RAJEEV GANDHI GOVT. POST GRADUATE COLLEGE, AMBIKAPUR, SURGUJA (CG), INDIA

Learning Outcomes based Curriculum Framework

FOR FOUR YEAR UNDERGRADUATE

PROGRAMME IN

ELECTRONICS SCIENCE

UNDER COICE BASED CREDIT SYSTEM (CBCS) PATTERN

SESSION 2022-2023

DEPARTMENT OF PHYSICS

VISION

The vision of the Physics Department is to provide in proficiency both in depth understanding of principles and concept of Electronics Science , theoretical and experimental Electronics Science. The Department aims to enhance the students' knowledge in basic and applied Electronics Science. To inculcate aptitude for a research career in academia or industry by introducing advanced ideas and techniques that are applicable while emphasizing the underlying concepts of Electronics Science.

MISSION

- To impart quality education in Electronics Science such that they aim to become Scientists in reputed Research Organisations. To make the students effectively disseminate their knowledge in Electronics Scienceto coming generations.
- Develop the capacity and know -how to apply principles/laws of Electronics Science to solve the problems. The ability to do and interpret the data obtained in experiments. To become a center of excellence and extend research facilities.
- Apply the Electronics Science knowledge for sustainable development useful for society. Assume responsibility and always practice ethical principles. To function effectively as individual as well as in a team.

Graduate attributes in Electronics Science

Some of the characteristic attributes of a graduate in Electronics Science are

- **Disciplinary knowledge and skills:** Capable of demonstrating good knowledge and understanding of major concepts, theoretical principles and experimental findings in Electronics Science and its different subfields like Basic Circuit Theory and Network Analysis , Mathematics Foundation for Electronics, Semiconductor Devices, Applied Physics , Electronic Circuits , Digital Electronics and Verilog, C Programming and Data Structures ,Operational Amplifiers and Applications, Signals and Systems ,Electronic Instrumentation ,Microprocessors and Microcontrollers ,Electromagnetics , Communication Electronics , Photonics .
  - ability to use modern instrumentation and laboratory techniques to design and perform experiments is highly desirable in almost all the fields of Physics listed above in (i).
- **Skilled communicator:** Ability to transmit complex technical information relating all areas in Electronics Science in a clear and concise manner in writing and oral ability to present complex and technical concepts in a simple language for better understanding.
- **Critical thinker and problem solver:** Ability to employ critical thinking and efficient problem solving skills in all the basic areas of Electronics Science.
- **Sense of inquiry:** Capability for asking relevant/appropriate questions relating to the issues and problems in the field of Electronics Science, and planning, executing and reporting the results of a theoretical or experimental investigation.
- **Team player/worker**: Capable of working effectively in diverse teams in both classroom, laboratory, Electronics workshop and in industry and field-based situations.
- **Skilled project manager:** Capable of identifying/mobilizing appropriate resources required for a project, and manage a project through to completion, while observing responsible and ethical scientific conduct; and safety and laboratory hygiene regulations and practices.
- **Digitally Efficient*:*** Capable of using computers for simulation studies

in Electronics Science and computation and appropriate software for numerical and statistical analysis of data, and employing modern e-library search tools like Inflibnet, various websites of the renowned Physics labs in countries like the US A, Europe, Japan etc. to locate, retrieve, and evaluate Electronics information.

Ethical awareness / reasoning*:* The graduate should be capable of demonstrating ability to think

- and analyze rationally with modern and scientific outlook and identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights, and adopting objectives, unbiased and truthful actions in all aspects of work

- **National and international perspective*:*** The graduates should be able to develop a national as well as international perspective for their career in the chosen field of the academic activities. They should prepare themselves during their most formative years for their appropriate role in contributing towards the national development and projecting our national priorities at the international level pertaining to their field of interest and future expertise.
- **Lifelong learners:** Capable of self-paced and self-directed learning aimed at personal development and for improving knowledge/skill development and reskilling in all areas of Electronics Science.

Qualification descriptors f or a UG programs in Electronics Science

The qualification descriptors for a **T h r e e year under rgraduate programme in** Electronics Science mayincludethe following.

The graduates should be able to:

- Demonstrate
  - a fundamental/systematic or coherent understanding of the academic field of Electronics Science, its different learning areas like Basic Circuit Theory and Network Analysis , Mathematics Foundation for Electronics, Semiconductor Devices, Applied Physics , Electronic Circuits , Digital Electronics and Verilog, C Programming and Data Structures ,Operational Amplifiers and Applications, Signals and Systems ,Electronic Instrumentation ,Microprocessors and Microcontrollers ,Electromagnetics , Communication Electronics , Photonics .

    (i) and applications, and its linkages with related disciplinary areas/subjects like Chemistry, Mathematics, Life sciences, Environmental sciences, Atmospheric Science, Computer science, Information Technology;

    (ii) procedural knowledge that creates different types of professionals related to different areas of study in Electronics Science outlined above, including research and development, teaching and government and public service;

    (iii) skills in areas related to specialization area relating the subfields and current developments in the academic field of Electronics Science.
- Use knowledge, understanding and skills required for identifying problems and issues relating to Electronics Science, collection of relevant quantitative and/or qualitative data drawing on a wide range of sources from various Electronics laboratories of the world, and their application, analysis and evaluation using methodologies as appropriate to Electronics Science for formulating new theories and concepts.
- Communicate the results of studies undertaken accurately in a range of different contexts using the main concepts, constructs and techniques of Electronics Science. Develop communication abilities to present these results in technical as well as popular science meetings organized in various universities and other private organizations.
- Ability to meet one's own learning needs, drawing on a range of current

research and development work and professional materials, and interaction with other Electronics Scientist around the world.

