GOA UNIVERSITY
Taleigao Plateau, Goa 403 206

REVISED MINUTES

of the 9th Special Meeting of the

X ACADEMIC COUNCIL

Day & Date

Saturday, 30th July, 2022

Time

10.00 a.m.

Council Hall
Goa University

	Francophone Studies meeting held on 22.04.2022 with the suggestions to revise/change the Course Codes for the PG programme. The proposed syllabus/structure for Semester III and Semester IV was deferred by the house. **(Action: Assistant Registrar Academic – PG)**
D 3.22	**Minutes of the Board of Studies in Microbiology meeting held on 19.07.2022.** The Academic Council approved the minutes of the Board of Studies in Microbiology meeting held on 19.07.2022 with the following suggestion: 1. Optional Courses to be indicated separately for each semester. 2. The Course Codes for the PG Programme to be revised/changed. 3. The Chairperson, Board of Studies was requested to resubmit the syllabus incorporating the suggestions. The Vice-Chancellor was authorized to approve the same on behalf of the Academic Council. **(Action: Assistant Registrar Academic – PG)**
D 3.23	**Minutes of the Board of Studies in Electronics meeting held on 21.07.2022.** The Academic Council approved the minutes of the Board of Studies in Electronics meeting held on 21.07.2022 with the suggestion to revise/change the Course Codes for the PG Programme. However, B. Voc. in Electronics, Instrumentation and Computer Networking Course structure and the proposed syllabus/structure for Semester III and Semester IV was deferred by the house. **(Action: Assistant Registrar Academic – PG)**
D 3.24	**Minutes of the Board of Studies in Portuguese meeting held on 01.07.2022 and 22.07.2022.** The Academic Council partly approved the minutes of the Board of Studies in Portuguese meeting held on 21.07.2022 with the following suggestions: 1. Part A of the minutes was deferred. 2. It was informed that the Board of Studies should work within the framework of Goa University Statutes and Ordinances and should not make proposals that do not fall within its ambit. Thus the irrelevant recommendations to be expunged by the Board from its minutes. 3. RSOC semester IV total credits to be corrected. 4. The Chairperson, Board of Studies was requested to resubmit the syllabus incorporating the suggestions. The Vice-Chancellor was authorized to approve the Syllabus on behalf of the Academic Council. The proposed syllabus/structure for Semester III and Semester IV was deferred by the House.

X AC- 9 (Special)
30.07.2022

GOA UNIVERSITY
Taleigao Plateau, Goa 403 206

F I N A L U P D A T E D A G E N D A

For the 9th Special Meeting of the

X ACADEMIC COUNCIL

Day & Date

30th July, 2022

Time

10.00 a.m.

Venue
Conference Hall
Administration Block

Dean,School of Biological Sciences and Biotechnology

Place: Office of Dean,
School of Biological Sciences and Biotechnology

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D 3.23 **Minutes of the Board of Studies in Electronics meeting held on 21.07.2022.**

Part A

i) Recommendations regarding courses of study in the subject or group of subjects at the undergraduate level:

B.Voc in Electronics, Instrumentation and Computer Networking

ii) Recommendations regarding courses or group of subjects at postgraduate level:

Semester I & II Syllabus as per NEP 2020

Part B

i) Scheme of the Examinations at Undergraduate Level: NA
ii) Panel of examiners for different examinations at Undergraduate Level: NA
iii) Scheme of the examinations at post-graduate level: NA
iv) Panel of examiners for different examinations at post-graduate Level: NA

Part C

i) Recommendations regarding preparation and publication and selection of Anthologies in any subject or group of subjects and the names of person recommended for appointment to make the selection : NA

Part D

i) Recommendations regarding general academic requirements in the Departments of University or affiliated colleges: NA
ii) Recommendation of Academic Audit Committee and status thereof: NA

Part E

i) Recommendations of text books for the course for study at the Undergraduate level: NA
ii) Recommendations of text books for the courses of study at the post Graduate level:
List of books required is indicated below each subject in the syllabus.

Part F

Important points for consideration/approval of Academic Council

i) The Important points/recommended of BOS that require consideration/approval of **Academic council (points to be highlighted) as mentioned below.**

- **Approval of M.Sc. Electronics syllabus Semester I and II as per NEP 2020 Annexure I (refer page no. 774)**
- **Approval of B.Voc. in Electronics, Instrumentation and Computer Networking Syllabus Annexure II (refer page no. 794) and Annexure III (refer page no. 800)**

ii) The declaration by the Chairman, that the minutes were read out by the Chairman at the meeting itself.

Sd/-
Signature of Chairman

	Date: 21.07.2022 Place: Goa University **Part G: The remarks of the Dean of the Faculty.** i) The minutes are in order. ii) The minutes may be placed before the Academic Council with remarks if any. iii) May be recommended for approval of Academic Council iv) Special remarks if any Sd/- Signature of the Dean Date: 21.07.2022 Place: Goa University **(Back to Index)**
D 3.24	**Minutes of the Board of Studies in Portuguese meeting held on 01.07.2022 and 22.07.2022.** **Part A** **i) Recommendations regarding the course of study in the subject or group of subjects at the undergraduate level.** The Board members discussed the new core papers for First Year BA Portuguese, "Listening Comprehension and Oral Interaction I & II", for Semesters 1 and 2 respectively, that had been approved at the last DC Meeting of the erstwhile Department of Portuguese & Lusophone Studies, held on the 19th of May 2022. The new papers were approved and given the codes UPRC-111 and UPRC-112 respectively**. [Annexure I refer page no. 869]** Consequently, the existing core papers at the FYBA level, "Civilization and Culture 1 & 2" would be shifted to Second Year BA Portuguese. **ii) Recommendations regarding the course of study in the subject or group of subjects at the postgraduate level.** 1) The board members approved the semester-wise flow chart of subjects for M.A. Portuguese as per the NEP to be implemented from A.Y. 2022-23, classifying the courses into Discipline Specific Core Courses (DSCC), Discipline Specific Optional Courses (DSOC), Optional Generic Courses (OGC) and Research Specific Optional Courses (RSOC). **[Annexure II refer page no.873]** 2) The board members approved the syllabi of courses of first two semesters of MA Portuguese as per the NEP. The syllabi for courses of Semesters 3 & 4 will be worked on subsequently. **[Annexure III refer page no.875]** 3) The board members approved 3 optional courses on the Swayam platform for the M.A.Portuguese students to enrol during the current semester: 1. Photojournalism (5 credits conducted by Dr. Radhika Khanna, Pondicherry University) 2. Introduction to Japanese Language & Culture-II (3 credits by Prof. Vatsala Misra, IIT Kanpur) 3. Spoken Sanskrit: Basic & Intermediate levels (3 credits by Prof. Anuradha Choudry; IIT Kharagpur) **Part B**

D 3.23 Minutes of the Board of Studies in Electronics meeting held on 21.07.2022.

Annexure I

M.Sc. Electronics Programme Course Syllabus as per NEP 2020

Semester	Course Code	Course Title	Theory/ Lab	Course Credits	Contact Hours
Semester I	**Discipline Specific Core Courses (DSCC)**				
	ELC 101	**Micro Electronics and VLSI Design**	Theory	4	60
	ELC 102	**Instrumentation & Control Theory**	Theory	4	60
	ELC 103	**Advanced Digital Communication System**	Theory	4	60
	ELC 104	**Electronics Practical I**	Lab	4	120
	Discipline Specific Optional Courses (DSOC)				
	ELO101	**Numerical Computation and Algorithms**	Theory	4	60
	ELO102	**EDA Tools**	Theory	4	60
Semester II	**Discipline Specific Core Courses (DSCC)**				
	ELC201	**Embedded System Design**	Theory	4	60
	ELC 202	**Real Time Operating System**	Theory	4	60
	ELC 203	**Digital System Design**	Theory	4	60
	ELC204	**Electronics Practical II**	Lab	4	120
	Discipline Specific Optional Courses (DSOC)				
	ELO 201	**Internet of Things**	Theory	4	60
	ELO 202	**Switching and Routing**	Theory	4	60
Semester III	**Research Specific Optional Courses (RSOC)**				
	ELR 301	**Signals and Systems**	Theory	4	60
	ELR 302	**Data Science and Machine Learning**	Theory/ Lab	4	60
		Elective V		4	60
	Optional Generic Course (OGC)				
	ELG 301	**Optical Communication Systems**	Theory	4	60
	ELG 302	**Robotics**	Theory	4	60
	ELG 303	**Biomedical Instrumentation**	Theory	4	60
		Elective VI		4	60
Semester IV	**Research Specific Optional Courses (RSOC)**				
	ELR 401	**Laser System Engineering**	Theory	4	60
	ELR 402	**Elective VII**	Theory/ Lab	4	60
	ELR 402	**Elective VIII**	Theory	4	60
	Discipline Specific Dissertation (DSD)				
	ELD 401	**Project**	--	16	

Semester I

Course Code: ELC 101 **Course Title: Micro Electronics and VLSI Design**		
Number of Credits: 04	**Total Hours: 60**	**Total Marks: 100**
Prerequisites for the course		
Should have graduate level knowledge in analog and digital electronics		
Objectives of Course		
This course is intended to: ● Introduce to the VLSI Technology, various fabrications processes involved in IC design , ● Analysis of Electronics circuits, Design examples of VLSI circuits, Circuit Optimization techniques ● Advance circuits designs: Memory, Registers, Synchronous circuits etc.		
Course Content		
Unit I	An overview of VLSI, Modern CMOS Technology	**4 Hours**
Unit II	Silicon Logic, Logic design with MOSFET.	**6 Hours**
Unit III	Physical structure of CMOS Integrated circuits	**6Hours**
Unit IV	Fabrication Technologies of CMOS Integrated Circuits	**8 Hours**
Unit V	Elements of Physical Design	**4 Hours**
Unit VI	Electrical characteristics of MOSFETS	**6 Hours**
Unit VII	Electronic analysis of CMOS Logic gates	**6 Hours**
UNIT VIII	Advanced Techniques in CMOS Logic Circuits	**6 Hours**
UNIT IX	System specifications using HDL, General VLSI components	**5 Hours**
UNIT X	Memories and Programmable Logic	**10 Hours**
Pedagogy		
Lectures/Experiential Learning		
Course Outcome		
Students will, ● Design fundamental gates and customize them for specific electrical and electronics application, ● Understand the fabrications processes involved in VLSI technology, ● Write the Hardware descriptive form of circuits, Synchronize the combinational and sequential circuits, design a static and dynamic memory cell, ● Understand the Programmable logics building blocks		
References/Readings		
1. Introduction to VLSI Circuits and Systems, John P. Uyemura, WILLEY.		

2. Principles of CMOS VLSI Design, N.H.E. W. &Eshahiraghian, Addison Wesley
3. Modern VLSI Design System on Silicon, Pearson Education Asia. By W. Wolf.
4. VLSI Technology, S.M. Sze, McGraw -Hill (1995). 5.Basic VLSI Design, Douglas Pucknell, K. Eshraghian, Prentice Hall India.

Course Code: ELC 102 **Course Title: Instrumentation & Control Theory**		
Number of Credits: 04	**Total Hours: 60**	**Total Marks: 100**
Prerequisites for the course		
knowledge of analog and digital electronics, Basics of differential equations.		
Objectives of Course		
This course is intended to: ● Introduce principles of transduction and actuator. ● Explain the important parameters used in instrument characterization, Types of error committed by a user and how to deal with them. ● Describe various standards followed for accurate measurement. ● Explain the techniques used to convert analog data into digital domain and its analysis and storage. ● Understand instruments such as Oscilloscope, spectrum analyzers, wave analyzers, Lock in amplifiers depth. ● Fundamentals of control theory and working of PID controller tuned for a given application.		
Course Content		
Unit I	**Introduction**	**8 Hours**
Basic Concepts of measurements, Calibrations and standards, Transducers: Types and parameters, Sensors - Displacement, Strain, Vibration, Pressure, Flow, Temperature, Force and Torque		
Unit II	**Signal Conditioning**	**8 Hours**
Introduction, Amplification, Simple ended amplifier, Instrumentation amplifier, Types of Filters		
Unit III	**Sampling**	**8 Hours**
Fundamental concepts, Anti-aliasing, Multiplexers, Sample and Hold, Track and Hold.		
Unit IV	**Computer Interfaces**	**08 Hours**
Serial (RS-232), Parallel, GPIB (IEEE-488), Universal Serial Bus (USB) and Variants, Bluetooth		
Unit V	**Display Devices**	**10 Hours**
Review of LED, LCD, Plasma display devices, segmental and dot matrix displays, MEMS display		
Unit VI	**General Purpose Test Equipments**	**08 Hours**
CRO, Digital storage oscilloscope, Digital voltmeter, Wave Analyser, Spectrum analysis, Lock-in-amplifiers, Pulse generators and waveform generators		
Unit VII	**Control System**	**10 Hours**
Types of control system - open loop, closed loop, linear, non-linear, continuous, discrete, frequency and time response, open loop motor control, Principles of PD, PI, PID		
Pedagogy		
Lectures/Experiential Learning		
Course Outcome		
students will:		

- Explain measurement parameters, calibrations and standards in electronic instrumentation.
- Comprehend the significance of signal conditioning and sampling theorem.
- Gain the knowledge of various computer interfaces, and understand the construction, working principle of different display devices and general-purpose equipments used in signal analysis.
- Explain the working principle of different types of control systems.

References/Readings

1. H. S. Kalsi, 'Electronic Instrumentation', Tata MacGrow-Hill
2.Joseph J. Carr, 'Elements of Electronic Instrumentation and Measurement', Prentice Hall India.
3.Albert Helfnick and William Cooper, 'Modern Electronic Instrumentation and Measurement Techniques', Prentice Hall India.
4.Robert Northrop, 'Introduction to Instrumentation and Measurements', CRC Press

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Course Code: ELC 103
Course Title: ADVANCED DIGITALCOMMUNICATION SYSTEMS

Number of Credits: 04 **Total Hours: 60** **Total Marks: 100**

Prerequisites for the course

Graduate level understanding in basics of Electronic Communications

Objectives of Course

This course is intended to:

- Introduce to students with basics of wireless systems – concepts, theory.
- Covers various modulation techniques, to enable the student to synthesize and
- analyse wireless and mobile cellular communication systems over a stochastic fading channel
- Mitigation and diversity techniques

Course Content

Unit I	**Introduction to Mobile and Cellular Communication Systems:**	**5 Hours**

Definitions, impact of Mobile and Cellular Radio Communication Historical overview. Fundamental of Radio Mobile and Cellular Practices Radio mobile links and cells, Frequency re-use, Principles of Cellular Com. Mobile Telephone Switching Subsystem, The mobile frequency spectrum, Hand-off, Cochannel and adjacent channel interference limitations, Near-far problem, Power Control.

Unit II	**Mobile Communication Channel including antennas**	**10 Hours**

The mobile wireless propagation channel, Notions on antennas especially the near and far field concept, Line of Sight (LOS) propagation, Multipath fading , outdoor and Indoor Propagation, Flat and selective fading, Special antennas for base stations and headsets, Deterministic, Empirical and Statistical Methods for propagation link computations.

Unit III	**Overview of Mobile and Cellular Radio Communication Modulation and Detection Techniques:**	**15 Hours**

Analog modulations and detection: AM, FM, PM, ACSB, Hybrid and Digital modulation: PCM, ASK, FSK, QPSK, QAM, MSK, etc, Coherent and noncoherent detection, C/N, S/N, Eb/No and BER relations, Probability concepts, Mobile Radio links parameters.

Unit IV	**Overview of Multiple Accesses Techniques**	**12 Hours**

Simplex, Duplex TDD and Time Division Duplex, Time division multiple access (TDMA) FDMA and OFDM, Code Division multiple access (CDMA), Hybrid multiple access, Management of voice, Data and Video (Multimedia) information.

Unit V	**Modern Digital Radio Systems**	**10 Hours**

standards, proposals and comparisons GSM (Europe and all over the world) - TDMA, IS-54 (U.S.A.)- TDMA, IS-95 (U.S.A., Korea) CDMA-, PHS (Japan) - TDMA, Frequency Hopping (FH) (U.S.A.) - CDMA, PCS, PCS Cordless telephone 2nd generation (CT-2), Cellular digital packet data (CDPD), and Wireless LAN, New standard trends Edge, 3rd and 4th generation beginning, LTE,

Unit VI	**Mitigation Techniques for Mobile System**	**4 Hours**

Overview of Natural and manmade external noise sources, Radiation hazards effects from base stations, Mobile and portable equipments.

Unit VII	**Diversity Techniques for Mobile Radio Systems**	**4 Hours**

Dispersive channels, Space diversity, Frequency diversity, Equalizer techniques

Pedagogy

Lectures/Experiential Learning

Course Outcome

Students will

- understand the design, specifications and the performances of various wireless communication systems
- Apply the cellular concepts to evaluate the signal reception performance in a cellular network.
- Apply the traffic analysis to design cellular network with given quality of service constraints.
- Determine the appropriate model of wireless fading channel based on the system parameters and the property of the wireless medium.
- Analyze and design receiver and transmitter diversity techniques.

References/Readings

1. Steele, R., Hanzo, L., "Mobile Radio Communication" 3rd Edition Wiley 2005.

2. Rappaport, T.S., "Wireless Communications: Principles And Practice, 2/E,Pearson

3. Wireless Communications (WIRELESS COMMUNICATIONS, 2ND ED, Molisch A F),Wiley

Course Code: ELC 104
Course Title: ELECTRONICS PRACTICALS – I

Number of Credits: 04	**Total Hours: 60**	**Total Marks: 100**

Prerequisites for the course

Should have studied graduate level basic level electronic subject. It is assumed that students have a working knowledge of passive and active components and digital circuits.

Objectives of Course

This course is intended to:

- Give the hands-on experience to design the basic digital and analog circuits
- Simulate the various digital modulation techniques and data correction and detection used in general communication system.
- Expose students to design digital circuits using microwind.
- Implement numerical algorithm.

Course Content

Practical Title	**120 Hours**

Unit I

1. Design of counters for digital clock (using Microwind s/w)
2. Multiplexer and Demultiplexer (using Microwind s/w)
3. Encoder and Decoder (using Microwind s/w)
4. 2nd order Butter-worth Notch Filter (p-Spice)
5. Buffer design using SPICE (p-Spice)
6. Memory design using 6T cell

Unit II

7. Design of variable voltage supply @ 2 Amps.
8. Design of Function Generator.
9. Design of Power Amplifier 10 Watts.
10. Design of Stepper driver using Monoshot& 555 Timer.
11. Design of S/C circuit for Strain gauge /Glucose strip @ 3.3V.
12. Design of 4-bit UP-DOWN Counter.

Unit III

13. Implementation of MSK modulation and demodulation.
14. ASK, FSK, QPSK modulation & demodulation.
15. QPSK, modulation & demodulation
16. DS-CDMA simulation.
17. Channel Coding methods. a. Convolution b. Block code
18. Error detection and correction Algorithm
    a. CRC
    b. Hamming code

Unit IV

19. Numerical Programming 1 (Trapezoid method)
20. Numerical Programming 2 (Bisection method)
21. Numerical Programming 3 (Runge Kutta method)
22. Numerical Programming 4 (Newton Raphson method)
23. Numerical Programming 5 (Regula falsi method)
24. Numerical Programming 6 (Secant method)

Pedagogy

Presentations /assignments/Experiential learning

Course Outcome

The Students will :

- learn the basics of a communication system for modulation, data coding , error coding channel coding methods.
- Design signal conditioning and VLSI circuits for various applications.

