions.
- Become familiar with programming environment used to develop embedded systems
- Understand key concepts of embedded systems like IO, timers, interrupts, interaction with peripheral devices
- Ability to apply current knowledge and applications of mathematics, science.
- Ability to creatively design a system, component or process to meet desired needs.
- Analyse complex microelectronics circuits and systems.
- Design layout and schematics related with various CMOS based application.
- Analyse the performance issues & inherent trade off involved in system design
- Be able to model complex digital systems at several level of abstractions; behavioural and structural, synthesis and rapid system prototyping.
- Be able to develop and simulate register-level models of hierarchical digital systems

COURSE III

Teaching and Learning Skills

Course 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

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-- **ICT for Professional Development**: Concept of professional development; institutional efforts for competency building; individual learning for professional development using professional networks, OERs, technology for action research, etc.

Unit II : Communications 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 : 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.

Unit IV : E- Learning, Technology Integration and Academic Resources in India

Concept and types of e-learning (synchronous and asynchronous instructional delivery and means), m-learning (mobile apps); blended learning; flipped learning; E-learning tools (like LMS; software's for word processing, making presentations, online editing, etc.); subject specific tools for e-learning; awareness of e-learning standards- Concept of technology integration in teaching- learning processes; frameworks guiding technology integration (like TPACK; SAMR); Technology Integration Matrix- Academic Resources in India: MOOC, NMEICT; NPTEL; e-pathshala; SWAYAM, SWAYAM Prabha, National academic depository, National Digital Library; e-Sodh Sindhu; virtual labs; eYantra, Talk to a teacher, MOODLE, mobile apps, etc.

Unit V : Skills of Teaching and Technology based assessment

Teaching skills: 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- **Technology for Assessment:** Concept of assessment and paradigm shift in assessment; role of technology in assessment 'for' learning; tools for self & peer assessment (recording devices; e-rubrics, etc.); online assessment (open source software's; e-portfolio; quiz makers; e- rubrics; survey tools); technology for assessment of collaborative learning like blogs, discussion forums; learning analytics.

References

1. Bela Rani Sharma (2007), Curriculum Reforms and Teaching Methods, Sarup and sons, New Delhi
2. Brandon Hall , E-learning, A research note by Namahn, found in: [www.namahn.com/resources/ .../note-e-learning.pdf](http://www.namahn.com/resources/.../note-e-learning.pdf), Retrieved on 05/08/2011
3. Don Skinner (2005), Teacher Training, Edinburgh University Press Ltd., Edinburgh
4. Information and Communication Technology in Education: A Curriculum for schools and programmed of Teacher Development, Jonathan Anderson and Tom Van Weert, UNESCO, 2002.
5. Jereb, E., & Šmitek, B. (2006). Applying multimedia instruction in e-learning. *Innovations in Education & Teaching International*, 43(1), 15-27.
6. Kumar, K.L. (2008) Educational Technology, New Age International Publishers, New Delhi.
7. Learning Management system : https://en.wikipedia.org/wiki/Learning_management_system , Retrieved on 05/01/2016
8. Mangal, S.K (2002) Essential of Teaching – Learning and Information Technology, Tandon Publications, Ludhiana.
9. Michael,D and William (2000), Integrating Technology into Teaching and Learning: Concepts and Applications, Prentice Hall, New york.

10. Pandey,S.K (2005) Teaching communication, Commonwealth Publishers, New Delhi.
11. Ram Babu,A abd Dandapani,S (2006), Microteaching (Vol.1 & 2), Neelkamal Publications, Hyderabad.
12. Singh,V.K and Sudarshan K.N. (1996), Computer Education, Discovery Publishing Company, New York.
13. Sharma,R.A., (2006) Fundamentals of Educational Technology, Surya Publications,Meerut
14. Vanaja,M and Rajasekar,S (2006), Computer Education, Neelkamal Publications, Hyderabad.

Course Outcomes

After completing the course, the students will:

- Develop skills of ICT and apply them in Teaching Learning context and Research.
- Be able to use ICT for their professional development.
- Leverage OERs for their teaching and research.
- Appreciate the role of ICT in teaching, learning and Research.
- Develop communication skills with special reference to Listening, Speaking, Reading and Writing.
- Learn how to use instructional technology effectively in a classroom.
- Master the preparation and implementation of teaching techniques.
- Develop adequate skills and competencies to organize seminar / conference / workshop / symposium / panel discussion.
- Develop skills in e-learning and technology integration.
- Have the ability to utilize Academic resources in India for their teaching.
- Have the mastery over communication process through the web.
- Develop different teaching skills for putting the content across to targeted audience.
- Have the ability to use technology for assessment in a classroom.