- Apply one's knowledge of Electronics and theoretical and laboratory skills to new/unfamiliar contexts to identify and analyse problems and issues and solve complex problems in Electronics and related areas with well-defined solutions.
- Demonstrate Electronics -related technological skills that are relevant to Electronics -related job trades and employment opportunities.

The B.Sc. (Physics) programme is a three-year course divided into six semesters.

The syllabus and schemes of examination are detailed herewith.

ACADEMIC PROGRAMMES &
SCHEMES
B.Sc. (Electronics)

FIRST SEMESTER:

Paper	Paper Code	Course (Paper/Subjects)	Semester Exam		Continuous Comprehensive Evaluation(CCE) (Internal Evaluation)					Grand Total
			Max. Marks	Min.	Test	Seminar	Assignment	Total	Min.	
I.	ELE 101	NETWORK ANALYSIS & ANALOG ELETRINICS	50	18	08	08	09	25	09	75

SECOND SEMESTER:

Paper	Paper Code	Course (Paper/Subjects)	Semester Exam		Continuous Comprehensive Evaluation(CCE) (Internal Evaluation)					Grand Total
			Max. Marks	Min.	Test	Seminar	Assignment	Total	Min.	
I	ELE 201	LINEAR & DIGITAL INTEGRATED CIRCUIT	50	18	08	08	09	25	09	75
II	ELE 202	ELECTRONICS PRACTICAL LAB-I	50	18	-	-	-	-	-	50

THIRD SEMESTER:

Paper	Paper Code	Course (Paper/Subjects)	Semester Exam		Continuous Comprehensive Evaluation(CCE) (Internal Evaluation)					Grand Total
			Max. Marks	Min.	Test	Seminar	Assignment	Total	Min.	
	ELE 301	COMMUNICATION ELECTRONICS	50	18	08	08	09	25	09	75

FOURTH SEMESTER:

Paper	Paper Code	Course (Paper/Subjects)	Semester Exam		Continuous Comprehensive Evaluation(CCE) (Internal Evaluation)					Grand Total
			Max. Marks	Min.	Test	Seminar	Assignment	Total	Min.	
I.	ELE 401	MICROPROCESSOR & MICROCONTROLLER	50	18	08	08	09	25	09	75
II.	ELE 402	ELECTRONICS PRACTICAL LAB-II	50	18	-	-	-	-	-	50

FIFTH SEMESTER:

Paper	Paper Code	Course (Paper/Subjects)	Semester Exam		Continuous Comprehensive Evaluation(CCE) (Internal Evaluation)					Grand Total
			Max. Marks	Min.	Test	Seminar	Assignment	Total	Min.	
I	ELE 501	INDUSTRIAL ELECTRONICS	50	18	08	08	09	25	09	75

SIXTH SEMESTER:

Paper	Paper Code	Course (Paper/Subjects)	Semester Exam		Continuous Comprehensive Evaluation(CCE) (Internal Evaluation)					Grand Total
			Max. Marks	Min.	Test	Seminar	Assignment	Total	Min.	
I	ELE 601	MOBILE APPLICATION PROGRAMMING & INTRODUCTION TO VHDL	50	18	08	08	09	25	09	75
II	ELE 602	ELECTRONICS PRACTICAL LAB-III	50	18	-	-	-	-	-	50

B.Sc. Semester-I

Paper-I: NETWORK ANALYSIS & ANALOG ELETRINICS

Course Outcomes

After completing the course the students will able to: -

a. the concepts of electromagnetic induction and its applications and eddy currents,
b. resonant circuits with RC, LR and LCR combinations and the power factor of an AC circuit,
c. power generation, three phase AC, DC motors and induction motors,
d. theory of electromagnetic waves and Maxwell's equations.
e. Network theorem, two port network, ac and dc analysis.
f. basics of circuit theory and network analysis
g. resonant circuits with RC, LR and LCR combinations and the power factor of an AC circuit,

B.Sc. (ELECTRONICS) FIRST SEMESTER COURSE CODE: UD1	
PAPER CODE: E L E 101	
PAPER TITLE: NETWORK ANALYSIS & ANALOG ELETRINICS	
MARKS:75 **THEORY: 50 CCA : 30 PRACTICAL: 00**	
Scheme of marks: i. Objective type questions: 08 questions carrying 1 marks each to be asked. ii. Short answer type questions: 03 questions carrying 2 marks each to be asked. (Word limit 70-100words). iii. Middle answer type questions: 04 questions carrying 3 marks each to be asked. (Word limit 200-250 words). iv. Long answer type questions: 03 questions carrying 08 marks each to be asked. (Word limit 500-600words).	
UNIT-1 15Hours	**Circuit Analysis**: Concept of Voltage and Current Sources. Kirchhoff's Current Law, Kirchhoff's Voltage Law. Mesh Analysis. Node Analysis. Star and Delta networks, StarDelta Conversion. Principal of Duality. Superposition Theorem. Thevenin's Theorem. Norton's Theorem. Reciprocity Theorem. Maximum Power Transfer Theorem. Two Port Networks: h, y and z parameters and their conversion.
UNIT-2 20Hours	**Junction Diode and its applications:** PN junction diode (Ideal and practical)-constructions, Formation of Depletion Layer, Diode Equation and I-V characteristics. Idea of static and dynamic resistance, dc load line analysis, Quiescent (Q) point. Zener diode, Reverse saturation current, Zener and avalanche breakdown. Qualitative idea of Schottky diode. **Rectifiers**- Half wave rectifier, Full wave rectifiers (center tapped and bridge), circuit diagrams, working and waveforms, ripple factor and efficiency. **Filter**Shunt capacitor filter, its role in power supply, output waveform, and working. Regulation- Line and load regulation, Zener diode as voltage regulator, and explanation for load and line regulation
UNIT-3 20 Hours	**Bipolar Junction Transistor:** Review of the characteristics of transistor in CE and CB configurations, Regions of operation (active, cut off and saturation), Current gains α and β. Relations between α and β. dc load line and Q point
UNIT-4 20Hrs	**Amplifiers:** Transistor biasing and Stabilization circuits- Fixed Bias and Voltage Divider Bias. Thermal runaway, stability and stability factor S. Transistor as a two port network, h-parameter equivalent circuit. Small signal analysis of single stage CE amplifier. Input and Output impedance, Current and Voltage gains. Class A, B and C Amplifiers. **Cascaded Amplifiers**: Two stage RC Coupled Amplifier and its Frequency Response.