Course Code: ELO101
Course Title: Numerical Computation and Algorithms

Number of Credits: 04 **Total Hours: 60** **otal Marks: 100**

Prerequisites for the course

Students should have a knowledge of programming

Objectives of Course

The course is intended to,

- **Develop the basic understanding of numerical computation and algorithm.**
- **Develop skills to implement algorithms to solve mathematical problems on the computer and Data Bases.**

Course Content

Unit I	**Computer Programming**	**8 Hours**

Introduction to Algorithms, Elements of Computer Programming language, Basics of algorithm
design, general model, Dynamic programming model, principle of optimality, backtracking models.

Unit II	**Data Structures**	**12 Hours**

Introduction to Data Structures, Vectors and Lists, Stack, Queue, Binary Trees, Graphs, Hashing.

Unit III	**Theory of Numerical programming**	**25 Hours**

Numerical Integration: Theory of numerical errors, Trapezoidal & Simpsons rule, Romberg method, Improper integrals;
Numerical Solution of linear equations: Gauss-Jordon elimination and Lu decomposition;
Numerical Solutions of nonlinear equations: Bracketting, bisection, Secant & Regula falsi method, Newton Raphson method;
Numerical Solutions to Ordinary differential equations: Runge-Kutta method, Modified midpoint method, Richardson extrapolation.

Unit IV	**Database**	**15 Hours**

Basic Concepts, Relational Data Model, Database Design, DBMS storage structures and access methods, Query Processing, Transaction Processing, Security & Integrity, Distributed Databases, Client Server Computing

Pedagogy

lectures/ Experiential Learning

Course Outcome

The students will:

- Use numerical methods for solving a problem, locate and use good mathematical software to achieve the required accuracy for a particular application, get the accuracy you need from the computer, assess the reliability of the numerical results.
- Solve a linear system of equations using an appropriate numerical method.
- Use data structures like Lists, Stack, Queue, Binary Trees.

References/Readings

1. Data structures using C and C++ by YedidyahLangsam, Moshe J Augenstein, Aaron M Tenenbaum, Prentice Hall of India, 1995
2. Data Abstraction and Problem solving in Java by Frank M Carrano, Janet J Prichard ,Addison-Wesley, 2001
3. Numerical Recipes in C, William H. Press, Brain P. Flannery, William T. Vetterling, Saul A. Teulosky, Cambridge University Press, 1990.
4. Numerical Mathematical Analysis, J. B. Scarborough, Oxford and IBM Publishing Company (1979).
5. Numerical Recipes in C: The Art of Scientific Computing by William H Press, Brian P Flannery, Saul A Teukolsky - Mathematics – 1992.
6. Fundamentals of Database Systems, 4th Edition by R Elmasri, S Navathe Addison-Wesley, 2003

Course Code: ELO 102
Course Title: EDA Tools

Number of Credits: 04	**Total Hours: 60**	**Total Marks: 100**

Prerequisites for the course

Should have studied Digital Communication Systems

Objectives of Course

This course is intended to:

- Familiarize the students with industry oriented EDA tools.
- Teach Quartus, ISE compilations and programming and its use for design and analysis.
- Enable the student to extract various design parameters from simulation results.

Course Content

Study of JTAG, Modelsim Syntax study.

1. Study of Phases of Quartus compilations.
2. Study of phases of ISE compilations
3. Testing logic using ChipScope-I.
4. Testing logic using ChipScope-II
5. Parallel implementation of CRC.
6. Serial implementation of CRC.
7. FIFO implementation
8. Pulse stretcher
9. Test bench using Modelsim-I
10. Test bench using Modelsim-I
11. Test bench using Modelsim-I
12. Test bench using Modelsim-I

Pedagogy

Lectures/FLIPPED CLASSROOM/Experiential Learning

Course Outcome

The students will,

- Perform compilation using Quartus and ISE software.
- Analyse logic using Chipscope-I and II.
- Develop the Test benches using Modelsim-I

References/Readings

1. Design through Verilog HDL By T. R> Padmanabhan & Sundari. IEEE press, Wiley Interscience.
2. http://www.xilinx.com/itp/xilinx7/help/iseguide/html/ise_fpga_design_flow_overview.htm
3. Hands on experience on altera development board by J.S.Parab,etal: Springer Netherland 2018(ISBN 978-81-322-3769-3)

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SEMESTER II

Course Code: ELC 201
Course Title: EMBEDDED SYSTEMS DESIGNS

Number of Credits: 04	**Total Hours: 60**	**Total Marks: 100**

Prerequisites for the course

Should have studied microprocessor and C programming at graduate level

Objectives of Course

This course is intended to:

- Introduce with Architectures of Microcontroller and its programming with Interfacing various Interfaces is discussed in depth in this paper.
- Programming in assembly as well as in C for 8/16/32 bit controller

Course Content

Unit I	**Introduction to Controller Architecture**	**5 Hours**
Computer Architecture, RISC/CISC and Princeton Architectures		
Unit II	**Embedded system**	**5**
Definition, Basic Block, Designing of System, Applications		
Unit III	8-bit Micro controllers	**20**
Introduction to various 8-Bit microcontroller, 8051 features, Architecture , Memory organization, Instruction set, Interrupts, Timer/counter, LED, Switches, ADC, DAC, LCD Interfacing, Programming in Assembly and C,		
Unit IV	**16 bit microcontroller**	**15**
PIC controller Introduction, Architecture, Instruction set, Peripheral interfaces: LED, LCD, Serial RS232,Programming in C		
Unit V	**32-bit Microcontroller**	**15**
ARM architecture, THUMB/ARM instruction, ARM Exception Handling, Timers/Counters, UART, SPI, PWM, WDT, Input Capture, Output Compare Modes, I2C ,Instruction set, Programming in Assembly and C.		

Pedagogy

Lectures/Experiential Learning

Course Outcome

The students will:

- Students will learn the architecture of 8051,PIC and ARM .
- students will write an assembly and C program for 8051,PIC and ARM .
- students will write an assembly and C program for
- Students will be able to develop their own embedded platform using 8051, PIC and ARM

References/Readings

1. JivanParabetal., Exploring C for microcontroller (Springer 2007)
2. Lipovski G. J. Single and multiple Chip Microcontroller interfacing. Prentice Hall, USA 1998.
3. Beginning Android 4 Application Development
4. Professional Android 4 Application Development

Learning Android Game Programming : A Hands-On Guide to Building Your First Android Game 1st Edition

5 .Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand,StamatisKarnouskos, David Boyle, **"**From Machine-to-Machine to theInternet of Things: Introduction to a New Age of Intelligence**",** 1st Edition, Academic Press, 2014.

6. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet ofThings", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer

7. Vijay Madisetti and ArshdeepBahga, **"**Internet of Things (A Hands-onApproach)**",** 1st Edition, VPT, 2014.

Course Code: ELC 202
Course Title: Real Time Operating System

Number of Credits: 04	**Total Hours: 60**	**Total Marks: 100**

Prerequisites for the course

Should have studied microprocessor and C programming at graduate level

Objectives of Course

This course is intended to:

- To focus on concept of highlighting the various methods of improvising speed of computing machine through the operating system organization and various entity managements.
- To analyse the small embedded system developments through the Real Time Operating Systems for task management efficiency.
- Porting RTOS on embedded platform

Course Content

Unit I	**Introduction to Computer Organization and Architecture**	**7 Hours**
hardware vs. software -the virtual machine concept, the concept of von Neumann architecture, hardware components and functions, trends in hardware development, system configurations and classifications.		
Unit II	**Process Description and Control:**	**6**
Processes, process states, processor modes, context switching, CPU scheduling algorithms, threads		
Unit III	Concurrency Control:	**6**
Concurrent processes, critical section problem and solutions, mutual exclusion solution requirements, semaphores and monitors.		
Unit IV	**Deadlocks:**	**6**
Characterization, detection and recovery, avoidance, prevention		
Unit V	**Inter Process Communication**	**7**
classical IPC problems and solutions, IPC techniques.		
Unit VI	The Input/Output and File Subsystem:	**7**
I/O devices, controllers and channels, bus structures, 1/0 techniques (programmed, interrupt-driven and DMA), I/O subsystem layers. Concepts of files and directories, issues and		

techniques for efficient storage and access of data. I/O and file system support for graphics, multimedia, databases, transaction processing and networking.		
Unit VII	**The Memory Subsystem**	**7**
Memory types and hierarchy, module level Organization, cache memory. Memory partitioning, swapping, paging, segmentation, virtual memory.		
Unit VIII	**The Central Processing Unit**	**7**
CPU components, register sets, instruction cycles, addressing modes, instruction sets, the concept of micro-programming, Basics of RISC approach, pipelined and super-scalar approaches, vector processors and parallel processors, hardware support for the OS.		
Unit IX	**µCOS case study**	**8**

Pedagogy
Lectures/Experiential Learning
Course Outcome
The Student Will: ● Generalize the understanding of the computing machine and various entities associated with the enhancement of the efficiency. ● Handle the operating system management process, memory, I/O, Secondary Disk and organizations of various. ● Handle any operating system for process and task managements if follows the documentations of the same.
References/Readings
1.Operating system principles, 3rd Edition,by Willian Stallings –PHI(1998) 2. Operating system concepts by Silberchatz and Galvin - Addisionwesley 3. Operating system by Tanaumbuam, PHI New Delhi

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Course Code: ELC 203
Course Title: Digital System Design

Number of Credits: 04	**Total Hours: 60**	**Total Marks: 100**

Prerequisites for the course

Should have studied digital electronics at the graduate level

Objectives of Course

This course is intended to,

- Teach principles of combination and sequential logic design
- Develop implementation skills using hardware description languages.
- Teach and familiarize with industry technologies such as Memory, CPLDS, FPGA.

Course Content

Unit I	**Introduction**	**6 Hours**

About Digital Design, Analog versus Digital, Electronic Aspects of Digital Design, PLD's, ASIC, Digital Design level. Digital Concept and Number System: General Positional number system conversions, Operation, BCD, Gray Code,Character Codes, Codes for Actions, Conditions, and States nCubes and Distance, Codes for Detecting and Correcting Errors, Error-Detecting Codes, Error-Correcting and Multiple Error-Detecting Codes, Hamming Codes, CRC Codes, Two Dimensional Codes, Checksum Codes, m-out-of-n Codes, Codes for Serial Data Transmission and Storage, Parallel and Serial Data, Serial Line Codes

Unit II	**Combinational Logic Design Principles**	**4 Hours**

Switching Algebra, Combinational-Circuit Analysis, Combinational-Circuit Synthesis, and Timing Hazards.

Unit III	**Hardware Description Languages**	**4 Hours**

HDL-Based Digital Design, The VHDL Hardware Description Language, The Verilog Hardware Description Language

Unit IV	**Combinational Logic Design Practices**	**4 Hours**

Documentation Standards, Circuit Timing, Combinational PLDs, Decoders, Encoders, Three-State Devices , Multiplexers, Exclusive-OR Gates and Parity Circuits , Comparators, Adders, Subtractors, and ALUs , Combinational Multipliers, Exclusive-OR Gates and Parity Circuits , Comparators, Adders, Subtractors, and ALUs , Combinational Multipliers.

Unit V	**Sequential Logic Design Principles & Practices**	**12 Hours**

Bistable Elements, Latches and Flip-Flops, Clocked Synchronous State-Machine Analysis, Clocked Synchronous State-Machine Design, Designing State Machines Using State Diagrams, State-Machine Synthesis Using Transition Lists, Another State-Machine Design Example, Decomposing State Machines, Feedback Sequential-Circuit Analysis, Feedback Sequential-Circuit Design, Features ,Sequential-Circuit Design with VHDL , Sequential- Circuit Design with Verilog, Sequential-Circuit Documentation Standards , Latches and Flip-Flops ,Sequential PLDs , Counters, Shift Registers, Iterative versus Sequential Circuits , Synchronous Design Methodology , Impediments to Synchronous Design , Synchronizer Failure and Metastability

Unit VI	**Memory, CPLDS**	**10 Hours**

Read-Only Memory, Read/Write Memory, Static RAM, Dynamic RAM, Complex Programmable Logic Device

Unit VII	**Field Programmale Gate Array**	**10 Hours**

Introduction, FPGA Architectures, Configuration: SRAM-Based FPGAs and Antifuse Permanently Programmed FPGAs, Chip I/O, Circuit Design of FPGA Fabrics, Architecture of FPGA Fabrics, FPGA Soft-core Processor Development flow.

VIII	Neural Networks on FPGA	10 Hours

Introduction, Designing a Neuron, Activation functions, Design of layers, Training and validations, Hardware verification, Case study using PYNQ/VITIS AI framework.

Pedagogy

lectures/ Experiential Learning

Course Outcome

The student will,

- Understand principles of combination and sequential logic design
- Leverage Hardware description languages for realization of combinational and sequential designs
- Understand the architecture of field programmable gate array.

References/Readings

1. Digital Design Principles and Practices, by John F. Wakerly, Prentice Hall's Fourth Edition.
2. Digital System Design using VHDL: Charles. H.Roth ; PWS (1998)
3. Scott Hauck and Andre DeHon , Reconfigurable Computing, Morgan Kaufmann, 2008
4. Srinivas Devadas, Abhijit Ghosh, and Kurt Keutzer, "Logic Synthesis," McGraw-Hill, USA, 1994.
5. Neil Weste and K. Eshragian,"Principles of CMOS VLSI Design: A System Perspective,2nd edition, Pearson Education, 2000.
6. Kevin Skahill, "VHDL for Programmable Logic," Pearson Education, 2000. M.N.O. Sadiku, Elements of Electromagnetics 2nd Edition) , Oxford University press, 1995.

Course Code: ELC 204
Course Title: ELECTRONICS PRACTICALS – II

Number of Credits: 04 **Total Hours: 120** **Total Marks: 100**

Prerequisites for the course

Should have studied microcontrollers, embedded system, OS and EDA tools

Objectives of Course

This course is intended to,

- Develop skills in handling controllers like 89C51/52, PIC and ARM controller derivatives .
- Input Output operation, Various communication interfaces, data acquisition, task management and Robotic applications.
- Cover experiments using LabVIEW with MyRIO and NI ELVIS Platform

Course Content

Practical Title	120 Hours

Unit I

1. 7-segment Interfacing to ATMEL 89C52 (BCD counter)
2. Display Temperature using ATMEL 89C52 on LCD
3. Obstacle Avoidance using 89V52 based Robot
4. Serial Transmission and reception PIC16F877
5. Configuring On – chip ADC PIC16F877
6. Hex Keypad Interfaced to ARM controller & display on LCD

Unit II

7. Switching of LED using μ - COS
8. Switching of LED using RTX
9. Switching of LED using FPGA
10. KEY pad and ADC interfacing using RTOS
11. Shell programming – Web Application.
12. Shell programming – System Management

Unit III

13. VHDL implementation for the Multiplexer & Demultiplexer
14. VHDL Implementation for Encoder & Decoder
15. VHDL implementation for the Counter.
16. LCD and 7 -segment Interfacing using DE2 board
17. UART Interface using DE2 board
18. Echo & Reverberation implementation on speedy33 kit(lab view)

Unit IV

19. Automated Street lighting
20. Smart Irrigation System
21. Home Automation
22. Smart water monitoring system
23. Surveillance System
24. Smart Parking System

Unit V

25. Switch basic setup
26. Virtual LAN
27. Spanning tree protocol
28. Routing
29. DHCP (Dynamic Host Configuration Protocol)
30. Switch stacking

Pedagogy

Presentations /Experiential Learning/laboratory design and implementation

Course Outcome

The Students will be,

- Able to analyze the architectures of any controller.
- Designs application using embedded system using tasks for real time applications.
- Handle any computing machine using shell script for computing and management.
- Develop and design some applications based on SPEEDY 33 using LABView , NI ELVIS , MYRio, Altera DE2 Board.
- Develop an android app.

References/Readings

1. Digital Design Principles and Practices, by John F. Wakerly, Prentice Hall's Fourth Edition.Lipovski G. J. Single and multiple Chip Microcontroller interfacing. Prentice Hall, USA 1998.

2. Beginning Android 4 Application Development
3. Professional Android 4 Application Development
4. Learning Android Game Programming : A Hands-On Guide to Building Your First Android Game 1st Edition

Course Code: ELO 201
Course Title: Internet of Things

Number of Credits: 04	**Total Hours: 60**	**Total Marks: 100**

Prerequisites for the course

Students should know the basic knowledge about passive electrical and electronics components, and programming

Objectives of Course

This course is intended to:

- Introduce the fundamentals of Internet of Things and its building blocks along with their characteristics.
- understand the protocols and standards designed for IoT and the current research on it.
- know the other associated technologies like cloud and fog computing in the domain of IoT.
- provide the recent application domains of IoT in everyday life.

Course Content

Unit I	**Introduction**	**05 Hours**
Evolution, Addressing strategies, Sensing and Actuation -Type, Characteristics, Processing topologies and types		
Unit II	**IOT Networking**	**10 Hours**
Basics of Networking, Networking Components, Connectivity Protocol: 6LoWPAN and RFID, Data Protocol – MQTT, SMQTT, CoAP, XMPP and AMQP, Communication protocols – IEEE 802.15.4, Zigbee, HART & Wireless HART, NFC, Bluetooth, Z-wave and ISA 100.11A		
Unit III	**Sensing Network**	**15 Hours**
Wireless Sensor Networks, Sensor nodes, Sensor web, Node Behavior in WSNs, Applications of WSNs, Coverage of WSNs, Stationary and Mobile Wireless Sensor Network, UAV Network, Flying Ad Hoc Network, Interoperability		
Unit IV	**Software Defined Networking**	**10 Hours**
Basic concept, SDN architecture, SDN in IOT, Software Defined WSN, SDN for Mobile Networking		
Unit V	**Cloud and Fog Computing**	**10 Hours**
Cloud Computing: Fundamentals, Components & Characteristics, Architecture, Service Models, Cloud types, Service Management & Security and Sensor Cloud, Fog Computing: Fog nodes, Architecture, Fog Computing in IOT and Application		
Unit VI	**IOT case studies and Future Trends**	**05 Hours**
Smart Cities and Smart Homes, Connected Vehicles, Smart Grid, Industrial IOT, Agriculture, Healthcare, Paradigms, Challenges and the future.		
Unit VII	**Hands-on**	**05 Hours**
Integration of sensors and actuators with Ardunio, Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IOT with Raspberry Pi		

Pedagogy

Lectures/Experiential Learning

Course Outcome

On completion of the course, students will be able to:

1. Explain the of IOT enabling components, such as sensors, connectivity protocols, and communication protocols.
2. Describe the IOT architecture and its component details.
3. Explain the associated technologies including cloud computing, fog computing and its applications.
4. Gain practical knowledge about the integration of sensor and actuators, coding structure, and implementation of IOT in various applications.

References/Readings

1. S. Misra, A. Mukherjee, and A. Roy, 'Introduction to IoT', Cambridge University Press.
2. S. Misra, C. Roy, and A. Mukherjee, 'Introduction to Industrial Internet of Things and Industry 4.0', CRC Press.
3. Pethuru Raj and Anupama C. Raman, 'The Internet of Things: Enabling Technologies', Platforms, and Use Cases", CRC Press.
4. ArshdeepBahga and Vijay Madisetti, 'Internet of Things: A Hands-on Approach', Universities Press.

Course Code: ELO 202
Course Title: Switching and Routing

Number of Credits: 04	**Total Hours: 60**	**Total Marks: 100**

Prerequisites for the course

Students should know the basic knowledge about network, basic terminologies and security at graduate level

Objectives of Course

This course is intended to:

- Introduce the student to the broader understanding of computer networks
- Cover Extensive learning in switching and routing technologies.
- Comprehensive understanding in LAN switching environment.

Course Content

Unit I	**Computer Networking**	**05 Hours**
Introduction, Network Components, Network types: LAN, PAN, MAN & WAN, Connection type: Point-to-point & Point-to-multipoint, Physical Topology: Star, Mesh, Bus and Ring, Data Communication		
Unit II	**Network Models**	**10 Hours**
OSI Model, TCP/IP Model, OSI and TCP/IP model comparison, Critique of OSI and TCP/IP model, Internet and Internet Architecture		
Unit III	**IP Addressing and Subnets**	**15 Hours**
IP Addressing: Composition, Types & Classes, Private and Public IP addresses, Subnetting, Variable Length Subnet Masks (VLSM), Troubleshooting IP addressing		
Unit IV	**Switching and Spanning Tree Protocol**	**15 Hours**
Switching and Switches, Switch Operation, Virtual Local Area Network (VLAN) and VLAN Trunding Protocol (VTP), Spanning Tree Protocol (STP), Switch Stacking, Network Address Translation (NAT)		
Unit V	**Routing**	**10 Hours**
IP Routing, Types, Classes of Routing, Distance Vector Routing Protocol (DVRP), Routing Information Protocol (RIP)		
Unit VI	**Network Security**	**05 Hours**
Cryptography, Digital Signatures, Communication Security, Web Security, Virtual Private Network (VPN),		

Pedagogy

Lectures/Experiential Learning

Course Outcome

The students will:

- Explain in detail the concepts of Computer networking, OSI and TCP/IP model architecture along with the comparison.
- Gain the knowledge about the Switching and Routing
- Understand the basic device configuration and troubleshooting.
- Explain the Network security principles and its applications

References/Readings

1. Andrew S.Tanenbaum, 'Computer Networks', 3rd Edition, Prentice Hall.
2. James F. Kurose and Keith W. Ross, 'Computer Networking: A Top-Down Approach', 7th Edition, Pearson Education.
3. D-Link Certified, DCS Switching Training Guide.

4. D-Link Certified, DCS Switching Lab Manual
5. Cisco Certified Network Associate Training Guide

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Annexure II

B. Voc. in Electronics, Instrumentation and Computer Networking
Course Structure

NSQF Level 4: Certificate in Electronics, Instrumentation and Computer Networking (Semester I)
Job Role:Field Technician
Course Outcome: Field Technician provides after sale support services to customers, typically, at their premises. The individual at work is responsible for attending to customer complaints, installing newly purchased appliances and basic troubleshooting.

NSQF Level / Semester	Course Code	Course Title		Course Credits	Contact Hours		Evaluation Scheme		
Level 4 / Semester I	**General component**					**ISA**	**SEA**	**Practical**	**Total**
	EIGC 101	**Communication Skills- I**	**Theory**	3	42	15	60	-	75 Marks
	EIGC 102	**Aptitude Training**	**Theory**	3	42	15	60	-	75 Marks
	EIGC 103	**Fundamentals of Computer**	**Theory**	3	42	15	60	-	75 Marks
	EIGC 104	**Fundamentals of Computer Lab**	**Lab**	3	84	-	-	75	75 Marks
	Skill component								
	EISC 101	**Basic Electrical and Electronics**	**Theory**	3	42	75 Marks			
	EISC 102	**Basic Electrical and Electronics Lab**	**Lab**	3	84	75 Marks			
	EISC 103	**Maintenance and Repair of Home Appliances- I**	**Theory**	3	42	75 Marks			
	EISC 104	**Maintenance and Repair of Home Appliances- I Lab**	**Lab**	3	84	75 Marks			
	EISC 105	**Computer Networking- I**	**Theory**	3	42	75 Marks			
	EISC 106	**Computer Networking- I Lab**	**Lab**	3	84	75 Marks			
	EISC 107	**Basics of Troubleshooting**	**Theory**	3	42	75 Marks			
	EISC 108	**Basics of Troubleshooting Lab**	**Lab**	3	84	75 Marks			

General Education: 12 Credits, 210 Hours and 300 Marks
Skill Development: 18 Credits, 378 Hours and 450 Marks
Total: 30 Credits, 588 Hours and 750 Marks.

NSQF Level 5: Diploma inElectronics, Instrumentation and Computer Networking(Semester II)
Job Role: Service Technician
Course Outcome: The individual at work is responsible for attending to customer complaints, installing newly purchased appliances, troubleshooting system problems and, configuring hardware equipment and related networking devices.He/she identifies the minor problem and recommends factory repairs for major faults.

NSQF Level / Semester	Course Code	Course Title		Course Credits	Contact Hours		Evaluation Scheme		
	General component					**ISA**	**SEA**	**Practical**	**Total**
Level 5 / Semester II	**EIGC 201**	**Fundamentals of IT**	**Theory**	3	42	15	60	-	75 Marks
	EIGC 202	**Communication Skills- II**	**Theory**	3	42	15	60	-	75 Marks
	EIGC 203	**Computer Maintenance and Troubleshooting-Hardware**	**Theory**	3	42	15	60	-	75 Marks
	EIGC 204	**Computer Maintenance and Troubleshooting- Hardware Lab**	**Lab**	3	84	-	-	75	75 Marks
	Skill component								
	EISC 201	**Analog Electronics**	**Theory**	3	42	75 Marks			
	EISC 202	**Analog Electronics Lab**	**Lab**	3	84	75 Marks			
	EISC 203	**Maintenance and Repair of Home Appliances- II**	**Theory**	3	42	75 Marks			
	EISC 204	**Maintenance and Repair of Home Appliances- II Lab**	**Lab**	3	84	75 Marks			
	EISC 205	**Computer Networking- II**	**Theory**	3	42	75 Marks			
	EISC 206	**Computer Networking- II Lab**	**Lab**	3	84	75 Marks			
	EISC 207	**Sensors and Transducers**	**Theory**	3	42	75 Marks			
	EISC 208	**Sensors and Transducers Lab**	**Lab**	3	84	75 Marks			

General Education: 12 Credits, 210 Hours and 300 Marks
Skill Development: 18 Credits, 378 Hours and 450 Marks
Total: 30 Credits, 588 Hours and 750 Marks.

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NSQF Level 6: **Advanced Diploma in Electronics, Instrumentation and Computer Networking(Semester III & IV)**
Job Role: Senior Technician
Course Outcome: The Senior Technician is responsible for managing the Electronic/Computer Hardware and related software systems either at customer's premises or remotely.He/she will be able to handle general laboratory and Industrial instruments.The jobholder also interacts with customers to install the appliance like refrigerator, air conditioner and diagnose problems to assess possible causes of malfunction.Once a problem is identified, the technician rectifies the minor problem or replaces faulty modules for failed parts or recommends factory repair for major faults.

NSQF Level / Semester	Course Code	Course Title		Course Credits	Contact Hours		Evaluation Scheme		
Level 6 / Semester III	**General component**					**ISA**	**SEA**	**Practical**	**Total**
	EIGC 301	**General Instrumentation**	**Theory**	3	42	15	60	-	75 Marks
	EIGC 302	**Communication Skills- III**	**Theory**	3	42	15	60	-	75 Marks
	EIGC 303	**Computer Maintenance and Troubleshooting- Software**	**Theory**	3	42	15	60	-	75 Marks
	EIGC 304	**Computer Maintenance and Troubleshooting- Software Lab**	**Lab**	3	84	-	-	75	75 Marks
	Skill component								
	EISC 301	**Digital Electronics- I**	**Theory**	3	42	75 Marks			
	EISC 302	**Digital Electronics- I Lab**	**Lab**	3	84	75 Marks			
	EISC 303	**Refrigeration and Air Conditioning**	**Theory**	3	42	75 Marks			
	EISC 304	**Refrigeration and Air ConditioningLab**	**Lab**	3	84	75 Marks			
	EISC 305	**Computer Networking- III**	**Theory**	3	42	75 Marks			
	EISC 306	**Computer Networking- III Lab**	**Lab**	3	84	75 Marks			
	EISC 307	**Power Electronics**	**Theory**	3	42	75 Marks			
	EISC 308	**Power Electronics Lab**	**Lab**	3	84	75 Marks			

General Education: 12 Credits, 210 Hours and 300 Marks
Skill Development: 18 Credits, 378 Hours and 450 Marks
Total: 30 Credits, 588 Hours and 750 Marks.

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NSQF Level 6: **Advanced Diploma in Electronics, Instrumentation and Computer Networking (Semester III & IV)**
Job Role: Senior Technician
Course Outcome: The Senior Technician is responsible for managing the Electronic/Computer Hardware and related software systems either at customer's premises or remotely. He/she will be able to handle general laboratory and Industrial instruments. The jobholder also interacts with customers to install the appliance like refrigerator, air conditioner and diagnose problems to assess possible causes of malfunction. Once a problem is identified, the technician rectifies the minor problem or replaces faulty modules for failed parts or recommends factory repair for major faults.

NSQF Level / Semester	Course Code	Course Title		Course Credits	Contact Hours		Evaluation Scheme		
	General component					**ISA**	**SEA**	**Practical**	**Total**
	EIGC 401	**Environmental Studies**	**Theory**	3	42	15	60	-	75 Marks
	EIGC 402	**Communication Skills- IV**	**Theory**	3	42	15	60	-	75 Marks
	EIGC 403	**Computer Peripherals and Troubleshooting**	**Theory**	3	42	15	60	-	75 Marks
	EIGC 404	**Computer Peripherals and Troubleshooting Lab**	**Lab**	3	84	-	-	75	75 Marks
Level 6/ Semester IV	**Skill component**								
	EISC 401	**Digital Electronics- II**	**Theory**	3	42	75 Marks			
	EISC 402	**Digital Electronics- II Lab**	**Lab**	3	84	75 Marks			
	EISC 403	**Industrial Instruments**	**Theory**	3	42	75 Marks			
	EISC 404	**Industrial InstrumentsLab**	**Lab**	3	84	75 Marks			
	EISC 405	**Computer Networking- IV**	**Theory**	3	42	75 Marks			
	EISC 406	**Computer Networking- IV Lab**	**Lab**	3	84	75 Marks			
	EISC 407	**Laboratory Instruments**	**Theory**	3	42	75 Marks			
	EISC 408	**Laboratory Instruments Lab**	**Lab**	3	84	75 Marks			

General Education: 12 Credits, 210 Hours and 300 Marks
Skill Development: 18 Credits, 378 Hours and 450 Marks
Total: 30 Credits, 588 Hours and 750 Marks.

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X AC- 9 (Special)
30.07.2022

NSQF Level 7: B. Voc. Degree in Electronics, Instrumentation and Computer Networking(Semester V & VI)
Job Role: System Administrator
Course Outcome: The System administrator is responsible to determine an organization's system needs, make needed upgrades and repairs to ensure that systems are operating correctly, Evaluate and optimize network or system performance, Interpret and solve problems when a user or an automated monitoring system alerts them that a problem exists.

NSQF Level / Semester	Course Code	Course Title		Course Credits	Contact Hours		Evaluation Scheme		
	General Education					**ISA**	**SEA**	**Practical**	**Total**
	EIGC 501	**Basic Accounting**	**Theory**	3	42	15	60	-	75 Marks
	EIGC 502	**Value Education**	**Theory**	3	42	15	60	-	75 Marks
	EIGC 503	**Introduction to Multimedia Technology**	**Theory**	3	42	15	60	-	75 Marks
	EIGC 504	**Introduction to Multimedia Technology Lab**	**Lab**	3	84	-	-	75	75 Marks
	Skill component								
Level 7 / Semester V	**EISC 501**	**Microcontroller**	**Theory**	3	42	75 Marks			
	EISC 502	**Microcontroller Lab**	**Lab**	3	84	75 Marks			
	EISC 503	**Computer Programming**	**Theory**	3	42	75 Marks			
	EISC 504	**Computer ProgrammingLab**	**Lab**	3	84	75 Marks			
	EISC505	**Computer Networking- V**	**Theory**	3	42	75 Marks			
	EISC 506	**Computer Networking- V Lab**	**Lab**	3	84	75 Marks			
	EISC 507	**Operating Systems**	**Theory**	3	42	75 Marks			
	EISC 508	**Operating Systems Lab**	**Lab**	3	84	75 Marks			

General Education: 12 Credits, 210 Hours and 300 Marks
Skill Development: 18 Credits, 378 Hours and 450 Marks
Total: 30 Credits, 588 Hours and 750 Marks.

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X AC- 9 (Special)
30.07.2022

NSQF Level 7: B. Voc. Electronics, Instrumentation and Computer Networking(Semester V&Semester VI)
Job Role: System Administrator
Course Outcome: TheSystem administrator is responsible to determine an organization's system needs, make needed upgrades and repairs to ensure that systems are operating correctly, Evaluate and optimize network or system performance, Interpret and solve problems when a user or an automated monitoring system alerts them that a problem exists.

NSQF Level / Semester	Course Code	Course Title		Course Credits	Contact Hours	Evaluation Scheme			
Level 7 / Semester VI	**General component**					**ISA**	**SEA**	**Practical**	**Total**
	EIGC 601	**Entrepreneurship**	**Theory**	3	42	15	60	-	75 Marks
	EIGC 602	**Web Designing**	**Theory**	3	42	60	60	-	75 Marks
	EIGC 603	**Android Development**	**Theory**	3	42	15	60	-	75 Marks
	EIGC 604	**Android Development Lab**	**Lab**	3	84	-	-	75	75 Marks
	Skill component								
	EISC 601	**Robotics**	**Theory**	3	42	75 Marks			
	EISC 602	**Robotics Lab**	**Lab**	3	84	75 Marks			
	EISC 603	**Electric Vehicle and Battery Technology**	**Theory**	3	42	75 Marks			
	EISC 604	**Electric Vehicle and Battery Technology Lab**	**Lab**	3	84	75 Marks			
	EISC 605	**Internship/ON Job Training /project**	**-**	12	336	300 Marks			

General Education: 12 Credits, 210 Hours and 300 Marks
Skill Development: 18 Credits, 462 Hours and 450 Marks
Total: 30 Credits, 672 Hours and 750 Marks.

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Annexure III

B. Voc. in Electronics, Instrumentation and Computer Networking
Course Syllabus

Semester I

Course Code: EIGC 101 **Course Title: Communication skills-I**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Individual who want to develop or improve their skills for listening effectively within the workplace		
Objectives of Course		
To achieve successful receivers' role in communication through input of hearing		
Course Content		
Unit I	**Listening basics**	**10 Hours**
Introduction, Types of Listening. Traits Of Good Listener: Being Non-Evaluate, Paraphrasing, Reflecting Hidden Feelings, Inviting Further, Contributions, Responding Non-Verbally,Exercises		
Unit II	**Barriers to Communication-I: organizational**	**11 Hours**
Definition Of Noise, What Is Noise, Classification of Barriers, Information Overload, Exercises		
Unit III	**Barriers to Communication-II: human**	**11 Hours**
Intrapersonal Barriers: Wrong Assumptions, Varied Perceptions, Differing Backgrounds, Wrong Inferences, Impervious Categories, Categorical Thinking. Interpersonal Barriers: Limited Vocabulary, Incongruity of Verbal, And Nonverbal Messages, Emotional Outburst, Communication Selectivity, Cultural Variations, Poor Listening Skills, Noise in The Channel,Exercises		
Unit IV	**Effective Listening**	**10 Hours**
Active Versus Passive Listening: Paying Attention, Dealing with Distractions, Implications of Effective Listening, Exercises		
Pedagogy		
Lectures/Tutorial/Assignments/ Practice Sessions		
Course Outcome		
Challenges of Listening effectively and efficiently in workplaces will be overcome; since real-life example and strategies oriented to practical scenario are given		
References/Readings		
1. Technical-Communication-Principles-And-Practice: Meenakshi Raman, Sangeeta Sharma Oxford-University-Press-2004 2. The Zen of Listening- Mindful Communication in the Age of Distraction : Rebecca Z.Shafir 3. Powerful Listening. Powerful Influence - Work Better. Live Better. Love Better: Tim Hast 4. The Five Keys to Mindful Communication- Using Deep Listening and Mindful Speech to Strengthen Relationships, Heal Conflicts, and Accomplish Your Goals: Susan Gillis Chapman 5. Power Listening- Mastering the Most Critical Business Skill of All: Bernard T Ferrari 6. The Compassionate Connection-The Healing Power of Empathy and Mindful Listening : David Rakel 7. The Dynamics of Effective Listening: Tony Alessandra		

Course Code: EIGC 102

Course Title: Aptitude Training		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Interest to augment aptitude power		
Objectives of Course		
This course is intended to train students in ability to 1. Interpret different data 2. Establish relationship between numbers 3. Solve different logical problems 4. Perform Reasoning efficiently		
Course Content		
Unit I	**Data Analysis**	**10 Hours**
Data sufficiency, Measurement, Time and distance, Arithmetic, Relationship between numbers		
Unit II	**Data process**	**11 Hours**
Basic mathematical relations and formula, Computation, Data interpretation		
Unit III	**Solving**	**11 Hours**
Differences, Discrimination, Decision making, Judgment, Problem-solving, Analogies, Analysis		
Unit IV	**Reasoning**	**10 Hours**
Arithmetic reasoning, Relationship concept, Arithmetic number series, Similarities, Verbal and figureclassification, Space visualization, Observation		
Pedagogy		
Lectures/Tutorial/Assignments		
Course Outcome		
At the end of the course the students will be able to: 1. Interpret different data 2. Establish relationship between numbers 3. Solve different logical problems 4. Perform Reasoning efficiently		
References/Readings		
1. How to Prepare for Data Interpretation for the CAT by Arun Sharma. 2. Modern Approach to Verbal & Non-Verbal Reasoning by R.S Aggarwal. 3. A New Approach to Reasoning Verbal & Non-Verbal by B.S. Sijwalii 4. Verbal Reasoning by Bhupendra Kumar Singh 5. How to Prepare for Logical Reasoning for the CAT by Arun Sharma 6. Logical and Analytical Reasoning by A.K. Gupta 7. How to Crack Test of Reasoning by Jaikishan and Premkishan 8. R.S. Aggarwal - Quantitative Aptitude for Competitive Examinations. 9. Arun Sharma - Quantitative Aptitude for CAT. 10. Arihant Publications - Fast Track Objective Arithmetic. 11. The Pearson Guide To Quantitative Aptitude For Competitive Examination by **Dinesh Khattar**		

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Course Code: EIGC 103 **Course Title: Fundamentals of Computer**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**

Prerequisites for the course

Student should be English literate

Objectives of Course

1. To understand fundamentally the general scope of the computer system
2. To interact effectively with the computer
3. To know the computer peripherals
4. To manage the storage fundamentals
5. To know the basics of Operating System
6. To know some basic PC Specifications

Course Content

Unit I	**Introduction to Computers**	**2 Hours**

Introduction, Definition, .Characteristics of computer, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Classification Of Computers, Applications of Computer, Capabilities and limitations of computer.