UNIT- 5 15Hrs	**Feedback in Amplifiers:** Concept of feedback, negative and positive feedback, advantages of negative feedback (Qualitative only). (2 Lectures) Sinusoidal **Oscillators:** Barkhausen criterion for sustained oscillations. Phase shift and Colpitt's oscillator. Determination of Frequency and Condition of oscillation. (5 Lectures) **Unipolar Devices:** JFET. Construction, working and I-V characteristics (output and
SUGGESTED READINGS	Electric Circuits, S. A. Nasar, Schaum's outline series, Tata McGraw Hill (2004) • Electrical Circuits, M. Nahvi & J. Edminister, Schaum's Outline Series, Tata McGraw-Hill (2005) • Electrical Circuits, K.A. Smith and R.E. Alley, 2014, Cambridge University Press • Network, Lines and Fields, J.D.Ryder, Prentice Hall of India. • Electronic Devices and Circuits, David A. Bell, 5th Edition 2015, Oxford University Press. • Electronic Circuits: Discrete and Integrated, D.L. Schilling and C. Belove, Tata McGraw Hill • Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6th Edn., Oxford University Press. • J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001) • J. J. Cathey, 2000 Solved Problems in Electronics, Schaum's outline Series, Tata McGraw Hill (1991

B.Sc. Semester-II

Paper-I: LINEAR AND DIGITAL INTEGRATED CIRCUITS

Course Outcomes

After completing the course the students will able to: -

a. number systems and the interconversion between them, Boolean algebra and the simplification of logic circuits using Karnaugh map,
b. arithmetic circuits, multiplexing and demultiplexing operations and a few logic families,
c. various flip-flops, design of registers and counters, and the architecture and applications of Timer 555, and
d. A/D and D/A converters and their accuracy resolution and VHDL

B.Sc. (ELECTRONICS) SECOND SEMESTER COURSE CODE: UD1	
PAPER CODE: ELE 201	
PAPER TITLE: LINEAR AND DIGITAL INTEGRATED CIRCUITS	
MARKS:75 **THEORY: 50 CCA: 30 PRACTICAL: 00**	
Scheme of marks: v. Objective type questions: 08 questions carrying 1 marks each to be asked. vi. Short answer type questions: 03 questions carrying 2 marks each to be asked. (Word limit 70-100 words). vii. Middle answer type questions: 04 questions carrying 3 marks each to be asked. (Word limit 200-250 words). viii. Long answer type questions: 03 questions carrying 08 marks each to be asked. (Word limit 500-600 words).	
UNIT-1 15Hours	**Operational Amplifiers (Black box approach):** Characteristics of an Ideal and Practical Operational Amplifier (IC 741), Open and closed loop configuration, Frequency Response. CMRR. Slew Rate and concept of Virtual Ground. **Applications of Op-Amps:** (1) Inverting and non-inverting amplifiers, (2) Summing and Difference Amplifier, (3) Differentiator, (4) Integrator, (5) Wein bridge oscillator, (6) Comparator and Zero-crossing detector, and (7) Active low pass and high pass Butterworth filter (1st order only)
UNIT-2 20Hours	**Number System and Codes:** Decimal, Binary, Octal and Hexadecimal number systems, base conversions. Representation of signed and unsigned numbers, BCD code. Binary, octal and hexadecimal arithmetic; addition, subtraction by 2's complement method, multiplication. **Logic Gates and Boolean algebra:** Truth Tables of OR, AND, NOT, NOR, NAND, XOR, XNOR, Universal Gates, Basic postulates and fundamental theorems of Boolean algebra.
UNIT-3 20 Hours	**Combinational Logic Analysis and Design**: Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh map minimization up to 4 variables for SOP). **Arithmetic Circuits**: Binary Addition. Half and Full Adder. Half and Full Subtractor, 4- bit binary Adder/Subtractor. **Data processing circuits:** Multiplexers, De-multiplexers, Decoders, Encoders.
UNIT-4 20Hrs	**Sequential Circuits:** SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered) Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop. Masterslave JK Flip-Flop. **Shift registers:** Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits).

UNIT- 5 15Hrs	**D-A and A-D Conversion:** 4 bit binary weighted and R-2R D-A converters, circuit and working. Accuracy and Resolution. A-D conversion characteristics, successive approximation ADC. (Mention of relevant ICs for all)
SUGGESTED READINGS	• OP-Amps and Linear Integrated Circuit, R.A. Gayakwad, 4th edition, 2000, Prentice Hall • Operational Amplifiers and Linear ICs, David A. Bell, 3rd Edition, 2011, Oxford University Press. • Digital Principles and Applications, A.P. Malvino, D.P. Leach and Saha, 7th Ed., 2011, Tata McGraw • Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009, PHI Learning. • Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill. • Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994) • Digital Principles, R.L.Tokheim, Schaum's outline series, Tata McGraw- Hill (1994)

B.Sc. (ELECTRONICS) SECOND SEMESTER COURSE CODE: UD1

PAPER CODE: ELE 202

PAPER TITLE: ELECTRONICS PRACTICAL LAB-I

MARKS:50
THEORY: 00 PRACTICAL: 50

GROUP-A

LIST OF EXPERIMENTS

ELECTRONICS LAB: DSC 1A LAB: NETWORK ANALYSIS AND ANALOG ELECTRONICS LAB 60 Periods

AT LEAST 06 EXPERIMENTS FROM THE FOLLOWING BESIDES #1

1. To familiarize with basic electronic components (R, C, L, diodes, transistors), digital Multimeter, Function Generator and Oscilloscope.
2. Measurement of Amplitude, Frequency & Phase difference using Oscilloscope.
3. Verification of (a) Thevenin's theorem and (b) Norton's theorem.
4. Verification of (a) Superposition Theorem and (b) Reciprocity Theorem.
5. Verification of the Maximum Power Transfer Theorem.
6. Study of the I-V Characteristics of (a) p-n junction Diode, and (b) Zener diode.
7. Study of (a) Half wave rectifier and (b) Full wave rectifier (FWR).
8. Study the effect of (a) C- filter and (b) Zener regulator on the output of FWR.
9. Study of the I-V Characteristics of UJT and design relaxation oscillator..
10. Study of the output and transfer I-V characteristics of common source JFET.
11. Study of Fixed Bias and Voltage divider bias configuration for CE transistor.
12. Design of a Single Stage CE amplifier of given gain.
13. Study of the RC Phase Shift Oscillator.
14. Study the Colpitt`s oscillator

GROUP-B

LIST OF EXPERIMENTS

ELECTRONICS LAB- DSC 1B LAB: LINEAR AND DIGITAL INTEGRATED CIRCUITS LAB 60 Periods

At least 04 experiments each from section A, B and C

Section-A: Op-Amp. Circuits (Hardware design)

1. To design an inverting amplifier using Op-amp (741, 351) for dc voltage of given gain.
2. (a) To design inverting amplifier using Op-amp (741, 351) and study its frequency response.
(b) To design non-inverting amplifier using Op-amp (741, 351) and study frequency response.
3. (a) To add two dc voltages using Op-Amp in inverting and non-inverting mode.
(b) To study the zero-crossing detector and comparator.
4. To design a precision Differential amplifier of given I/O specification using OpAmplifier.
5. To investigate the use of an op-amp as an Integrator.
6. To investigate the use of an op-amp as a Differentiator.
7. To design a Wien bridge oscillator for given frequency using an Op-Amplifier.
8. To design a circuit to simulate the solution of simultaneous equation and 1st/2nd order differential equation.
9. Design a Butterworth Low Pass active Filter (1st order) and study frequency response.
10. Design a Butterworth High Pass active Filter (1st order) and study frequency response.
11. Design a digital to analog converter (DAC) of given specifications.

Section-B: Digital circuits (Hardware design)

1. (a) To design a combinational logic system for a specified Truth Table.
(b) To convert Boolean expression into logic circuit & design it using logic gate ICs.
(c) To minimize a given logic circuit. 2. Half Adder and Full Adder.
3. Half Subtractor and Full Subtractor.
4. 4 bit binary adder and adder-subtractor using Full adder IC.
5. To design a seven segment decoder.
6. To build Flip-Flop (RS, Clocked RS, D-type and JK) circuits using NAND gates.
7. To build JK Master-slave flip-flop using Flip-Flop ICs. 8. To build a

Counter using D-type/JK Flip-Flop ICs and study timing diagram.

9. To make a Shift Register (serial-in and serial-out) using D-type/JK Flip-Flop ICs

B.Sc. Semester-III

Paper-I: : COMMUNICATION ELECTRONICS

Course Outcomes

After completing the course the students will able to: -

a. fundamentals of noise, their characteristics and types,
b. amplitude modulation and demodulation and radio wave transmission and reception,
c. frequency modulation and demodulation and FM radio wave transmission and reception,
d. Principle of analog and digital pulse modulation and their applications,
e. transmission and detection of digital signals.