Unit II	**Computer Peripherals: Internal Components**	**8 Hours**

IDE and SATA Devices: Hard Disk Drive and CD/DVDs Drives, Floppy Disk, Zip Drive, Backup Drive. Expansion Cards: LAN Card, IDE Card , VGA and SVGA Cards, Sound Card, Interface Cards, I/O cards, Video Cards, USB Card, Fire-Wire Cards, Internal Ports, Cables and Connector Types.

Unit III	**Computer Peripherals: External Components**	**8 Hours**

Monitors: CRT, LCD and LED Displays. Printers: Dot-Matrix Printer, Inkjet Printer, Laser Printer Scanner: Photo Scanner, Documents Scanner, Bar Cord Scanner. Keyboards, Mouse, External Modem, Ports and Connectors, Batteries, Power supply, Pen Drives, SCSI interface devices, Laptop Computers, Digital Advance storage technology.

Unit III	**Storage Fundamentals**	**8 Hours**

Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAMROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives.

Unit V	**Operating System Basics**	**8 Hours**

Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, Multiprogramming, Multi-Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.

Unit VI	**PC Specifications**	**8 Hours**

CPU: Generation, core, threads, RAM, Storage, System type OS Specifications, Ports available, Battery specifications, Comparison of Competitive brands

Pedagogy

Lectures/Tutorial/Assignments

Course Outcome

On completion of the course, students will be able to:

1. Bridge the fundamental concepts of computers with the present level of knowledge of the students
2. Familiarise with operating systems, programming languages, peripheral devices.
3. Understand storage fundamentals

References/Readings

1. Reema Thareja, Fundamentals of Computers.
2. V. Rajaraman, 6th Edition Fundamentals of Computers, NeeharikaAdabala.
3. Anita Goel, Computer Fundamentals.
4. Deborah Morley and Charles S. Parker; Fundamentals of Computers; Cengage Learning, India edition; 2009.

5. Alexis Leon and Mathews Leon; Fundamentals of Information Technology; Vikas Publication, Chennai.
6. Peter Nortons- Introduction to Computers, Sixth Edition, Published by Tata McGraw Hill
7. P K Sinha &Priti Sinha – Computer Fundamentals , Fourth Edition, BPB Publications.
8. Fundamentals of Computers, V Rajaraman 6th edition PHI Learning Private Limited 2014
9. Nasib Singh Gill: Handbook of Computer Fundamentals, Khanna Books Publishing Co.(P) Ltd., New Delhi, 2016.
10. Data communications and Networking, Behrouz A Forouzan, Tata Mc Graw-Hill 5th edition, 2013

Course Code: EIGC 104
Course Title: Fundamentals of Computer Lab

Number of Credits: 03	**Total Hours: 84**	**Total Marks: 75**

Prerequisites for the course

Computer Basic Theory

Objectives of Course

1. This course is intended to introduce to students into the basics of computer – concepts, theory.
2. To interact effectively with the computer
3. To know the Operating system basics
4. To know the computer peripherals
5. To manage the storage fundamentals
6. To know some basic PC Specifications

Lab Content

Exp.1 : Understanding different components of PC.
Exp.2 : Dismantling and reconnecting components of PC.
Exp.3 : Identify the internal and external hardware/peripheral components
Exp.4 : Introduction to DOS.
Exp.5 : Familiarisation with operating system along with file management commands like create, copy, move, delete and rename files and folders.
Exp.6 : Introduction to Linux.
Exp.7 : Installation of Windows OS.
Exp.8 : Implementation of Memory Partitioning.
Exp.9 : Explore Control Panel.
Exp.10 : Explore Windows Tools / Applications.
Exp.11 : To understand different Computer Peripherals.
Exp.12 : Demonstrate the usage of various storage devices (data copying, CD/DVD burning)

Pedagogy

Experiments

Course Outcome

On completion of the course, students will be able to:
1. Identify different PC Components and their connection
2. Understand basic concepts of different OS
3. Use different system utilities
4. Know computer peripherals

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Course Code: EISC 101
Course Title: Basic Electrical and Electronics

Number of Credits: 03 **Total Hours: 42** **Total Marks: 75**

Prerequisites for the course

Should have basic knowledge of current, voltage concept, AC and DC voltage.

Objectives of Course

This course is intended to introduce to students into the basics of electrical circuits, concepts, theory The electrical experiments give a student hands-on experience to design the basic.

Course Content

Unit I	**Basic Electrical concepts**	**5 Hours**

Concept of electric charge, potential difference, current and voltage, AC source and DC source, measuring circuit voltage and current using voltmeters and ammeters positive cycle, negative cycle, Frequency, Single phase and Three phase supply, grounding.

Unit II	**Introduction to Resistors**	**8 Hours**

Resistor, different types of resistors, colour coding of resistors, tolerance value, Wattage of resistors, series and parallel concept, Ohms law.

Unit III	**Introduction- Capacitor- Capacitance and Resonance circuits**	**8 Hours**

Working principle of capacitors, dielectric constant, capacitive reactance, types of Capacitors, measuring capacitance and capacitive reactance, series and parallel, resonance

Unit IV	**Introduction to Inductor and Inductance**	**8 Hours**

Definition of inductance, types, Inductive reactance, measuring inductance, series and parallel, self and mutual inductance, coefficient of coupling, transformers, turns ratio, transformer winding.

Unit V	**Circuit Breaker and Its Importance**	**5 Hours**

Circuit breaker working and construction, types of circuit breakers, air Circuit Breaker, plain air circuit breaker, air blast circuit breaker, axial blast breaker.

Unit VI	**Switches and Relays**	**8 Hours**

Types of Switches: one-way (single-pole) electrical switch, two-way (double-pole) do not disturb switch, light dimmer, SPST, SPDT, DPST, DPDT, pushbutton switches, selector switches, limit switches. Design of a Relay, working and construction of relay, relay in normally closed and normally opened condition.

Pedagogy

Lectures/Tutorial/Assignments/

Course Outcome

On completion of the course, students will be able to understand the basic electrical components such as resistor, capacitor, inductor etc. Apply knowledge to solve basic electrical circuits.

References/Readings

1. Basic Electrical engineering by V. K Mehta
2. Principle of electronics by V. K. Mehta
3. Electrical circuit action by Henry C Veatch
4. Textbook of electrical technology, B. L. Theraja, Volume 1 and 2
5. Electrical relays: Principle and application by Vladimir Gurevech
6. Basic electronics components, Instruction manual, by Arthur Seymour

Course Code: EISC 102
Course Title: Basic Electrical and Electronics Lab

Number of Credits: 03 **Total Hours: 84** **Total Marks: 75**

Prerequisites for the course	
Should have some basic knowledge of electrical components such as resistor, capacitor, inductor, transformer, relay, switches etc.	
Objectives of Course	
This course is intended to provide the laboratory training and designing of basic electrical circuits	
Course Content	**84 Hours**
Expt. 1: Getting familiar with measuring instruments (Voltmeter, Ammeter, DMM, Current source, Voltage Source) **Expt. 2:** Study of AC waveform parameters **Expt. 3:** Finding the values of resistance based colour codes **Expt. 4:** Parallel and series combination of resistor **Expt. 5:** Verifying Ohm's law and Kirchhoff's law **Expt. 6:** Series and parallel combinations of capacitor **Expt. 7:** Charging and discharging of capacitors **Expt. 9:** Series and parallel combinations of inductor **Expt. 10:** Measuring voltage across different step down transformer **Expt. 11:** Study of different types circuit breaker **Expt. 12:** Turning light/lamp/led ON and OFF using relay **Expt. 13:** Implementation of switch in the electrical circuit	
Pedagogy	
Lab experiments	
Course Outcome	
On completion of the course, students will be able to perform the experiments with a given circuit diagram and maintain the lab work book. Students will be also able to plot the results on the graph and analyse it.	

Course Code: EISC 103
Course Title: Maintenance and Repair ofHome Appliances– I

Number of Credits: 03 **Total Hours: 42** **Total Marks: 75**

Prerequisites for the course

Students should have basic understanding of electrical and electronic components.

Objectives of Course

This course is intended to provide the knowledge of low power home appliances devices, their working principle and some basic troubleshooting procedures.

Course Content

Unit I	**Heating based devices**	**16 Hours**
Working principle, parts, thermostat heat controls, wiring diagram of steam iron, Electric kettle, Geyser, Electric rice cooker.		
Unit II	**Mixer Grinder and Hand blender**	**8 Hours**
Various parts & functions of Mixer/Grinder, speed control circuit & automatic overload protector, wiring diagram, parts of hand blender.		
Unit III	**Grill oven**	**5 Hours**
Principle of grill oven, parts of oven, heating rod, control knobs, wiring diagram		
Unit IV	**Electric fan**	**4 Hours**
Ceiling fan, motor, capacitor, table fan		
Unit V	**Electric drill**	**3 Hours**
Parts of electric drill, motor, wiring diagram		
Unit VI	**Water Purifier**	**6 Hours**
Types of water purifiers, Internal structure, electronics parts, sediment filters.		

Pedagogy

Lectures/Tutorial/Assignments/

Course Outcome

On completion of the course, students will have working knowledge of low power home appliances devices. Students will be able to identify the different parts and trace to the wiring diagram.

References/Readings

1. Troubleshooting and Repairing Major Appliances Hardcover by Eric Kleinert
2. Complete Guide to Home Appliance Repair Hardcover – June 1, 1990
3. Electrical Appliances: The Complete Step-by-step Guide to the Repair and Maintenance of a Wide Range of Domestic Electrical Appliances (Haynes for Home DIY) Paperback – January 1, 1995 by Graham Dixon
4. Handbook of Repair and Maintenance of Domestic Electronics Appliances Paperback by Shashi Bhushan Sinha

Course Code: EISC 104 **Course Title: Maintenance and Repair ofHome Appliances– ILab**		
Number of Credits: 03	**Total Hours: 84**	**Total Marks: 75**
Prerequisites for the course		
Should have basic knowledge of electricity and working knowledge of low power home appliance devices.		
Objectives of Course		
This course is intended to provide the laboratory training of repairing home appliances. Identify the faults of each part and repair it or replace the part.		
Course Content		**84 Hours**
Expt. 1: Dismantle and identification of various parts of electric iron, wiring, tracing of various controls, testing of wire, thermostat. **Expt. 2:** Identify various components of the Electric rice cooker, controls and trace the circuit and rectify the simulated faults. **Expt. 3:** Identify various components of Electric kettle, control and trace the circuit and rectify the simulated faults. **Expt. 4:** Dismantle and identification of various parts, wiring, tracing of various controls, Electronic circuits in various types of Mixer. Identify the faults in various types of Mixers/grinders & rectify **Expt. 5:** Identify various components of the Electric geyser, controls and trace the circuit and thermostat. **Expt. 6:** Dismantle and identification of various parts of grill oven, wiring, tracing of various controls, testing of wire, thermostat. **Expt. 7:** Installation of ceiling fan, replacing capacitor and motors. Assembling and disassembling table fan. **Expt. 8:** Identify various components of electric drill and troubleshooting. **Expt. 9:** Identify the parts of the water purifier, filters and power supply unit.		
Pedagogy		
Lab experiments		
Course Outcome		
On completion of the course, students will be able to identify different important parts of the devices and perform the basic action on the faulty home appliance. If necessary student will be able to replace the faulty parts.		

Course Code: EISC 105 **Course Title: Computer Networking- I**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Fundaments of computer, Computer basics		
Objectives of Course		
1. To understand basic concepts about internet 2. To understand switching in networking 3. To know the history of networking 4. To understand data communication		
Course Content		
Unit I	**Internet**	**4 Hours**
Overview, Protocol, Network edge		
Unit II	**Network Core**	**10 Hours**

Packet switching, Circuit Switching, Network of Networks, Overview of delay in Packet switched networks, Queuing delay and packet loss, End to end delay, Throughput in computer networks.		
Unit III	**Protocol Layers and their service models**	**8 Hours**
Layered Architecture, Encapsulation, Networks under attack		
Unit IV	**History of Computer Networking and Internet**	**10 Hours**
Development of packet switching, Proprietary networks and Internetworking, Proliferation of Networks, The Internet Explosion: The 1990s, The New Millennium		
Unit V	**Data Communication**	**10 Hours**
Introduction to Data Communication, Analog and Digital Signals, Simplex, Half- Duplex and Full-Duplex transmission mode.		

Pedagogy

Lectures/Tutorial/Assignments

Course Outcome

On completion of the course, students will be able to:

1. Understand basic concepts about internet and protocols
2. Understand switching in networking
3. Know the history of networking
4. Understand data communication

References/Readings

1. Bell, C. G., Habermann, A. N., McCredie, J., Rutledge, R., & Wulf, W. (1970). Computer networks. In *Computer* (Vol. 3, Issue 5).
2. Tanenbaum, A. S., &Wetherall, D. J. (2005). Computer Networks. In Computers, Software Engineering, And Digital Devices. https://Doi.Org/10.4337/9781784711603.00023
3. D-Link Certified, DCS Switching Training Guide
4. D-Link Certified, DCS Switching Lab Manual
5. Cisco Certified Network Associate Training Guide
6. James F. Kurose, Keith W. Ross, Computer Networking A Top down Approach, 7th Edition, Pearson, 2001.
7. Data communications and Networking, Behrouz A Forouzan, Tata Mc Graw-Hill 5th edition, 2013
8. Larry Peterson and Bruce S Davis "Computer Networks :A System Approach" 5 thEdition , Elsevier -2014
9. Douglas E Comer, " Internetworking with TCP/IP, Principles, Protocols and Architecture" 6th Edition, PHI - 2014
10. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
11. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

Course Code: EISC 106 **Course Title: Computer Networking- I Lab**		
Number of Credits: 03	**Total Hours: 84**	**Total Marks: 75**
Prerequisites for the course		
Students should know to use the computer.		
Objectives of Course		
1. Understand basic concepts about internet and protocols 2. Understand switching in networking 3. Know the OSI Model 4. Understand data communication and transmission modes.		
Lab Content		
Exp.1 : Introduction to internet **Exp.2 :** Introduction to Protocols used in internet **Exp.3 :** Packet Switching **Exp.4 :** Circuit Switching **Exp.5 :** Understanding OSI Model **Exp.6 :** Devices at different layers of OSI Model **Exp.7 :** Understanding TCP/IP Model **Exp.8 :** Devices at different layers of TCP/IP Model **Exp.9 :** Data Communication : Analog-Digital Signals **Exp.10 :** Transmission Modes		
Pedagogy		
Experiments		
Course Outcome		
On completion of the course, students will be able to: 1. Understand basic concepts about internet and protocols 2. Understand switching in networking 3. Know the OSI Model 4. Understand data communication and transmission modes.		

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Course Code: EISC 107
Course Title: Basics of Troubleshooting

Number of Credits: 03 **Total Hours: 42** **Total Marks: 75**

Prerequisites for the course

Should have some basic knowledge of electrical concepts.

Objectives of Course

To give students an idea of maintenance, tools, techniques used in any dealing with electrical circuits. Students will be also introduced to the different measuring instruments.

Course Content

Unit I	**Maintenance concept**	**8 Hours**

Introduction, Modern electronic equipment, Mean time between failures (MTBF), Mean time to repair (MTR), potential problems, preventive maintenance, corrective maintenance. Tools and Aid for servicing and maintenance, study of basic procedure of service and maintenance, circuit tracing techniques, concepts of shielding, grounding and power supply considerations in instruments.

Unit II	**Installation Procedure**	**8 Hours**

Environmental Considerations, Humidity, altitude, Shock and Vibrations, Protection from EMI, Safety.Service and Maintenance Laboratory: Workbench, Lighting, Storage. Documentation: Maintenance of System Overview, Sample of a Work Order for Repairs, Information Tags, Personal Safety.

Unit III	**Troubleshooting basics**	**11 Hours**

Fundamental Troubleshooting Procedure: Making of an electronics equipment, electronic circuits, Understanding of diagram: Block diagram, circuit diagram, wiring diagram, Equipment Failures: Causes, design, Production Deficiencies, Careless Storage and Transport, Inappropriate conditions during working life. Getting Inside electronic equipment: Disassembly, Re -assembly. Troubleshooting Process. Fault Finding Aids: Service and maintenance Manuals and Instruction manuals. Troubleshooting techniques: Preliminary observation, troubleshooting methods, systematic troubleshooting checks.

Unit IV	**Soldering techniques**	**5 Hours**

Soldering, Soldering tools, Soldering materials, Soldering procedure, Soldering technique, Replacement of components, Soldering of leadless capacitors, Good and bad Soldering joints, De-soldering techniques.

Unit V	**Tools for servicing**	**10 Hours**

Hand tools: Pliers, cutters, spanners, screwdrivers, nut drivers, drill. Test Equipments: Multimeters, Oscilloscope, Logic Analyser, Signal Generators, Power Supplies etc. Mechanical and Electromechanical Components: Fuses and Fuse Holders, Switches, Wires and Cables, Connectors, Circuit Boards,Electromagnetic Relays. Chemicals: Solvents, Adhesive and Lubricants.

Pedagogy

Lectures/Tutorial/Assignments/

Course Outcome

On completion of the course, students will be able to understand the maintenance and troubleshooting procedure. He will understand different parameters of electrical voltage and different measuring instruments.

References/Readings

1. Manual of laboratory experiments and workshop practice by B. S Nair
2. Electronics measurements and instrumentation by K. Lal Kishore
3. Troubleshooting Electronic Equipment, Dr R. S. Khandpur.
4. Troubleshooting& Maintenance of Electronic Equipment by K. Sudeep Singh.
5. Handbook of Repair and Maintenance of Domestic Electronics Appliances Paperback by Shashi Bhushan Sinha.

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Course Code: EISC 108 **Course Title: Basics of TroubleshootingLab**		
Number of Credits: 03	**Total Hours: 84**	**Total Marks: 75**
Prerequisites for the course		
Should have some knowledge of electrical components and measuring devices such as DMM and DSO		
Objectives of Course		
This course is intended to provide the laboratory training and designing electrical circuits		
Course Content		**84 Hours**
Expt. 1: Study different tools required for servicing of device **Expt. 2:** Case study of installation of device **Expt. 3:** Study of given circuit, wiring and block diagram. **Expt. 4:** Tracing faults in the circuits **Expt. 5:** Study of current and voltage source **Expt. 6:** Study of digital multimeter **Expt. 7:** Measuring AC and DC voltage source using multimeter **Expt. 8:** Mounting of electronics components on the test board and soldering **Expt. 9:** Generation of Square wave, sign wave and triangular waves using function generator and their measurement **Expt. 10:** Understanding of CRO and DSO **Expt. 11:**Case study of wiring diagram any device **Expt. 12:**Making a PCB and soldering		
Pedagogy		
Lab experiments		
Course Outcome		
On completion of the course, students will be able to perform the experiments with given measuring instruments and maintain the lab work book. He/she will be also able to record the observation from different measuring instruments.		