B.Sc. (ELECRTRONICS) THIRD SEMESTER COURSE CODE: UD1	
PAPER CODE: ELE 301	
PAPER TITLE: : COMMUNICATION ELECTRONICS	
MARKS:75 **THEORY: 50 CCA: 30 PRACTICAL: 00**	
Scheme of marks: i. Objective type questions: 08 questions carrying 1 marks each to be asked. ii. Short answer type questions: 03 questions carrying 2 marks each to be asked. (Word limit 70-100words). iii. Middle answer type questions: 04 questions carrying 3 marks each to be asked. (Word limit 200-250 words). iv. Long answer type questions: 03 questions carrying 08 marks each to be asked. (Word limit 500-600words).	
UNIT-1 15Hours	**Electronic communication:** Introduction to communication – means and modes. Need for modulation. Block diagram of an electronic communication system. Brief idea of frequency allocation for radio communication system in India (TRAI). Electromagnetic communication spectrum, band designations and usage. Channels and base-band signals. Concept of Noise, signal-to-noise (S/N) ratio
UNIT-2 20Hours	**Analog Modulation**: Amplitude Modulation, modulation index and frequency spectrum. Generation of AM (Emitter Modulation), Amplitude Demodulation (diode detector), Concept of Single side band generation and detection. Frequency Modulation (FM) and Phase Modulation (PM), modulation index and frequency spectrum, equivalence between FM and PM, Generation of FM using VCO, FM detector (slope detector), Qualitative idea of Super heterodyne receiver. **Analog Pulse Modulation:** Channel capacity, Sampling theorem, Basic PrinciplesPAM, PWM, PPM, modulation and detection technique for PAM only, Multiplexing.
UNIT-3 20 Hours	**Digital Pulse Modulation**: Need for digital transmission, Pulse Code Modulation, Digital Carrier Modulation Techniques, Sampling, Quantization and Encoding. Concept of Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), and Binary Phase Shift Keying (BPSK).
UNIT-4 20Hrs	**Introduction to Communication and Navigation systems:** Satellite Communication– Introduction, need, Geosynchronous satellite orbits, geostationary satellite advantages of geostationary satellites. Satellite visibility, transponders (C - Band), path loss, ground station, simplified block diagram of earth station. Uplink and downlink.

UNIT- 5 15Hrs	**Mobile Telephony System** – Basic concept of mobile communication, frequency bands used in mobile communication, concept of cell sectoring and cell splitting, SIM number, IMEI number, need for data encryption, architecture (block diagram) of mobile communication network, idea of GSM, CDMA, TDMA and FDMA technologies, simplified block diagram of mobile phone handset, 2G, 3G and 4G concepts (qualitative only). GPS navigation system (qualitative idea only
SUGGESTED READINGS	• Electronic Communications, D. Roddy and J. Coolen, Pearson Education India. • Advanced Electronics Communication Systems- Tomasi, 6th edition, Prentice Hall. • Modern Digital and Analog Communication Systems, B.P. Lathi, 4th Edition, 2011, Oxford University Press. • Electronic Communication systems, G. Kennedy, 3rd Edn., 1999, Tata McGraw Hill. • Principles of Electronic communication systems – Frenzel, 3rd edition, McGraw Hill • Communication Systems, S. Haykin, 2006, Wiley India • Electronic Communication system, Blake, Cengage Learning, 5th edition. • Wireless communications, Andrea Goldsmith, 2015, Cambridge University Press

B.Sc. Semester-IV

Paper-I: MICROPROCESSOR AND MICROCONTROLLER

Course Outcomes

After completing the course the students will able to: -

a) architecture of 8085 microprocessor, instruction sets, addressing modes and programming exercises
b) stacks and stack operations
c) interfacing memory devices
d) interfacing 8085 microprocessor with input/output devices,
and
e) interfacing programmable peripheral devices
f) the architecture of 8051 Micro-controller
g) the interrupts, counter, timer and serial data transmission
h) the instruction set and simple programs
i) interfacing peripherals

B.Sc. (ELECTRONICS) FOURTH SEMESTER COURSE CODE: UD1	
PAPER CODE: ELE 401	
PAPER TITLE: MICROPROCESSOR AND MICROCONTROLLER	
MARKS:75 **THEORY: 50 CCA : 30 PRACTICAL: 00**	
Scheme of marks: v. Objective type questions: 08 questions carrying 1 marks each to be asked. vi. Short answer type questions: 03 questions carrying 2 marks each to be asked. (Word limit 70-100 words). vii. Middle answer type questions: 04 questions carrying 3 marks each to be asked. (Word limit 200-250 words). viii. Long answer type questions: 03 questions carrying 08 marks each to be asked. (Word limit 500-600 words).	
UNIT-1 15Hours	**Microcomputer Organization:** Input/Output Devices. Data storage (idea of RAM and ROM). Computer memory. Memory organization & addressing. Memory Interfacing. Memory Map. **8085 Microprocessor Architecture:** Main features of 8085. Block diagram. Pin-out diagram of 8085. Data and address buses. Registers. ALU. Stack memory. Program counter.
UNIT-2 20Hours	**8085 Programming :** Instruction classification, Instructions set (Data transfer including stacks. Arithmetic, logical, branch, and control instructions). Subroutines, delay loops. Timing & Control circuitry. Timing states. Instruction cycle, Timing diagram of MOV and MVI. Hardware and software interrupts.
UNIT-3 20 Hours	**8051 microcontroller:** Introduction and block diagram of 8051 microcontroller, architecture of 8051, overview of 8051 family, 8051 assembly language programming, Program Counter and ROM memory map, Data types and directives, Flag bits and Program Status Word (PSW) register, Jump, loop and call instructions.
UNIT-4 20Hrs	**8051 I/O port programming:** Introduction of I/O port programming, pin out diagram of 8051 microcontroller, I/O port pins description & their functions, I/O port programming in 8051 (using assembly language), I/O programming: Bit manipulation..
UNIT- 5 15Hrs	**8051 Programming:** 8051 addressing modes and accessing memory locations using various addressing modes, assembly language instructions using each addressing mode, arithmetic and logic instructions, **8051 programming in C:** for time delay and I/O operations and manipulation, for arithmetic and logic operations, for ASCII and BCD conversions.

SUGGESTED READINGS	• Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Goankar, Prentice Hall. • Embedded Systems: Architecture, Programming & Design, Raj Kamal, 2008, Tata McGraw Hill 13 • The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A. Mazidi, J.G. Mazidi, and R.D. McKinlay, 2nd Ed., 2007, Pearson Education India. • Microprocessor and Microcontrollers, N. Senthil Kumar, 2010, Oxford University Press • 8051 microcontrollers, Satish Shah, 2010, Oxford University Press. • Embedded Systems: Design & applications, S.F. Barrett, 2008, Pearson Education India • Introduction to embedded system, K.V. Shibu, 1st edition, 2009, McGraw Hill • Embedded Microcomputer systems: Real time interfacing, J.W. Valvano 2011, Cengage Learning .

B.Sc. (ELECTRONICS) FOURTH SEMESTER COURSE CODE: UD1

PAPER CODE: ELE 402

PAPER TITLE: ELECTRONICS PRACTICAL LAB-II

MARKS:50
THEORY: 00 PRACTICAL: 50

LIST OF EXPERIMENTS

ELECTRONICS LAB-DSC 1C LAB: COMMUNICATION ELECTRONICS LAB 60 Periods

AT LEAST 05 EXPERIMENTS FROM THE FOLLOWING

1. To design an Amplitude Modulator using Transistor
2. To study envelope detector for demodulation of AM signal
3. To study FM - Generator and Detector circuit
4. To study AM Transmitter and Receiver
5. To study FM Transmitter and Receiver
6. To study Time Division Multiplexing (TDM)
7. To study Pulse Amplitude Modulation (PAM)
8. To study Pulse Width Modulation (PWM)
9. To study Pulse Position Modulation (PPM)
10. To study ASK, PSK and FSK modulators.

ELECRONICS LAB-DSC 1D LAB: MICROPROCESSOR AND MICROCONTROLLER LAB 60 Periods

At least 06 experiments each from Section-A and Section-B

Section-A: Programs using 8085 Microprocessor

1. Addition and subtraction of numbers using direct addressing mode
2. Addition and subtraction of numbers using indirect addressing mode
3. Multiplication by repeated addition.
4. Division by repeated subtraction.
5. Handling of 16-bit Numbers.
6. Use of CALL and RETURN Instruction.
7. Block data handling.
8. Other programs (e.g. Parity Check, using interrupts, etc.).

Section-B: Experiments using 8051 microcontroller:

1. To find that the given numbers is prime or not.
2. To find the factorial of a number.
3. Write a program to make the two numbers equal by increasing the smallest number and decreasing the largest number.

4. Use one of the four ports of 8051 for O/P interfaced to eight LED's. Simulate binary counter (8 bit) on LED's .

5. Program to glow the first four LEDs then next four using TIMER application.

6. Program to rotate the contents of the accumulator first right and then left.

7. Program to run a countdown from 9-0 in the seven segment LED display.

8. To interface seven segment LED display with 8051 microcontroller and display 'HELP' in the seven segment LED display.

9. To toggle '1234' as '1324' in the seven segment LED display.

10. Interface stepper motor with 8051 and write a program to move the motor through a given angle in clock wise or counter clockwise direction.

11. Application of embedded systems: Temperature measurement & display on LCD

B.Sc. Semester-V

Paper-I : Industrial Electronics

Course Outcomes

After completing the course the students will able to: -

1. Know main aspects of the inadequacies of classical mechanics and understand historical development of quantum mechanics and ability to discuss and interpret experiments that reveal the dual nature of matter.
2. Understand the theory of quantum measurements, wave packets and uncertainty principle.
3. Understand the central concepts of quantum mechanics: wave functions, momentum and energy operator, the Schrodinger equation, time dependent and time independent cases, probability density and the normalization techniques, skill development on problem solving
   e.g. one dimensional rigid box, tunneling through potential barrier, step potential, rectangular barrier.
4. Understanding the properties of nuclei like density, size, binding energy, nuclear forces and structure of atomic nucleus, liquid drop model and nuclear shell model and mass formula.
5. Ability to calculate the decay rates and lifetime of radioactive decays like alpha, beta, gamma decay. Neutrinos and its properties and role in theory of beta decay.
6. Understand fission and fusion well as nuclear processes to produce nuclear energy in nuclear reactor and stellar energy in stars.
7. In the laboratory course, the students will get opportunity to perform the following experiments
8. Measurement of Planck's constant by more than one method.
9. Verification of the photoelectric effect and determination of the work Function of a metal.
10. Determination of the charge of electron and e/m of electron.
11. Determination of the ionization potential of atoms.
12. Determine the wavelength of the emission lines in the spectrum of Hydrogen atom.
13. Plan and Execute 2-3 group projects in the field of Atomic, Molecular and Nuclear Physics in collaboration with other institutions, if, possible where advanced facilities are available.