Semester II

Course Code: EIGC 201
Course Title: Fundamentals of IT

Number of Credits: 03 **Total Hours: 42** **Total Marks: 75**

Prerequisites for the course

Student is expected to have basic understanding of computer and basic mathematics.

Objectives of Course

To learn the specified foundational concepts of Information Technology

Course Content

Unit I	**Number System**	**7 Hours**

Non-Positional Number System, positional Number System, Decimal Number System, Binary Number System, Octal Number System, Hexadecimal Number, Number Conversion

Unit II	**Computer Codes**	**8 Hours**

Data Types, Computer Codes. BCD: Coding of Alphabetic and Numeric Characters in BCD, BCD Coding Scheme Examples. EBCDIC: Coding of Alphabetic and Numeric Characters in EBCDIC. ASCII: Coding of Numeric and Alphabetic Characters in ASCII, ASCII-7 Coding scheme, ASCII-8 Coding scheme.

Unit III	**Computer Arithmetic**	**10 Hours**

Reasons for using binary instead of Decimal Numbers, Basic arithmetic operations using binary numbers: Addition, Subtraction, Multiplication, Division. Binary over decimal, Examples of a few devices that work in binary mode, Binary arithmetic, Binary addition, Binary subtraction, Complement of a number, Complement of a binary number, Complementary method of subtraction, Binary multiplication, Binary division, Rules for binary division, Additive method of multiplication and division

Unit IV	**Computer languages**	**10 hours**

Some popular Computer languages or programming languages. Categories of programming languages: machine, assembly, and high level languages. Programming language tools: assembler, linker, and interpreter. Concepts: object oriented programming languages, subprogram, characteristics of a good programming language, and factors to consider while selecting a language for coding an application.

Unit V	**Business Data Processing**	**7 Hours**

Standard methods of organizing data: Database system and File Management System. Data Processing, Data storage Hierarchy, Relationship Among character, Field, Record, And File. File Organizations, Organization Of an Indexed Sequential File, File Utilities, Sorting on One Key, Sorting on Two Keys, Merging of two Files. Database Models: Hierarchical Database, network Database, Relational Database, Object-Oriented Database, Creating Reports, Sample Output of Reports.

Pedagogy

Lectures/Tutorial/Assignments

Course Outcome

The core topics in Information Technology as enlisted will be studied

References/Readings

1. Computer Fundamentals –P.K. Sinha &Priti Sinha
2. ITIL for Beginners (The Complete Beginner's Guide to Itil by ClydeBank Technology
3. Open Source for the Enterprise (Managing risks, raping rewards) by Dan Woods, Gautam Guliani
4. Technology in Action Complete by Alan Evans, Jonathan Weyers, Mary Anne Poatsy
5. ITSM (Quickstart Guide — The Simplified Beginner's Guide to IT Service Management) by ClydeBank Technology

Course Code: EIGC 202 **Course Title: Communication skills- II**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Keen interest to develop the technical writing		
Objectives of Course		
To achieve successful receiver's role in communication through input of text		
Course Content		
Unit I	**Reading Comprehension**	**11 Hours**
Introduction, Purpose of Reading, Reading Rates, What is Reading Comprehension, Reasons for Poor Comprehension, Improving Comprehension Skills, Exercises		
Unit II	**Enhanced Comprehension**	**11 Hours**
Techniques for Good Comprehension: skimming and scanning, non-verbal signals, Structure of text, Structure of Paragraph, Punctuation, Authors Viewpoint (Inference), Exercises		
Unit III	**Reading Nuances-I**	**10 Hours**
Reader Anticipation: Determining the meaning of words, Summarizing, Typical Reading - Comprehension Questions Worked Out Sample Passages, Exercises		
Unit IV	**Reading Nuances-II**	**10 Hours**
Words Commonly Misspelt Words and Phrases from Foreign Languages Proofreading Symbols		
Pedagogy		
Lectures/Tutorial/Assignments/ Practice Sessions		
Course Outcome		
Completion of any given reading tasks with ease and confidence by learning: the content, writing style, text organization and format of various types of technical documents via amalgamation of theory and practice of this subject.		
References/Readings		
1. Reading Development And Difficulties By Kate Cain 2. Bringing Words To Life: Robust Vocabulary Instruction By Isabel L. Beck, Margaret G. Mckeown, LindaKucan 3. Ending The Reading Wars: Reading Acquisition From Novice To Expert By Castles, A., Rastle, K., & Nation, K. (2018) Psychological Science In The Public Interest, 19(1), 5–51. 4. Understanding Reading Development By Colin Harrison 5. Understanding Reading Comprehension: Processes And Practices By Wayne Tennent 6. Developing Reading Comprehension By Paula J. Clarke, Emma Truelove, Charles Hulme, Margaret J. Snowling 7. How To Read A Book: The Classic Guide To Intelligent Reading By Mortimer J. Adler, Charles Van Doren		

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Course Code: EIGC 203

Course Title: Computer Maintenance and Troubleshooting-Hardware		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Students should know the basics of computer Hardware		
Objectives of Course		
Computer Maintenance and Troubleshooting is frequently required for smooth functioning of computer system. The Objective of this subject is : 1. To make the students capable to understand the functioning of hardware parts 2. To develop skills in diagnosing the faults 3. To troubleshoots the computer system.		
Course Content		
Unit I	**Safety Measures**	**6 Hours**
Hand Tools Basics and Specifications. Types of cabinets: relation with mother board form factor. Precautions to be taken while opening and closing PC cabinet. Main devices: components- Cards- boards inside a PC (to card or device level only).		
Unit II	**Introduction to PC Hardware**	**10 Hours**
Basic terms, concepts, and functions of system modules (System board, firmware, storage devices, monitor, boot process, ports). CMOS and BIOS, Overview of system components, Motherboard: definition, Components/connections in motherboard, Knowing motherboard of PC, Identifying types of motherboard, SMPS: Circuit diagrams and pin assignments, working of SMPS Input and load requirements.		
Unit III	**Assembling Hardware 05Hrs**	**10 Hours**
Specifications of processors, Memory devices- types- principle of storing. Data organization 4bit- 8 bit- word. Semiconductor memories- RAM- ROM- PROM- EMPROM- EEPROM- Static and dynamic. Example of memory chips, pin diagram, pin function. Concept of track- sector-cylinder. HDD Drive components read write head, head actuator, spindle motor, sensors, PCB. Precaution and care to be taken while dismantling Drives. Drive bay: sizes, types of drives that can be fitted. Precautions to be taken while removing drive bay from PC. Concept of SATA and PCI INTEFACE SSD. Precautions to be taken while fitting drives into bays and bay inside PC cabinet CMOS setting (restrict to drive setting sonly). Meaning and need for Using Scan disk and defrag Basic blocks of SMPS- description of sample circuit. Vendor/sources of PC hardware components.		
Unit IV	**Introduction to Hard disk Partition, formatting and installation**	**10 Hours**
Introduction to hard drive, working of hard disk: Hard Drive Motherboard Desktop Hard Drive Buyer's Guide, RAID, Using Multiple Hard Drives for Performance and Reliability Partitioning a hard disk (primary and extended partitions). Bad Sectors in Hard disk- Master Boot Record- in-place installation- Registry fixing- performance level check- Shortcut fixing- Fixing Start up process- log- difference between MBR and GPT etc. Cloning of Secondary Storage.		
Unit V	**Troubleshooting and Preventive Maintenance**	**6 Hours**
Troubleshooting basics, Troubleshooting by visual Inspection, Preventative Maintenance, Using Preventative Maintenance Tools, POST : Functions, Test Sequence, Error messages, Troubleshooting Procedures and Preventative Maintenance: Identifying Troubleshooting Tools, Hardware tools, Diagnostic software, Materials and equipment, Software utilities, Maintaining Environmental Controls, Ventilation and airflow, Humidity and liquids, Dirt and dust, Power, UPS, and suppressors, Completing Maintenance Tasks, Case and components, Power supplies		

Pedagogy

Lectures/Tutorial/Assignments

Course Outcome

On completion of the course, students will be able to:

1. Understand Basics of Hardware Components.
2. Acquire knowledge of Finding Faults in Components
3. Install, Configure and maintain various components in computer system and peripherals.
4. Diagnose faults of Different Component
5. Repair and maintain computer system and its peripherals.

References/Readings

1. IBM PC & Clones: Hardware Trouble Shooting and Maintenance by B.Govindarajalu, Tata McGraw Hill
2. PC Upgrade & Repair Bible , Wiley India.
3. PC Systems, Installation and Maintenance, Second Edition by R. P. Beales,
4. PC Upgrade & Repair Black Book by Ron Gilster.
5. Computer Installation and Servicing by D Balasubramanian
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – *CISCO Press, Pearson Education*.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan – CISCO Press, Pearson Education.
8. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, *WILEY Dreamtech*
9. Introduction to Information Technology, ITL Education Solutions limited, *Pearson Education.*
10. IBM PC & Clones: Hardware Trouble Shooting and Maintenance by B.Govindarajalu, Tata McGraw Hill
11. Computer Installation and Servicing by D Balasubramanian

Course Code: EIGC 204
Course Title: Computer Maintenance and Troubleshooting-Hardware Lab

Number of Credits: 03 **Total Hours: 84** **Total Marks: 75**

Prerequisites for the course

Students should know the basics of computer Hardware

Objectives of Course

The Objective of this course is

1. To make the students capable to understand the functioning of hardware parts
2. To develop skills in diagnosing the faults
3. To troubleshoots the computer system

Lab Content

Exp.1 : Study assembling and disassembling the PC.
Exp.2 : Study computer I/O ports.
Exp.3 : Identify the on-board features of the motherboard and installation of drivers and hardisk.
Exp.4 : Study of components of power supply (SMPS).
Exp.5 : Perform formatting of Hard Disk.
Exp.6 : Installation of Computer Input devices and troubleshooting.
Exp. 7 : Installation of Computer Output devices and troubleshooting.

Exp.8 : Preventive Maintenance of Computers.
Pedagogy
Experiments
Course Outcome
On completion of the course, students will be able to: 1. Understand Basics of Hardware Components. 2. Acquire knowledge of Finding Faults in Components 3. Install, Configure and maintain various components in computer system and peripherals. 4. Diagnose faults of Different Component 5. Repair and maintain computer system and its peripherals.

Course Code: EISC 201
Course Title: Analog Electronics

Number of Credits: 03 **Total Hours: 42** **Total Marks: 75**

Prerequisites for the course

Students should have some basic idea of electrical concepts and some basic knowledge of electronics.

Objectives of Course

This course is intended to give fundamentals of electronics components such as diodes, transistors, power supply and amplifiers. To understand the working of different circuits based on these electronics components.

Course Content

Unit I	**Introduction to semiconductor diode**	**10 Hours**

Intrinsic and extrinsic semiconductors, P and N type semiconductor, P.N. junction, barrier potential, effect of temperature, breakdown voltage, Forward and reverse bias, Half wave, full wave rectifiers and bridge rectifiers, filters for rectifiers, Zener diode.

Unit II	**Introduction to Transistor and Amplifiers**	**6 Hours**

Working principle of Transistor, NPN and PNP transistor, transistor amplifier (CE, CB and CC).

Unit III	**Introduction to Power Supply**	**6 Hours**

Unregulated and regulated DC power supply specifications, Application of different types of power supply, Short circuit protection, Overload protection, Fixed and variable voltage regulators, SMPS.

Unit IV	**Basic Amplifier and feedback**	**12 Hours**

Gain, I/O resistance, Classes of amplifier, Decibel, Amplifier bandwidth. Types of feedback, Voltage and current feedback, series and shunt feedback. Barkhausen criterion, types of oscillators.

Unit V	**Linear IC's and Operation Amplifiers**	**8 Hours**

Differential Amplifier, OP-Amp characteristics, Differential and Common mode gains, CMRR, Slew rate, virtual ground, inverting and non Inverting amplifier, Applications of op-amps.

Pedagogy

Lectures/Tutorial/Assignments

Course Outcome

On completion of the course, students will be able to understand the basic electronics components such as diodes, transistors, power supply Op-amps etc. Students will be able to design the amplifiers using transistor and op-amps.

References/Readings

1. Principle of electronics by V. K. Mehta
2. Electronics devices by Thomas. L. Floyd
3. Basic electronics for scientist and engineers by Dennis Eggleston
4. The Art of electronics by Thomas c Hayes and Paul Horowitz
5. J. Millman and C. C. Halkias, Integrated Electronics: Analog and Digital Circuits and Systems, Mc Graw Hill International Student Ed. (1972).

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Course Code: EISC 202 **Course Title: Analog Electronics Lab**		
Number of Credits: 03	**Total Hours: 84**	**Total Marks: 75**
Prerequisites for the course		
Working knowledge of analog electronics devices		
Objectives of Course		
This course is intended to provide laboratory training and designing electronics circuits such as transistor amplifiers, power supply and operational amplifiers. Identify different sections and components in the circuit diagram.		
Course Content		**84 Hours**
Expt. 1: Identifying and testing of diode, NPN and PNP transistors. **Expt. 2:**Study of bridge rectifier **Expt. 3:**Study of Zener diode and its characteristics **Expt. 4:**Unregulated and regulated power supply **Expt. 5:**Load regulation of regulated and unregulated power supply **Expt. 6:**Line regulation **Expt. 7:**Study of Wien's bridge oscillator **Expt. 8:**Phase shift oscillator **Expt. 9:**Hartley oscillator and Colpitts oscillator **Expt. 10:**Non-inverting and inverting amplifier **Expt. 11:**Integrator and differentiator using OP-AMP **Expt. 12:**Adder and subtractor using OP-AMP **Expt. 13**: Design of class A amplifiers		
Pedagogy		
Lab experiments/Assignment		
Course Outcome		
Should be able to design and construct electronic circuits by identifying different components. Plot the graph and analyse the results. Students are expected to learn how to maintain lab record.		

Course Code: EISC 203 **Course Title: Maintenance and Repair of Home Appliances– II**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Basic knowledge of working of home appliances devices		
Objectives of Course		
This course is intended to provide the knowledge of home appliances devices, their working principle and some basic troubleshooting procedure.		
Course Content		
Unit I	**UPS/Inverter**	**10 Hours**
Working principle, specifications, block diagram. Types of inverter and UPS. Various types of batteries used in UPS and Inverters and their maintenance.		
Unit II	**SMPS**	**4 Hours**
Block Diagram of Switch mode power supplies and their working principles, main parts.		
Unit III	**Washing Machine**	**8 Hours**
Working principle, types of machines, washing techniques, working of motors, different types of timers, power supply circuits.		
Unit IV	**Microwave oven**	**4 Hours**
Working principle, Different types of oven, study the various functions of Oven, Electrical wiring diagram of microwave oven, working of Power supply		
Unit V	**Induction cooktops**	**6 Hours**
Working Principle of Induction cooktops, eddy current, electrical induction, Advantages of induction cooktops, the limitations of induction cooktop.		
Unit VI	**OTG**	**4 Hours**
Working of OTG, Internal parts of OTG, heating principle, Control knobs: Timer, temperature. Wiring diagrams.		
Unit VII	**Dish TV and CCTV**	**6 Hours**
Working of CCTV and DISH TV, Antenna of Dish TV, Set top box, LNB, Types of cameras, DVR		
Pedagogy		
Lectures/Tutorial/Assignments/		
Course Outcome		
On completion of the course, students will be able understand the working principle of home appliance devices. Student should be able to identify the various faults leading to non-working of the device.		
References/Readings		
1. Troubleshooting and Repairing Major Appliances Hardcover by Eric Kleinert 2. Complete Guide to Home Appliance Repair Hardcover – June 1, 1990 3. Electrical Appliances: The Complete Step-by-step Guide to the Repair and Maintenance of a Wide Range of Domestic Electrical Appliances (Haynes for Home DIY) Paperback – January 1, 1995 by Graham Dixon. 4. Handbook of Repair and Maintenance of Domestic Electronics Appliances Paperback by Shashi Bhushan Sinha.		

Course Code: EISC 204 **Course Title: Maintenance and Repair of Domestic Appliances– II Lab**		
Number of Credits: 03	**Total Hours: 84**	**Total Marks: 75**
Prerequisites for the course		
Basic knowledge of electronics and understanding working principle of home appliance devices		
Objectives of Course		
This course is intended to provide the laboratory training of repair and maintenance of home appliance devices. Their basic troubleshooting, identifying the faults and replacing the faulty parts.		
Course Content		**84 Hours**
Expt. 1: UPS and Inverters I. **Expt. 2:** UPS and Inverters II. **Expt. 3:**Study SMPS. **Expt. 4:**Repairing of SMPS: simulating various faults diagnosing and rectifying it. **Expt. 5:**Installation of Dish TV and CCTV. **Expt. 6:**Identify the internal and external parts of microwave oven **Expt. 7:** Troubleshooting of OTG **Expt. 8:**Identifying different parts and Installation of front/top load Washing machine **Expt. 9:**Troubleshooting various faults in the washing machine. **Expt. 10:**Working of induction cooktop, auxiliary power supply unit, MCU section		
Pedagogy		
Lab experiments/ Assignment/Self study		
Course Outcome		
On the successful completion of the subject student will be able to identify the faults, troubleshoot the device and basics of servicing.		

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Course Code: EISC 205 **Course Title: Computer Networking- II**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Students should know the concepts taught in Computer Networking- I		
Objectives of Course		
1. To introduce the basics of computer networking– concepts, theory 2. To Identify different network components and tools 3. To know techniques of crimping and punching 4. To understand basics of OSI and TCP/IP Model 5. To understand the basic home appliances		
Course Content		
Unit I	**Components of the Computer Network**	**4 Hours**
Identify various Network tools: Wire crimper, Wire Map Testers, Multifunction Cable Tester, LAN Tester, Tone Generator etc. Identify various Network devices: Switch (Normal and Managed), Router(Normal and wireless), Rack, Patch Panel, I/o box, Access Point etc. Understand the Layout of network on your lab and campus.		
Unit II	**Networking Cables**	**10 Hours**

Network cable Types and specifications. UTP Cables : Electrical and Mechanical Properties, Construction, colour codes Applications, Patch Cords		
Unit III	**Crimping & Punching**	**8 Hours**
Communication Media and Connectors – Unshielded twisted-pair (UTP), shielded twisted-pair (STP), Fibre Optic and coaxial cable: RJ-45, RJ-11, BNC. Understanding colour codes of CAT5 cable. 568A and 568B convention. Network Cabling : Crimping and punching		
Unit V	**Configuration of Data communication equipment**	**10 Hours**
Network Components: Modems, Firewall, Hubs, Bridges, Routers, Gateways, Repeaters, Transceivers, Switches, Access point, etc. Types, functions, advantages and applications of Network Component. Layer 2 manage switch configuration and use it on network, Latest configurations. Understand the use of Network simulation software and the process of use it.		
Unit VI	**Basic Home Network Hardware Components, Devices and Services**	**10 Hours**
Modem, dongle, Broadband, Home Switch, Home Router, Home Router with Landline, Repeater, Firewall and NAT Router, Combination of various devices, WAP, PoE Injector		

Pedagogy

Lectures/Tutorial/Assignments

Course Outcome

On completion of the course, students will be able to:

1. Identify different network components and tools
2. Understand techniques of crimping and punching
3. Understand basics of OSI and TCP/IP Model
4. Know the basic Home Network appliances

References/Readings

1. Bell, C. G., Habermann, A. N., McCredie, J., Rutledge, R., & Wulf, W. (1970). Computer networks. In *Computer* (Vol. 3, Issue 5).
2. TANENBAUM, A. S., & WETHERALL, D. J. (2005). Computer networks. In *Computers, Software Engineering, and Digital Devices*. https://doi.org/10.4337/9781784711603.00023
3. D-Link Certified, DCS Switching Training Guide
4. D-Link Certified, DCS Switching Lab Manual
5. Cisco Certified Network Associate Training Guide
6. James F. Kurose, Keith W. Ross, Computer Networking A Top down Approach, 7th Edition, Pearson, 2001.
7. Data communications and Networking, Behrouz A Forouzan, Tata Mc Graw-Hill 5th edition, 2013
8. Larry Peterson and Bruce S Davis "Computer Networks :A System Approach" 5 thEdition , Elsevier -2014
9. Douglas E Comer, " Internetworking with TCP/IP, Principles, Protocols and Architecture" 6th Edition, PHI - 2014
10. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
11. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

Course Code: EISC 206 **Course Title: Computer Networking- II Lab**		
Number of Credits: 03	**Total Hours: 84**	**Total Marks: 75**
Prerequisites for the course		
Student should know to use the computer.		