B.Sc. (ELECTRONICS) FIFTH SEMESTER COURSE CODE: UD1	
PAPER CODE: ELE501	
PAPER TITLE: : Industrial Electronics	
MARKS:75 **THEORY: 50 CCA: 30 PRACTICAL: 00**	
Scheme of marks: ix. Objective type questions: 08 questions carrying 1 marks each to be asked. x. Short answer type questions: 03 questions carrying 2 marks each to be asked. (Word limit 70-100 words). xi. Middle answer type questions: 04 questions carrying 3 marks each to be asked. (Word limit 200-250 words). xii. Long answer type questions: 03 questions carrying 08 marks each to be asked. (Word limit 500-600 words).	
UNIT-1 15Hours	**Thyristors:** Principles and operations of SCR, voltage amplifier gate characteristics of SCR, characteristics of two transistor models, Thyristor construction, rectifier circuit using SCR, GTO, Operation and characteristics of DIAC, TRIAC, Silicon Controlled Switch, Silicon Unilateral Switch, Silicon Bilateral Switch and Light activated SCR. Turn ON/OFF Mechanism: Basics of turnon and turn off methods
UNIT-2 20Hours	**Applications of SCR**: Multiple connections of SCR, Series operation, Triggering of series connected SCR, Parallel operation, Triggering of parallel connected SCR, SCR di/dt calculation, Snubber circuit, dv/dt calculation across SCR, Types of converters, Full wave controlled rectifier with resistive load, FWCR with inductive load, FWCR with freewheeling diode .
UNIT-3 20 Hours	**Inverters:** Types of inverters, Single phase bridge inverter, Mc Murray impulse communication inverter, Single phase half bridge voltage source inverter, Single phase full bridge voltage inverter, Step down choppers, Step up choppers, Chopper classification. **Other Applications:** Induction heating, Resistance welding, Over voltage protection, Zero voltage switch, SMPS,UPS, DC circuit breaker, Battery charger, AC static switch, DC static switch, Time delay, Fan regulator using TRIAC .

UNIT-4 20Hrs	**PCB Fundamentals:** PCB Advantage ,components of PCB, Electronics components, IC's Mount Devices (SMD). Classification of PCB - single, double, multilayer and flexible boards,Manufacturing of PCB, PCB standards. **Schematic & Layout Design:** Schematic diagram, General, Mechanical and Electrical design considerations, Placing and Mounting of components, Conductor spacing, routing guidelines, heat sinks and package density, Net list, creating components for library, Tracks, Pads, Vias, power plane, grounding, Lead cutting and Soldering Techniques, Testing and quality controls. PCB Technology Trends, Environmental concerns in PCB industry.
UNIT- 5 15Hrs	**Analog/Digital Multimeter:** Analog multimeter, AC and DC measurment, conversion of analog output to digital form (A/D), Dual ramp A/D converter, digital measuring system, multimeter block diagram, voltage, current and resistance measurments. Frequency counter: Elements of electronic counter, decade counting assembly temperature compensated prystal oscillator, universal counter, measurement modes; frequency measurement, period measurement, time interval measurement, measurement errors: gating errors, time base error, trigger level error.

SUGGESTED READINGS	Ramamourthy " Thyristor and their applications" East-West Publishers, 2nd Edition 2. Shamir K Datta " Power Electronics and Controllers" PHI, 3rd Edition 3. Power Electronics: Devices, Circuits and Industrial Applications 4. V.R. MoorthyOxford University Press; First Edition edition 5. Printed circuit Board Design & Technology by Walter C. Bosshart, Tata McGrawHill. 6. Printed Circuit Board Design, Fabrication, Assembly & Testing by R.S.Khandpur,TATA McGraw Hill Publisher 7. Electronics Instrumentation H.S.Kalsi McGraw Hill Education; 3 edition (1 July 2017) 8. Modern Electronic Instrumentation and Measurement Techniques Albert Helfrick andWilliam D Cooper Prentice Hall India Learning Private Limited 9. Electronic Instrumentation and Measurements David A. Bell Oxford University Press India;Third edition (12 April 2013) 1.

B.Sc. Semester-VI

Paper-II: Mobile Application Programming and Introduction to VHDL

Course Outcomes

After completing the course the students will able to : -

Android, Advantages and Future of Android, Tools and about Android SDK.

Android Development Environment.

Views and Layouts, Buttons, Menus, and Dialogs, Graphics Resources in Android.

Handling User Interface (UI) Events

iOS Development Environment: Windows phone Environment Introduction to VHDL

B.Sc. (ELECTRONICS) SIXTH SEMESTER COURSE CODE: UD1	
PAPER CODE: ELE601	
PAPER TITLE: Mobile Application Programming and Introduction to VHDL	
MARKS: 75 **THEORY: 50 CCA : 30 PRACTICAL: 00**	
Scheme of marks: xiii. Objective type questions: 08 questions carrying 1 marks each to be asked. xiv. Short answer type questions: 03 questions carrying 2 marks each to be asked. (Word limit 70-100 words). xv. Middle answer type questions: 04 questions carrying 3 marks each to be asked. (Word limit 200-250 words). xvi. Long answer type questions: 03 questions carrying 08 marks each to be asked. (Word limit 500-600 words).	
UNIT-1 15Hours	**Introduction:** What is mobile Application Programming, different Platforms, architecture and working of Android, iOS and Windows phone 8 operating system, comparison of Android, iOS and Windows phone 8. **Android Development Environment:** What is Android, Advantages and Future of Android, Tools and about Android SDK, Installing Java, Eclipse, and Android, Android Software Development Kit for Eclipse, Android Development Tool: Android Tools for Eclipse, AVDs: Smartphone Emulators, Image Editing
UNIT-2 20Hours	**Android Software Development Platform:** Understanding Java SE and the Dalvik Virtual Machine, directory Structure of an Android Project, common Default Resources Folders, the Values Folder, Leveraging Android XML, Screen Sizes, Launching your application: The AndroidManifest.xml File, Creating your First Android Application **Android Framework Overview:** The Foundation of OOP, the APK File, Android Application Components, Android Activities: Defining the User Interface, Android Services: Processing in the Background, Broadcast Receivers: Announcements and Notifications, Content Providers: Data Management, Android Intent Objects: Messaging for Components, Android Manifest XML: Declaring Your Components
UNIT-3 20 Hours	**Views and Layouts, Buttons, Menus, and Dialogs, Graphics Resources in Android:** Introducing the Drawables, Implementing Images, Core Drawable Subclasses, Using Bitmap, PNG, JPEG and GIF Images in Android, Creating Animation in Android **Handling User Interface (UI) Events:** An Overview of UI Events in Android, Listening for and Handling Events, Handling UI Events via the View Class, Event Callback Methods, Handling Click Events, Touchscreen events, Keyboard Events, Context Menus, Controlling the Focus,

UNIT-4 20Hrs	**Content Providers:** An Overview of Android Content Providers, Defining a Content Provider,Working with a Database **Intents and Intent Filters:** What is an Intent, Implicit Intents and Explicit Intents, Intents withActivities, Intents with Broadcast Receivers **Advanced Android,** and New Features in Android 4.4**. iOS Development Environment:** Overview of iOS, iOS Layers, Introduction to iOS applicationdevelopment. **Windows phone Environment:** Overview of windows phone and its platform, Building windowsphone application
UNIT- 5 15Hrs	**Introduction to VHDL:** Structure of HDL Module, Comparison of VHDL and Verilog, Introductionto Simulation and Synthesis Tools, Test Benches. VHDL Modules, Delays, data flow style, behavioral style, structural style, mixed design style, simulating design. Introduction to Language Elements, Keywords, Identifiers, White Space Characters, Comments, format. VHDL terms, describing hardware in VHDL, entity, architectures, concurrent signal assignment, event scheduling, statement concurrency, structural designs, sequential behavior, process statements, process execution, sequential statements, architecture selection, configuration statements
SUGGESTED READINGS	1. Beginning Android 4, OnurCinar , Apress Publication 2. Professional Android 4 Application Development, Reto Meier, Wrox 3. Beginning iOS 6 Development: Exploring the iOS SDK, David Mark, Apress 4. Beginning Windows 8 Application Development, IstvánNovák, Zoltan Arvai, György Balássy and David Fulop 5. Professional Windows 8 Programming: Application Development with C# and XML,Allen Sanders and Kevin Ashley, Wrox Publication 6. Programming with Mobile Applications: Android, iOS, and Windows Phone 7 ,Thomas Duffy, Course Technology, Cengage Learning 2013 7. A VHDL Primer –J. Bhasker, Prentice Hall, 1999, III Edition. Verilog HDL-A guide to digital design and synthesis-Samir Palnitkar, Pearson, 2nd edition. 1.

B.Sc. (ELECTRONICS) SIXTH SEMESTER COURSE CODE: UD1

PAPER CODE: ELE602

PAPER TITLE: ELECTRONICS PRACTICAL LAB-III

MARKS:50
THEORY: 00 PRACTICAL: 50

INDUSTRIAL ELECTRONICS & PCB Design LAB **MM-25**

(Hardware and Circuit Simulation Software)

Max.Marks:25

1. Study of I-V characteristics of DIAC
2. Study of I-V characteristics of a TRIAC
3. Study of I-V characteristics of a SCR
4. SCR as a half wave and full wave rectifiers with R and RL loads
5. DC motor control using SCR.
6. DC motor control using TRIAC.
7. AC voltage controller using TRIAC with UJT triggering.
8. Study of parallel and bridge inverter.
9. Design of snubber circuit
10. Study of chopper circuits

Design and Fabrication of Printed Circuit Boards

1. Design automation, Design Rule Checking; Exporting Drill and Gerber Files; Drills; Footprints and Libraries Adding and Editing Pins, copper clad laminates materials of copperclad laminates, properties of laminates (electrical & physical),

2. Study of soldering techniques. Film master preparation, Image transfer, photo printing,Screen Printing, Plating techniques etching techniques,

3. Study of Mechanical Machining operations, Lead cutting and Soldering Techniques, Testingand quality controls.

4. Study of Lead cutting and Soldering Techniques, Testing and quality controls.

1.

ELB 304 P: Mobile Application & VHDL Lab

M.

M. - 25Mobile communication Lab

- Develop an application that uses GUI components, Font and Colors.
- Develop an application that uses Layout Managers and event listeners.
- Develop a native calculator application.
- Write an application that draws basic graphical primitives on the screen.
- Develop an application that makes use of database.
- Develop an application that makes use of RSS Feed.
- Implement an application that implements Multi-threading.
- Develop a native application that uses GPS location information.
- Implement an application that writes data to the SD card.
- Implement an application that creates an alert upon receiving a message.
- Write a mobile application that creates alarm clock.

Introduction to VHDL

- Write the VHDL Code & Simulate it for the following gates.
    - Two I/P AND Gates.
    - Two I/P OR Gates.
    - Two I/P NAND Gates
    - Two I/P NOR Gates.
    - Two I/P Ex-OR Gates.
    - NOT Gates
- Write VHDL programs for the following circuits, check the wave forms and thehardware generated
    - Half adder b. Full adder