Objectives of Course

1. To introduce the basics of computer networking– concepts, theory
2. To Identify different network components and tools
3. To know techniques of crimping and punching
4. To implement cable testing
5. To implement small group of computer networking
6. Install and configure basic home appliances

Lab Content

Exp.1 : Introduction to different tools of computer network
Exp.2 : Introduction to different components/devices of computer network
Exp.3 : Understand the network on the campus
Exp.4 : To implement Crimping
Exp.5 : To Implement Punching
Exp.6 : Cable Testing
Exp.7 : Study of different types of networking cables
Exp.8 : Study of basic network command and Network configuration commands.
Exp.9 : Create a Small Physical Network using Computers, Network Connecting Devices and cables
Exp.10 : Install &Configure a Peer to-Peer Network using Windows
Exp.11 : Connect computers using Bluetooth, WI-FI, hotspot.
Exp.12 : Study of network IP
Exp.13 : Install and configure basic home networking appliances

Pedagogy

Experiments

Course Outcome

On completion of the course, students will be able to:

1. Identify different network components and tools
2. Implement crimping and punching
3. Implement cable testing
4. Implement basic communication between local PCs
5. Install and configure basic home appliances

Course Code: EISC 207
Course Title: Sensors and Transducers

Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**

Prerequisites for the course

The student should have basic knowledge of electrical concepts.

Objectives of Course

Various principles of transduction action will be discussed in this course. Make students familiar with different types of sensor used in the industry.

Course Content

Unit I	**Mechanical and Electromechanical sensor**	**9 Hours**

Definition, principle of sensing & transduction, classification Resistive (potentiometric type): Characteristics of sensors,Construction, working and types: Strain gauge, Inductive sensor, transformer action type, LVDT, Proximity sensor.

Unit II	**Capacitive sensors**	**9 Hours**

Capacitive sensors and its types, Stretched diaphragm type: microphone, response characteristics. Piezoelectric sensors working, construction, types and applications, ultrasonic sensors.

Unit III	**Thermal sensors**	**9 Hours**

Resistance change type: RTD materials, tip sensitive & stem sensitive type, Thermistor material, shape, ranges and accuracy specification. Thermo emf sensor: types, thermoelectric power, Pyroelectric type.

Unit IV	**Magnetic and Radiation sensors**	**08 Hours**

Villari effect for assessment of force, torque, proximity, Hall effect, LDR, Photovoltaic cells, photodiodes, photo emissive cell types, materials, construction, response.

Unit V	**Advances in sensor technology**	**7 Hours**

Semiconductor sensor, smart sensor, micro-sensor, IR radiation sensor, Ultrasonic sensor, Fiber optics sensor, chemical sensor, bio-sensor.

Pedagogy

Lectures/Tutorial/Assignments/

Course Outcome

On completion of the course, students will gain basic understanding of different types of sensors and transducers. The course empowers a student who is likely to go for higher studies in electronics and Instrumentation technology.

References/Readings

1. Transducers and instrumentation, D. V. Murthy
2. Sensors and Transducers, Ian Sinclair
3. Sensors and Transducers, M.J. Usher
4. Handbook of Modern Sensors by Jacob Fraden
5. Sensors and Transducers by Patranabis

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Course Code: EISC 208 **Course Title: Sensors and Transducer Lab**	
Number of Credits: 03 **Total Hours: 84** **Total Marks: 75**	
Prerequisites for the course	
Working knowledge of sensor and analog electronic	
Objectives of Course	
This course is intended to provide laboratory training using sensors for measuring real life applications.	
Course Content	**84 Hours**
Expt. 1: Measurement of temperature by RTD. **Expt. 2:** Temperature measurement using AD590 Semiconductor temperature sensor. **Expt. 3:** Torque measurement by Strain Gauge Transducers. **Expt. 4:** Measurement of temperature by thermocouple **Expt. 5:** Measurement of displacement using LVDT. **Expt. 6:** Measurement of load using strain gauge based load cell. **Expt. 7:** Study of LDR **Expt. 8:** Study of Photo Diodes &Photovoltaic cells **Expt. 9:** Ultrasonic sensor **Expt. 10:**Piezoelectric sensor	
Pedagogy	
Lab experiments	
Course Outcome	
Students will have working knowledge of different sensors. Students should be able to plot the input and output parameter relation. Expected to design a solution based on the requirement.	

Semester III

Course Code: EIGC 301
Course Title: General Instrumentation

Number of Credits: 03 **Total Hours: 42** **Total Marks: 75**

Prerequisites for the course

Student should have basic knowledge of electronics and different instruments

Objectives of Course

This course is intended to provide the basic understanding of the working principle behind any electronics measuring instruments. Students will be made familiar with the importance of instrumentation. He/ She will learn how to acquire the signal and process those signals.

Course Content

Unit I	**Plan and perform routine trade activities**	**5 Hours**
Protective equipment: Hard hat, goggles, face, Ear plug & Ear muffs, Hand (gloves), foot (boots with sole), Personal Breathing Apparatus, hand and power tools, Trade specific hand and power tools, Manufacturer instructions, mounting hardware, Location for installation of mounting hardware.		
Unit II	**Scope of Instrumentation**	**5 Hours**
Scope of Instrumentation, block diagram of measurement system, calibration, secondary and working standards, metric system base and supplementary units, Characteristics of instruments.		
Unit III	**Signal conditioning and display**	**10 Hours**
Single ended and differential amplifier instrumentation amplifiers, block diagram of AC signal conditioning and DC signal conditioning, sampling circuits, analog indicators, alphanumeric devices: 7-seg and dot array.		
Unit IV	**Data acquisition system and computer interfaces**	**10 Hours**
Data acquisition system, pre-amplification and filtering, single channel and multichannel data acquisition system, multiplexing, sample and hold, A/D and D/A converter, data logger, Interfaces: RS-232, GPIB, USB.		
Unit V	**Control System**	**12 Hours**
Basic idea of feedback control systems (open and control), basics of P, PI, PD, PID controllers, ON/OFF pneumatic control systems, ON/OFF electric controllers.		

Pedagogy

Lectures/Tutorial/Assignments/

Course Outcome

On completion of this course student is expected to gain good knowledge of instrumentation. Student will understand the importance of data acquisition system control system.

References/Readings

1. Electronics instrumentation, H.S. Kalsi
2. Electronics measurements and instrumentation, R. S. Sedha
3. R.K.Jain, “Mechanical & Industrial Measurements”, Khanna Publishers, 11th Edition, 2004.
4. Ernest O. Doeblin, Dhanish. N. Manik, “Measurement Systems Application & Design”, TMH, 5th Edition, 2004.
5. Electrical and Electronics Measurements and Instrumentation by PrithwirajPurakait.

Course Code: EIGC 302 **Course Title: Communication skills- III**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Keen interests to improve quality of technical writing		
Objectives of Course		
To achieve successful sender's role in communication via script means		
Course Content		
Unit I	**Writing messages**	**10 Hours**
Business Letters: Significance, Purpose, Structure, Layout, Principles, Types and Samples, Claims Letters, Adjustment Letters, Sales Letters, Job Application Letters. E-Mails: Advantages and Limitations of E-Mail, Style Structure and Content, E-Mail Etiquettes, Sample E-Mail Messages, Effectiveness and Security,Exercises		
Unit II	**Writing for documentation I**	**11 Hours**
Reports: Introduction, Objectives, Characteristics of a Report, Types of Reports, The Importance of Reports, Formats, prewriting, structure of reports. Writing the reports: First Draft, Visual Aids, revising, editing, and proofreading, samples,exercises.		
Unit III	**Writing for documentation-II**	**13 Hours**
Instruction Manuals: Types of Instructions- Oral Instructions, Written Instructions. Writing Instructions: Preliminary Steps, Components, Illustrations, Content Formatting, Checklist, User's Manuals, Cover,Precautions, Table of Contents, Introduction, Abbreviation, Technical Specification, Warranties, Accessories Technical Description: Introduction, Naming, Definition, Description, Illustrations, Process Description, Guidelines for Writing Good Descriptions, Examples.		
Unit IV	**Nuances of writing**	**8 Hours**
Common Errors: Usage, Punctuation and Capitalization, Words Commonly Misspelt.		
Pedagogy		
Lectures/Tutorial/Assignments/ Practice Sessions		
Course Outcome		
Firm grasp of effective writing of variety of technical documents: letters, reports and manuals		
References/Readings		
1. Technical-Communication-Principles-And-Practice :*Meenakshi Raman* , Sangeeta Sharma Oxford-University-Press-2004 2. Technical Writing Process by Kieran Morgan. 3. The Insider's Guide to Technical Writing by Krista Van Laan 4. Managing Your Documentation Projects by JoAnn T. Hackos 5. Technical Communication, 9th edition by Mike Markel. 6. Technical Writing for Dummies by Sheryl Lindsell-Roberts.		

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Course Code: EIGC 303 **Course Title: Computer Maintenance and Troubleshooting- Software**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Students should know to use the computer and understand basics of computer hardware.		
Objectives of Course		
Computer Maintenance and Troubleshooting is frequently required for smooth functioning of computer system. The Objective of this subject is:		

1. To understand the functioning of computer software
2. To develop skills in diagnosing the faults
3. To troubleshoots the computer system.
4. To install various device drivers
5. To manage junk files
6. To understand basics of Linux Operating System

Course Content

Unit I	**OS features, System utilities**	**6 Hours**
Functions of an operating system, Disk operating system. Concept of GUI, Modes of starting on different occasions, Desktop: Icon- selecting- choosing- drag and drop, My computer (User folder in Desktop), network places, Recycle bin, task bar, start menu, tool bar and menus. Windows Explorer, Properties of files and folders, Executing application programs.		
Unit II	**Device Driver, OS Update and Firewall Security**	**8 Hours**
Properties of connected devices, Applications under windows accessories, Windows Help, Finding files- folders- computers, Control panel, Installed devices and properties Updating of OS, Different configurations of Computer system and its peripherals, Compatible with different hardware/software, Pre-installation Prerequisites, Install procedure, Rollback or Uninstall procedure, Tests of various device driver software.		
Unit III	**User Account in Windows**	**5 Hours**
Users and user account, Types of user accounts, user access levels, Privileges: types of privileges, various scope, permissions, permission parameters, user and group permission, time based permission, expiration of permission etc.		
Unit IV	**Junk File**	**2 Hours**
Junk files deleted files, un-deleting files, configuration of internet browser.		
Unit V	**Data backup and data recovery software**	**3 Hours**
Maintenance of Temp folder, internet history, cookies, bookmark, Concepts of SAN- NAS and cloud storage.		
Unit VI	**Introduction To Mail Client Software (Outlook)**	**8 Hours**
Add and use contacts, Calendar basics, Recall and replace sent messages, Send automatic replies when you're out of the office, The ins and outs of BCC, Use Instant Search to find Calendar items, Use Instant Search to find contacts, Use Instant Search to find messages and text, Add holidays to your calendar, Create or delete a search folder, Import and export v Cards to Outlook contacts.		
Unit VII	**Linux operating system**	**10 Hours**
Basic Linux commands, Linux file system, The Shell- Users and fill permissions, vi editor, X window system, Filter Commands, Processes, Shell Scripting, Concept of UNIX.		

Pedagogy

Lectures/Tutorial/Assignments

Course Outcome

On completion of the course, students will be able to:

1. Understand Basics of Computer software.
2. Develop skills in diagnosing the faults
3. Troubleshoots the computer system.
4. Install various device drivers
5. Manage junk files
6. Understand basics of Linux Operating System

References/Readings

1. IBM PC & Clones: Hardware Trouble Shooting and Maintenance by B.Govindarajalu, Tata McGraw Hill
2. PC Upgrade & Repair Bible , Wiley India.
3. PC Systems, Installation and Maintenance, Second Edition by R. P. Beales,
4. PC Upgrade & Repair Black Book by Ron Gilster.
5. Computer Installation and Servicing by D Balasubramanian
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – *CISCO Press, Pearson Education*.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan – CISCO Press, *Pearson Education.*
8. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, *WILEY Dreamtech*
9. Introduction to Information Technology, ITL Education Solutions limited, *Pearson Education.*
10. IBM PC & Clones: Hardware Trouble Shooting and Maintenance by B.Govindarajalu, Tata McGraw Hill
11. Computer Installation and Servicing by D Balasubramanian

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Course Code: EIGC 304 **Course Title: Computer Maintenance and Troubleshooting- Software Lab**		
Number of Credits: 03	**Total Hours: 84**	**Total Marks: 75**
Prerequisites for the course		
Students should know the basics of computer Hardware		
Objectives of Course		
Computer Maintenance and Troubleshooting is frequently required for smooth functioning of computer system. The Objective of this subject is: 1. To understand the functioning of computer software 2. To develop skills in diagnosing the faults 3. To troubleshoots the computer system. 4. To install various device drivers 5. To manage junk files 6. To understand basics of Linux Operating System		
Lab Content		
Exp.1: Operating system Installation **Exp.2:** Creating User account in Windows **Exp.3:** Study of different Anti-Virus software. **Exp.4:**Working with BIOS settings. **Exp.5:**Recognize common symptoms associated with diagnosing and troubleshooting PCs and utilize Windows built-in diagnostic tools. **Exp.6:** Define registry file operation and maintenance. **Exp.7:**Installation of drivers of various devices from the internet. Demonstrate to remove unwanted software applications. **Exp.8:** Study on Mail Client Software **Exp. 9:** Install and Configure Dual OS Installation **Exp.10:** Data backup and recovery **Exp.11:** Linux Operating system **Exp.12:** Junk files management		

Pedagogy
Experiments
Course Outcome
1. On completion of the course, students will be able to: 2. Understand Basics of Computer software. 3. Develop skills in diagnosing the faults 4. Troubleshoots the computer system. 5. Install various device drivers 6. Manage junk files 7. Understand basics of Linux Operating System

Course Code: EISC 301 **Course Title: Digital Electronics- I**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Should have studied basic level electronic subjects. It is assumed that students have a working knowledge of passive, active components and basics of Boolean algebra.		
Objectives of Course		
This subject will introduce the basics of digital electronics. Student will be introduced to the different gates, Boolean algebra and logic families.		
Course Content		
Unit I	**Transistors and multivibrator**	**6 Hours**
Transistor multivibrators, types of multivibrators, construction and working of FET		
Unit II	**Logic gates**	**4 Hours**
Basic logic gates, OR, AND, NOR, NAND, and EX-OR gates, NAND and NOR gates as universal building blocks in logic circuits,		
Unit III	**Digital fundamentals**	**12 Hours**
De Morgan's Law's, Boolean Algebra, Sum of Products methods and Product of Sum methods, Minterms and Maxterms, Karnaugh map Minimization.		
Unit IV	**Combinational circuits**	**10 Hours**
Half adder and Full adder, Multiplexer and Demultiplexer, Encoders and decoders.		
Unit V	**Logic families**	**10 Hours**
TTL Standard, TTL NAND, ECL, MOS gates and CMOS gates, propagation delay, power dissipation, fan-out and fan-in, noise margin.		
Pedagogy		
Lectures/Tutorial/Assignments/		
Course Outcome		
On completion of the course, students will be able to understand the basic electronics components such as FET, multivibrator, combinational circuits. Students will gain knowledge of basics of digital electronics and number system.		
References/Readings		
1. Digital Principles and Applications: Malvino and Leach TMH 4th edition 1986. 2. Electronics Devices and Circuits An Introduction: Allen Mottershed PHI 1997 3. Integrated Electronics: Millman and Halkias TMH 1972 4. Electronic Devices and Circuits: Millman and Halkais Mc Graw Hill 1967 5. Modern Digital Electronics: R. P. Jain TMH 3rd edition 2003. 6. Principles of Electronics: V.K.Metha, S.Chand& Company 8th edition 2003		

Course Code: EISC 302 **Course Title: Digital Electronics- I lab**	
Number of Credits: 03	**Total Hours: 84 Total Marks: 75**
Prerequisites for the course	
Student should have working knowledge of basic digital electronics.	
Objectives of Course	
Students will be able to understand the basic block of digital electronics. He/she will able to design different digital electronics circuits.	
Course Content	**84 Hours**
Expt. 1: Astable multivibrator **Expt. 2:** Monostable multivibrator **Expt. 3:** Bi-stable multivibrator **Expt. 4:** DTL logic gate using transistors **Expt. 5:** TTL logic gate using transistors **Expt. 6:** Verification of logic AND, OR, NOR, NAND, EX-ORE and EX-NOR gates **Expt. 7:** Universal logic gates **Expt. 8:** Half adder and full adder circuits **Expt. 9:** Multiplexer/Demultiplexer **Expt. 10:** Encoder/decoder	
Pedagogy	
Lab experiments/Assignment	
Course Outcome	
Should be able to design and construct digital electronic circuits by identifying different integrated circuits. Plot the graph and analyse the results.	

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Course Code: EISC 303
Course Title: Refrigeration and Air Conditioning

Number of Credits: 03 **Total Hours: 42** **Total Marks: 75**

Prerequisites for the course

Student should have basic knowledge of temperature, pressure.

Objectives of Course

Learning the fundamental principles and different methods of refrigeration and air conditioning. Study of the various equipment operating principles, operating and safety controls employed in refrigeration air conditioning systems.

Course Content

Unit I	**Psychrometry**	**5 Hours**

Psychrometric Processes: Sensible Cooling, Sensible Heating, Cooling with dehumidification, Cooling with adiabatic Humidification, Chemical dehumidification, heating and humidification, Mixing of air- streams, Air Washers.

Unit II	**Heat transfer and air-distribution**	**10 Hours**

Principles of heat transfer, Conduction, Convection and Radiation. Properties of insulating materials, Air Distribution, Systems of air distribution, Duct systems, and cooling load and air quantities pressure in ducts, duct layout & construction.

Unit III	**Components of refrigeration system**	**10 Hours**

Condensers, Air cooled and water cooled Evaporative Condensers, Heat Rejected in condensers, construction of condensers, Driers, receivers, Purging, Cleaning of Condensers, Refrigerant Controls, Types of expansion devices and sensible heat factor, construction and operation of Automatic expansion valve, thermostatic expansion valve, and capillary tube, low side float valve, High Side float valve. Solenoid valves, testing and adjusting thermostatic expansion valves, Evaporators, types of evaporators, Heat absorbed in evaporators, water chillers, brine coolers, Methods of defrosting.

Unit IV	**Electrical controls**	**7 Hours**

Refrigeration Controls, H.P and L.P cut-outs, Oil Pressure failure safety switch, Motor Starters, capacitors, Relays, over load protectors and servicing of motors.

Unit V	**Air conditioning system and maintenance**	**10 Hours**

Air-Conditioning systems and equipments, classification of air-conditioning systems-all air systems, all water system types, Fans, Blowers, grills, resistors, filters, compressors, cooling coils, condensers Air-Handling Units, Fan coil Units, Central Air Conditioning plants. Ventilation Systems, Leak Detection, Pressure testing and charging.

Pedagogy

Lectures/Tutorial/Assignments

Course Outcome

Students will gain knowledge of the working principle behind refrigeration and AC. Operate and analyze the refrigeration and air conditioning systems.

References/Readings

1. Refrigeration & Air-conditioning, CP Arora, TMG
2. Refrigeration & Air-conditioning, Manohar Prasad, NAI
3. Refrigeration & Air-conditioning, Stoecker&Jons, MGH
4. Principles of Refrigeration, RC Dosset, LPE
5. ASHRAE Handbook (Fundamentals), ASHRAE

Course Code: EISC 304 **Course Title: Refrigeration and Air Conditioning Lab**		
Number of Credits: 03	**Total Hours: 84**	**Total Marks: 75**
Prerequisites for the course		
Working knowledge of AC and refrigeration system		
Objectives of Course		
To provide students with working of domestic refrigeration. This course is intended to provide the hand on experience with refrigeration and air conditioning devices.		
Course Content		**84 Hours**
Expt. 1: Testing of Thermostats. **Expt. 2:** Experiment on an Evaporative Cooler. **Expt. 3:** Study of expansion-valves, testing and adjusting. **Expt. 4:** Pressure testing and leak detection methods. **Expt. 5:** Charging Procedure and charging a refrigerator correctly. **Expt. 6:** Study of low and high Pressure cut-outs. **Expt. 7:** Study of Capacitors, Relays, Overloads, Chokes, etc. **Expt. 8:** Study of different thermal insulating materials **Expt. 9:** Servicing of a Refrigerator. **Expt. 10:** Servicing of an Invertor and non-inverter air-Conditioner. **Expt. 11:** Wiring diagrams of an Air-Conditioner and central Plants. **Expt. 12:** Wiring diagrams of a Multi-cylinder Compressor for capacity control.		
Pedagogy		
Lab experiments		
Course Outcome		
He will be able to locate the faults in the non-working RAC system. Student should be able to identify the tools required to service and repair the RAC system.		

Course Code: EISC 305 **Course Title: Computer Networking- III**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Students should know the topics covered in Computer Networking I, II		
Objectives of Course		
1. To understand OSI and TCP/IP Models In depth 2. To understand IP Addressing 3. To understand Subnet mask 4. To understand VLAN 5. To understand STP, RSTP 6. To understand IP Routing		
Course Content		
Unit I	**OSI Model**	**5 Hours**
Application layer (layer 7), Presentation layer (layer 6), Session layer (layer 5), Transport layer (layer 4), Network layer (layer 3), Data Link layer (layer 2) and sublayers, Physical layer (layer 1). Data Encapsulation Protocols used at each layer		
Unit II	**TCP/IP Model**	**5 Hours**
Process/Application layer, Host-to-Host layer, Internet layer, Network Access layer, Protocols used at each layer		

Unit III	**IP Addressing**	**4 Hours**
Network addressing, Classes of IP Addressing. • Setting IP Address (IP4/IP6) & Subnet Mask, Private IP Addressing, IPv4 Address Types, Troubleshooting IP Addressing		
Unit IV	**Subnet Mask**	**7 Hours**
Subnet Mask, CIDR, Subnetting Class A, B, C Addresses		
Unit V	**VLAN**	**7 Hours**
VLAN basics, types of VLAN, VLAN Trunking protocol, Routing between VLAN, VLAN Configuration		
Unit VI	**STP, RSTP**	**7 Hours**
BPDU, Selecting the Root Switch, Port States, Timer, Topology change, Convergence, Configuration		
Unit VII	**IP Routing**	**7 Hours**
Routing basics, routing Table, Routing methods, Routing preference, Classful and classless routing, DVRP, Routing protocols, Routing configuration.		

Pedagogy

Lectures/Tutorial/Assignments

Course Outcome

On completion of the course, students will be able to:

1. Understand OSI and TCP/IP Models In depth
2. Understand IP Addressing
3. Understand Subnet mask
4. Understand VLAN
5. Understand STP, RSTP
6. Understand IP Routing

References/Readings

1. Bell, C. G., Habermann, A. N., McCredie, J., Rutledge, R., & Wulf, W. (1970). Computer networks. In *Computer* (Vol. 3, Issue 5).
2. TANENBAUM, A. S., & WETHERALL, D. J. (2005). Computer networks. In *Computers, Software Engineering, and Digital Devices*. https://doi.org/10.4337/9781784711603.00023
3. D-Link Certified, DCS Switching Training Guide
4. D-Link Certified, DCS Switching Lab Manual
5. Cisco Certified Network Associate Training Guide
6. James F. Kurose, Keith W. Ross, Computer Networking A Top down Approach, 7th Edition, Pearson, 2001.
7. Data communications and Networking, Behrouz A Forouzan, Tata Mc Graw-Hill 5th edition, 2013
8. Larry Peterson and Bruce S Davis "Computer Networks :A System Approach" 5 thEdition , Elsevier -2014
9. Douglas E Comer, " Internetworking with TCP/IP, Principles, Protocols and Architecture" 6th Edition, PHI - 2014
10. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
11. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

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Course Code: EISC 306		
Course Title: Computer Networking- III Lab		
Number of Credits: 03	**Total Hours: 84**	**Total Marks: 75**

Prerequisites for the course
Students should know the topics covered in Computer Networking I, II Lab
Objectives of Course
This course is intended to introduce: 1. Basic switch configuration 2. Access switch via web browser 3. Implement VLAN 4. Understand STP
Lab Content
Exp.1: Accessing Switch via HyperTerminal **Exp.2:** Creating/ deleting user account on switch **Exp.3:** Resetting accounts and password of a switch **Exp.4:** Setting IP address of switch **Exp.5:** Getting information about switch **Exp.6:** Change name of switch **Exp.7:** To enable/disable ports of switch **Exp.8:** To access switch via web browser **Exp.9:** Creating static VLAN **Exp.10:** Configuring Tagged/untagged ports **Exp.11:** Configuring GVRP Dynamic VLAN **Exp.12:** Configuring STP on switches **Exp.13:** Configuring primary and secondary root bridge **Exp.14:** Monitoring STP Convergence **Exp.15:** Configuring static routes **Exp.16:** Configuring RIP **Exp.17:** Configuring route preference
Pedagogy
Experiments
Course Outcome
On completion of the course, students will be able to: 1. Implement basic switch configuration 2. Access switch via web browser 3. Implement VLAN 4. Implement STP

Course Code: EISC 307
Course Title: Power Electronics

Number of Credits: 03 **Total Hours: 42** **Total Marks: 75**

Prerequisites for the course

Basic understanding of electronics, semiconductor devices

Objectives of Course

To provide strong foundation of high power electronic components
Familiarize students to the principle of operation and design of different power conversion circuits and their applications. To give overview of practical application of power electronics.

Course Content

Unit I	**Power electronic system**	**4 Hours**
Power electronics vs. linear electronics, scope and applications, safety and maintenance.		
Unit II	**Power semiconductor devices**	**10 Hours**
Thyristors – Silicon Controlled Rectifiers (SCR's), Two transistor analogy, characteristics, Turn on and turn off methods, Snubber circuit, Power MOSFET, Power IGBT, UJTand their characteristics.		
Unit III	**Power converters**	**10 Hours**
Basics of AC-AC (AC voltage controllers, cyclo-converter) converter AC-DC Single phase and 3 phase full bridge rectifiers, DC-DC (choppers) step-up (boost) and step down (buck) converter DC-AC (Inverter) single and three phase inverter		
Unit IV	**Control of AC and DC drives**	**10 Hours**
Basic principle and operation of speed control of induction motor, rotor resistance control, synchronous motor drives, drive selection, DC motor speed control, DC chopper drives, PLL control of DC drives, computer control DC drives.		
Unit V	**Applications of power electronics**	**8 Hours**
Switch mode power supply, RF heating, Switch mode welding, Electronic lamp ballast, Emergency lighting system		

Pedagogy

Lectures/Tutorial/Assignments/

Course Outcome

Students are expected to have a good understanding of high power electronics devices. Student should be able to describe basic operation and compare performance of various power semiconductor devices, passive components and switching circuits

References/Readings

1. POWER ELECTRONICS: Converters, Applications, and Design Second Edition by Ned Mohan
2. Power electronics by M. D Singh and K. B. Khanchandani
3. Fundamentals of power electronics by Robert W. Erickson and Dragan Maksimović
4. Power electronic by Bhimbra
5. Modern power electronic by P C Sen

Course Code: EISC 308 **Course Title: Power Electronics Lab**	
Number of Credits: 03 **Total Hours: 84** **Total Marks: 75**	
Prerequisites for the course	
Basic understanding of power electronics and semiconductor devices	
Objectives of Course	
To give practical exposure of the field by conducting various experiments based on high power electronics components.	
Course Content	**84 Hours**
Expt. 1: Study the SCR characteristics **Expt. 2:** StudyIGBT characteristics **Expt. 3:** AC-AC conversion **Expt. 4:** AC-DC conversion **Expt. 5:** DC-AC conversion **Expt. 6:** To study V-I characteristics of SCR and measure latching and holding currents **Expt. 7:** To study UJT trigger circuit for half wave and full wave control **Expt. 8:** To study single phase cyclo-converters. **Expt. 9:** To study triggering of (i) IGBT (ii) MOSFET (iii) power transistors. **Expt. 10:** To study operation of IGBT/MOSFET chopper circuit. **Expt. 11:** AC voltage control using TRIAC and DIAC **Expt. 12:**Speed control of universal motor **Expt. 13:** Step-up and step-down converter	
Pedagogy	
Lab experiments	
Course Outcome	
Students are expected to identify the faults in the given circuit. Analyze a power electronic design at the system level. He/ She should be able to demonstrate the working of high power electronics elements.	

Semester IV

Course Code: EIGC 401
Course Title: Environmental Studies

Number of Credits: 03 **Total Hours: 42** **Total Marks: 75**

Prerequisites for the course

Concern and watchfulness about current status of environment

Objectives of Course

To provide various awareness programs required for the welfare of the environment apart from the emphasis on the general and conventional issues surrounding the environment

Course Content

Unit I	**Introduction**	**10 Hours**

Definition, scope, and importance, need for public Awareness, Renewable and non- renewable resources. Natural resources: associated problems, Role of an individual in conservation, Equitable use for sustainable lifestyles.Ecosystems: Concept, Structure, and function of an ecosystem. Producers, consumers, and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids.

Unit II	**Biodiversity and its conservation**	**11 Hours**

India as a mega diversity Nation, Bio-geographically classification of India. Biodiversity: Hotspots, Value of biodiversity, Biodiversity at global, National, and local levels. Threats to biodiversity: habitat loss, poaching of wildlife, man- wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In– situ and Ex- situ conservation of biodiversity.

Unit III	**Pollution**	**11 Hours**

Environmental Pollution: Definition, Cause, effects, and uncontrolled measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards. Solid waste Management: Causes, effects, and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

Unit IV	**Social Issues and Ethics**	**10 Hours**

Social Issues and the Environment: From Unsustainable to Sustainable development. Urban problems related to energy. Water conservation: rainwater harvesting, watershed management. Resettlement and Rehabilitation of people; its problems and concerns. Case Studies.Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents, and holocaust. Case Studies. Wasteland reclamation. Consumerism and waste products. Issues involved in enforcement of environmental legislation. Public awareness.

Pedagogy

Lectures/Tutorial/Assignments/ Practice Sessions

Course Outcome

Vigilance and actions to prevent degradation of environment will be inculcated

References/Readings

1. Mike Hulme, Climates and Cultures.
2. Mark Garrett, Encyclopaedia of Transportation Social Science and Policy.
3. Steel, Science An A - to - Z Guide to Issues and Controversies.
4. John A Matthews, Encyclopaedia of Environmental Change.

Course Code: EIGC 402 **Course Title: Communication skills- IV**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Interest to strengthen oratory skills		
Objectives of Course		
To achieve successful sender's role in communication via verbal means		
Course Content		
Unit I	**Speaking Nuances: preparation**	**14 Hours**
Words and Phrases:A Brief History of Words, Dictionary and Thesaurus, Elements of Style guidelines for Effectiveness, Exercises. Sentence Construction:Introduction, Guidelines for Effectiveness, Exercises. Paragraph Development:Introduction, Central Components of a Paragraph Length, Techniques for Paragraphs, Exercises. The Art of Condensation:Introduction, Steps to Effective Précis Writing, Samples, Guidelines,Exercises.		
Unit II	**Effective Presentation Strategies**	**14 Hours**
Introduction, Defining Purpose, Analyzing Audience and Locale. Organizing Contents, Understanding Nuances of Delivery, Kinesics, Proxemics, Paralinguistics, Sample Speech, Exercises		
Unit III	**Interviews**	**14 Hours**
Introduction, Objectives, A Types of Interviews. Job Interviews: Face- To–Face, Employer's Expectations, Ten Success Factors, Ten Failure Factors, Preparation, Process, Follow Up, Tips for Success, Telephone Interviews,Preparation,Guidelines, Exercises		
Unit IV	**Group Communication**	**14 Hours**
Organizational Group Discussion: Brainstorming. Group Discussion as Part ofa Selection Process: Meetings: Purposes, Preparation, Procedure, Follow-Up. Conferences: Significance, Planning and Preparation, Procedure, Exercises		
Pedagogy		
Lectures/Tutorial/Assignments/ Practice Sessions		
Course Outcome		
Certain techniques to improve confidence and effectiveness in oratory domain, while - 1) specifically making presentations, answering interviews, Group Discussion and 2) generally working in a team.		
References/Readings		
1. Technical-Communication-Principles-and-Practice :*Meenakshi Raman* , Sangeeta Sharma Oxford-University-Press-2004 2. The Quick And Easy Way To Effective Speaking by Dale Carnegie 3. Do You Talk Funny?: 7 Comedy Habits To Become A Better Public Speaker by David Nihill 4. Confessions Of A Public Speaker by Scott Berkun 5. The Art Of Public Speaking by Stephen Lucas 6. Talk Like Ted: The 9 Public-Speaking Secrets Of The World's Top Minds by Carmine Gallo 7. Ted Talks: The Official Ted Guide To Public Speaking by Chris Anderson		

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Course Code: EIGC 403 **Course Title: Computer Peripherals and Troubleshooting**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		

Students should know the basics of computer system.

Objectives of Course

1. To learn and understand different computer peripherals
2. To know to install computer peripherals
3. To diagnose faults in computer peripherals
4. To troubleshoot faults in computer peripherals
5. To maintain the computer peripherals

Course Content

Unit I	**Computer Peripherals: Internal Components**	**14 Hours**

IDE and SATA Devices: Hard Disk Drive and CD/DVDs Drives, Floppy Disk, Zip Drive, Backup Drive. Expansion Cards: LAN Card, IDE Card , VGA and SVGA Cards, Sound Card, Interface Cards, I/O cards, Video
Cards, USB Card, Fire-Wire Cards, Internal Ports, Cables and Connector Types.

Unit II	**Computer Peripherals: External Components**	**14 Hours**

Monitors: CRT, LCD and LED Displays, Printers: Dot-Matrix Printer, Inkjet Printer, Laser Printer. Scanner: Photo Scanner, Documents Scanner, Bar Cord Scanner. Keyboards, Mouse, External Modem, Ports and Connectors, Batteries, Power supply, Pen Drives, SCSI interface devices, Laptop Computers, Digital Advance storage technology.

Unit III	**Maintenance and Troubleshooting**	**14 Hours**

Monitors, Printers, Scanner, Keyboards, Mouse, External Modem, Ports and Connectors, Batteries, Power supply, Pen Drives, SCSI interface devices, Laptop Computers, Digital Advance storage devices

Pedagogy

Lectures/Tutorial/Assignments

Course Outcome

On completion of the course students will be able to:

1. Know different computer peripherals
2. To install computer peripherals
3. Diagnose faults in computer peripherals
4. Troubleshoot faults in computer peripherals
5. Maintain the computer peripherals

References/Readings

1. Operating System Concepts, 9th edition Peter B. Galvin, Greg Gagne, Abraham Silberschatz, John Wiley & Sons, Inc.
2. Modern Operating Systems -By Andrew S. Tanenbaum (PHI)
3. Operating Systems 5th Edition, William Stallings, Pearson Education India
4. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
5. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.
6. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education/PHI
7. Operating System A Design Approach- Crowley, TMH.
8. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
9. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
10. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

Course Code: EIGC 404
Course Title: Computer Peripherals and Troubleshooting Lab

Number of Credits: 03	**Total Hours: 84**	**Total Marks: 75**

Prerequisites for the course

Students should know the basics of computer system.

Objectives of Course

1. To learn and understand different computer peripherals
2. To know to install computer peripherals
3. To diagnose faults in computer peripherals
4. To troubleshoot faults in computer peripherals
5. To maintain the computer peripherals

Lab Content

Exp.1: Study of different computer peripheral ports
Exp.2: Study of Input Peripherals
Exp.3: Study of Output Peripherals
Exp.4: Study on sound card, video card, VGA Card, network card
Exp.5: Installation of various peripheral device drivers
Exp.6: Installation and troubleshooting of Printer
Exp.7: Installation and troubleshooting of Scanner
Exp.8: Study of Monitor
Exp.9: Study of Keyboard
Exp.10: Study of Mouse
Exp.11: Study of Laptop

Pedagogy

Experiments

Course Outcome

On completion of the course students will be able to:

1. Know different computer peripherals
2. To install computer peripherals
3. Diagnose faults in computer peripherals
4. Troubleshoot faults in computer peripherals
5. Maintain the computer peripherals

Course Code: EISC 401
Course Title: Digital Electronics II

Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**

Prerequisites for the course

Basic knowledge of digital electronics and logic gates.

Objectives of Course

To acquire basic knowledge of advanced digital electronics. To prepare students to perform the analysis and design of various digital electronic circuits.

Course Content

Unit I	**Flip flops**	**7 Hours**

Basic FF: RS, Clocked RS, JK, D-type and T-type, Master Slave Concept, Shift register (shift left, shift right), Schmitt trigger. Applications of FF.

Unit II	**Counters**	**7 Hours**

Binary ripple counter, modulus of counter, BCD Decade Counter, cascade BCD decade counters, principle of digital counter and digital clock.

Unit III	**Asynchronous and synchronous sequential circuits**	**10 Hours**

Triggering of FF, Analysis and design of clocked sequential circuits, Design of Moore/Mealy models, state minimization, state assignment, circuit implementation, Stable and Unstable states, output specifications, cycles and races, state reduction, race free assignments.

Unit IV	**Memory devices**	**8 Hours**

Basic memory structure, ROM, PROM, EPROM, EEPROM, EAPROM, RAM, Static and dynamic RAM, Programmable Logic Devices.

Unit V	**AD and DA converter**	**10 Hours**

Digital to Analog Converters,Specifications, types and applications of D/A converter, Analog to Digital converters, Specifications, Types and applications of A/D converters.

Pedagogy

Lectures/Tutorial/Assignments/

Course Outcome

To understand and examine the structure of various flips-flops, counters and its application in digital design. The ability to understand, analyze and design various sequential circuits.

References/Readings

1. Digital Principles and Applications: Malvino and Leach TMH 4th edition 1986.
2. Electronics Devices and Circuits An Introduction: Allen Mottershed PHI 1997
3. Integrated Electronics: Millman and Halkias TMH 1972
4. Electronic Devices and Circuits: Millman and Halkais Mc Graw Hill 1967
5. Modern Digital Electronics: R. P. Jain TMH 3rd edition 2003.
6. Principles of Electronics: V.K.MethaS.Chand& Company 8th edition 2003.

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Course Code: EISC 402
Course Title: Digital Electronics II Lab

Number of Credits: 03 **Total Hours: 84** **Total Marks: 75**

Prerequisites for the course

Should have studied basic level digital electronic subjects. It is assumed that students have a working knowledge of passive and active components and digital circuits

Objectives of Course

The objective of this course is to understand advanced digital electronics concept through experiments.

Course Content	**84 Hours**

Expt. 1: Design of clocked RS flip-flop
Expt. 2: Design of clocked SR flip-flop
Expt. 3: Design of D-flip flop
Expt. 4: Testing truth table of J-K flip flop
Expt. 5: Universal shift register
Expt. 6: BCD counter using 74LS90
Expt. 7: 7 segment display using BCD counter
Expt. 8: Using ic 0808 demonstrate analog to digital conversion
Expt. 9: Interfacing sensor data to AD converter
Expt. 10: Demonstrate digital to analog conversion
Expt. 11: Application of DA converter for driving electrical load

Pedagogy

Lab experiments/assignments

Course Outcome

Ability to identify basic requirements for a design application and propose a cost effective solution. To develop skill to build, and troubleshoot digital circuits.

Course Code: EISC 403 **Course Title: Industrial Instruments**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Basic knowledge of electronics and instrumentation		
Objectives of Course		
This course is intended to provide the knowledge of instruments used in the industry. To provide the knowledge of Pressure, Flow, Temperature, Level, Humidity, Torque, Viscosity and Vibration measurements.		
Course Content		
Unit I	**Explain codes, standards and regulations**	**5 Hours**
Safety and regulations, OHS Regulation: Chemical and biological agents, Noise, vibration, radiation and temperature. Tools machinery and equipment safety, Ladders, scaffolds and temporary work platforms, Rigging, cranes and hoists, Mobile equipment, Electrical safety in different industry.		
Unit II	**Metrology**	**5 Hours**
Dimensional measurement, Dial gauges, Gauge blocks, Comparators, Flatness measurement, Optical flats, Sine bar, Angle gauges, Planimeter, Translational and rotational displacement using potentiometers, Strain gauges, Differential transformer, Different types of tachometers, Accelerometers		
Unit III	**Installs & Maintains Safety and Process Monitoring Systems**	**10 Hours**
ESD control systems, types, Levels of Shutdown: Unit Shutdown, Process Shutdown, Emergency Shutdown, Emergency Depressurize Shutdown. Electric Pneumatic, Hydraulic, Mechanical, Purposes of different types of ESD, Protection: Personnel, Environmental, Equipment. ESD testing procedures, Partial Stroke Test, Time test, Valve integrity, Interlock checks		
Unit IV	**Measurements of physical parameters**	**10 Hours**
Pressure measuring instruments and its types, Level sensing devices and types, Flow measurement instruments, Temperature measuring devices and types, pH measurement and viscosity.		
Unit V	**Programmable controllers**	**12 Hours**
Evolution of PLC, architecture and block diagram, Basic Ladder logic, logic functions, electrical wiring diagram, scan cycle, Types of PLC, CPU unit architecture, Input/output devices and it's interfacing, Digital-Analog modules, Communication modules, Special function modules, Programming languages for PLC.		
Pedagogy		
Lectures/Tutorial/Assignments/		
Course Outcome		
Student is expected to learn the construction and working of various industrial devices used to measure temperature, level, vibration, viscosity and humidity.		
References/Readings		

1. Fundamentals of Industrial Instrumentation and Process Control William C. Dunn
2. Principles of Industrial Instrumentation Third Edition, Dipak Patranabis
3. Nakra, B. C. and Chaudhry, K. K., Instrumentation Measurement and Analysis, Tata McGraw Hill (2003).
4. Programmable logic controller: Principle and applications NIIT
5. S. K. Singh, "Industrial Instrumentation & Control" 3rd Edition, Tata McGraw Hill, Reprint 2009.

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Course Code: EISC 404 **Course Title: Industrial Instruments Lab**		
Number of Credits: 03	**Total Hours: 84**	**Total Marks: 75**
Prerequisites for the course		
Understanding of basic electronics and instrumentation		
Objectives of Course		
Students will be introduced to practical aspects of different sensors. They will also take some examples for understanding the PLC controller used in the industry.		
Course Content		**84 Hours**
Expt. 1: Understanding of pressure gauge **Expt. 2:** Working of Thermocouple **Expt. 3:** Demonstration of Level sensing **Expt. 4:** Humidity sensor **Expt. 5:** pH measurement **Expt. 6:** Understanding of PLC **Expt. 7:** Simple load such as relay and switches **Expt. 8:** Logic function implementation **Expt. 9:** Interfacing of PLC **Expt. 10:** Case study of PLC for industrial application		
Pedagogy		
Lab experiments		
Course Outcome		
In this course students will learn practical aspects of instrumentation by using sensors and controllers. After finishing this module they will get more exposure of the industrial instrumentation processes.		

Course Code: EISC 405 **Course Title: Computer Networking- IV**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Students should know the topics covered in Computer Networking I, II, III		
Objectives of Course		
1. To understand Switch stacking 2. To understand NAT 3. To understand WAN 4. To understand Network Management 5. To understand Wireless Technologies		

Course Content		
Unit I	**Switch Stacking**	**6 Hours**
Physical Stacking Architecture, Stacking Features, Stacking Configuration, Full utilization of ring bandwidth, Master switch selection, Backup Master selection, Box ID Assignment Rules, Stacking topology change, Single IP (SIM) Management, SIM Group, SIM Topology, SIM Operation, Stacking guidelines, Stacking Configuration		
Unit II	**NAT**	**10 Hours**
NAT Basics, Types of NAT, NAT Configuration		
Unit III	**WAN**	**10 Hours**
Introduction, WAN Bandwidth, Connection types, WAN Support, WAN Cable		
Unit IV	**Network Management**	**6 Hours**
Network management, Infrastructure for Network management, The Internet standard management framework.		
Unit V	**Wireless Technologies**	**10 Hours**
Wireless Access Points, Wireless Network Interface Card, Wireless Antennas, Wireless regulations, Wireless topologies.		

Pedagogy

Lectures/Tutorial/Assignments

Course Outcome

On completion of the course, students will be able to:

1. Understand Switch stacking
2. Understand NAT
3. Understand WAN
4. Understand Network Management
5. Understand Wireless Technologies

References/Readings

1. Bell, C. G., Habermann, A. N., McCredie, J., Rutledge, R., & Wulf, W. (1970). Computer networks. In *Computer* (Vol. 3, Issue 5).
2. TANENBAUM, A. S., & WETHERALL, D. J. (2005). Computer networks. In *Computers, Software Engineering, and Digital Devices*. https://doi.org/10.4337/9781784711603.00023
3. D-Link Certified, DCS Switching Training Guide
4. D-Link Certified, DCS Switching Lab Manual
5. Cisco Certified Network Associate Training Guide
6. James F. Kurose, Keith W. Ross, Computer Networking A Top down Approach, 7th Edition, Pearson, 2001.
7. Data communications and Networking, Behrouz A Forouzan, Tata Mc Graw-Hill 5th edition, 2013
8. Larry Peterson and Bruce S Davis "Computer Networks :A System Approach" 5 thEdition , Elsevier -2014
9. Douglas E Comer, " Internetworking with TCP/IP, Principles, Protocols and Architecture" 6th Edition, PHI - 2014
10. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
11. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

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Course Code: EISC 406
Course Title: Computer Networking- IV Lab

Number of Credits: 03	**Total Hours: 84**	**Total Marks: 75**

Prerequisites for the course

Students should know the topics covered in Computer Networking I, II, III Lab

Objectives of Course

1. To understand Switch stacking
2. To understand NAT
3. To understand WAN
4. To understand Network Management
5. To understand Wireless Technologies

Lab Content

Exp.1 : Configuring physical stacking
Exp.2 : Configuring logical stacking
Exp.3 : Static NAT Configuration
Exp.4 : Dynamic NAT Configuration
Exp.5 : Testing and troubleshooting NAT
Exp.6 : Network Management
Exp.7 : Understanding network management on the campus
Exp.8 : Wireless Access Point
Exp.9 : Wireless Antennas

Pedagogy

Experiments

Course Outcome

On completion of the course, students will be able to:

1. Understand Switch stacking
2. Understand NAT
3. Understand Network Management
4. Understand Wireless Technologies

Course Code: EISC 407
Course Title: Laboratory Instruments

Number of Credits: 03 **Total Hours: 42** **Total Marks: 75**

Prerequisites for the course

Basic knowledge of electronic and measuring instruments

Objectives of Course

Develop the understanding of subject knowledge. Students will be made familiar with different instruments used in laboratory environment.

Course Content

Unit I	**Troubleshooting procedure**	**8 Hours**

Nature of faults, What is troubleshooting?, Fault location, Fault finding aids, Troubleshooting Technique, Troubleshooting procedure, Approaching components for tests, Grounding system in electronic equipments, Systematic troubleshooting check, Temperature intermittent problems, Corrective action, Preventive maintenance, Service and maintenance of instrument.

Unit II	**Electronic test equipments**	**8 Hours**

Multimeters, types of multimeter, Measurement of resistance, AC/DC Voltage, Current, continuity test, transistor and diode. The oscilloscope, Logic analyser, Signal analyser, Signal generator.

Unit III	**Earthing**	**5 Hours**

Types of earthing, Components of Earthing, how to check Earthing using Multimeter and Bulb, Calculate the total leakage.

Unit IV	**Stirrer**	**5 Hours**

Different types of Stirrer. Block Diagram of Stirrer, different types of Speed controllers, motors.

Unit V	**Water Bath**	**6 Hours**

Types of Water Bath, Components of Water bath, Heater, Stirrer to circulate water to maintain uniform temp, Temperature sensor, Thermostat

Unit VI	**Temperature controlled Oven and electrical heater**	**10 Hours**

Types of laboratory Ovens, Working Principle of Oven, dryers, Types of Electric Heaters, Distribution for Heating Systems, types of electric resistance heating wires, Pro and Cons of Using Electric heater.

Pedagogy

Lectures/Tutorial/Assignments/

Course Outcome

After successful completion of the course students will develop good understanding of instrument. He will be confident in handling these instruments.

References/Reading

1. Fundamentals of Industrial Instrumentation and Process Control William C. Dunn
2. Principles of Industrial Instrumentation Third Edition, Dipak Patranabis
3. Nakra, B. C. and Chaudhry, K. K., Instrumentation Measurement and Analysis, Tata McGraw Hill (2003).

Course Code: EISC 408 **Course Title: Laboratory Instruments Lab**		
Number of Credits: 03	**Total Hours: 84**	**Total Marks: 75**
Prerequisites for the course		
Basic understanding of instruments and electronics		
Objectives of Course		
Apply concepts learned in class to new situations. Learn to use scientific apparatus.		
Course Content		**84 Hours**
Expt. 1: Basic troubleshooting of DMM **Expt. 2:** Testing of electronic components **Expt. 3:** Understanding of signal generator **Expt. 4:** Testing of various electronics components using DMM **Expt. 5:** Troubleshooting of water bath **Expt. 6:** Troubleshooting of water heater **Expt. 7:** Study of Temperature controlled oven **Expt. 8:** Study of Important parts of stirrer **Expt. 9:** Troubleshooting of electrical heater **Expt. 10:** Study of CRO **Expt.11:** Study Earthing		
Pedagogy		
Lab experiments/Assignment/self study		
Course Outcome		
Should be able to repair the device by identifying and fetching different components. Students will gain a good understanding of subject knowledge by carrying out experiments. Should be able to draw the wiring diagram by looking at the device from outside.		

Semester V

Course Code: EIGC 501 **Course Title: Basic Accounting**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Interest to develop financial literacy theory		
Objectives of Course		
The course will ensure the students to gain a comprehensive knowledge on the various areas of accounts		
Course Content		
Unit I	**Accounting Process**	**14 Hours**
Define the accounting process, Describe the role of accounts- Explain accounting concepts and principles, Discuss the concept of the accounting equation, Use the accounting equation to analyse basic transactions in terms of increases and decreases, Reporting financial information on a balance sheet, Determine how transactions change owner's equity in an accounting equation,		
Unit II	**Worksheet**	**14 Hours**
Describe and prepare the worksheet, Plan and adjust entries on a worksheet, Extend financial statement information on a worksheet, Find and correct errors on a worksheet, Describe the content and purpose of the three basic financial statements and how they are related.		

Unit III	Payroll	14 Hours
Prepare payroll records, Preparing payroll time cards, Calculating total earnings, Determining payroll tax withholding, Preparing payroll checks, Record, and journalize the payroll for a merchandising business, Record employer payroll taxes, Reporting, and paying withholding and payroll taxes		
Pedagogy		
Lectures Sessions		
Course Outcome		
Knowledge on the various areas of accounts will be studied		
References/Readings		
1. Basic Accounting: The step-by-step course in elementary accountancy, By Nishat Azmat, Andy Lymer, Hachette UK. 2. Basic Accounting, By Rajni Sofat, PHI Learning Pvt. Ltd. 3. Basic Accounting, By Sofat, Rajni , Hiro, Preeti, Phi Learning Pvt. Ltd. 4. Accounting for Beginners, By Kokab Rahman, Createspace Independent Pub, 2013		

Course Code: EIGC 502 **Course Title: Value Education**		
Number of Credits:03	**Total Hours:42**	**Total Marks: 75**
Prerequisites for the course		
Interest to strengthen ethics and morals.		
Objectives of Course		
To provide a sharp insight into the importance of human values, ethics, morality and above all the full growth of personality to ensure some total development of the human mind.		
Course Content		
Unit I	**Human Values**	**10 Hours**
Concept of Human Values, Value Education Towards personal development, Aim of value education; Evolution of value oriented education; Concept of Human values; types of values; Components of value education. Social Values, Professional Values , Religious Values, Aesthetic values.		
Unit II	**Factors influencing Human values**	**11 Hours**
Impact of Global Development on Ethics and Values, Conflict of cross–cultural influences, mass media, cross–border education, materialistic values, professional challenges and compromise, Modern Challenges of Adolescent Emotions and behaviour.		
Unit III	**Therapeutic Measures**	**11 Hours**
Therapeutic Measures: Control of the mind through: Simplified physical exercise, Meditation: Objectives, types, effect on body, mind and soul, Yoga: Objectives, Types, Asanas, Activities: Moralisation of Desires, Neutralisation of Anger, Eradication of Worries, Benefits of Blessings		
Unit IV	**Human Rights**	**10 Hours**
Human Rights: concepts & evolution, Broad classification of Human rights and Relevant Constitutional Provisions, Human Rights of Women and Children, HIV/AIDS. Women and Child Welfare. Case Studies		
Pedagogy		
Lectures Sessions including Motivational classes on values and ethics, PPT presentation on selected areas, case studies.		
Course Outcome		
Personality with morals, ethics, balanced mindset and civic sense will be inculcated		
References/Readings		

1. Value education and human rights, By R. P. Shukla, Sarup& Sons
2. Value Education And Education For Human Rights, By V.C. Pandey, Gyan Publishing House.
3. Education for Values, Environment and Human Rights, By Y. K. Sharma, Published by Deep and Deep Publications.
4. Human Rights: Twenty First Century Challenges, edited by V.N. Viswanathan (ed. By), Gyan Publishing House.
5. Education for Values, Environment and Human Rights, By J. C. Aggarwal, Shipra Publications, 2005
6. Human Rights Education: A Global Perspective, edited by HemlataTalesra, Nalini Pancholy, Mangi Lal Nagda, Published by Daya Books.

Course Code: EIGC 503
Course Title: Introduction to Multimedia Technology

Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**

Prerequisites for the course

Artistic(aesthetic) inclination augmented with technicalities

Objectives of Course

This course is aimed at learning introduction, terminologies, technologies, different types and forms ofmultimedia, storage and access mechanism of each multimedia file type.

Course Content

Unit I	**Introduction to Multimedia**	**10 Hours**

Multimedia: Types, Multimedia Design Principles. Multimedia Technologies: Image(Graphic), Sound(Audio), Motion Picture(Video), Applications all each one

Unit II	**Graphic Media**	**10 Hours**

Definition, Types, Colour Modes: RGB, CMYK, Grayscale. Common Graphic Formats:purpose, characteristics, advantages and disadvantage, correct usage. Compression Techniques: Definition, types, advantages, disadvantages, and use.Graphic manipulation effects. Introduction to 3D : creating, editing

Unit III	**Audio Media**	**11 hours**

Basic understanding of audio/sound media, Principles of Audio Recording, Analogue to digital, and digital to analogue conversion. Common audio Formats and Codecs: purpose, characteristics, advantages and disadvantage, correct usage, Uncompressed audio, Compressed audio. Audio Streaming & Podcasting, Audio effects & editing platforms

Unit IV	**Video Media**	**11 Hours**

Basic concepts of video media, Common Video Formats and Codec: purpose, characteristics, advantages and disadvantage, when to use and when not use), Principles of Video Production: Making, Pre-Production: concept, outline, and Post Production: Visual effects, Distribution, editing, Colour Correction, Uncompressed video, Compressed video

Pedagogy

Lectures (via multi-media projector, black board, group activities, demonstrations) etc. assignment/ mini-project

Course Outcome

The different types, forms, issues and principles in Multimedia, concepts of graphic media and colour modes, Design 3D models, choosing the best suitable file formats of graphic media, with focus on its storage and representation.

References/Readings

1. Tay Vaughan, Multimedia: Making It Work, Tata Mc-Graw Hill., 9th Edition
2. Buford, Multimedia Systems, Pearson edition, 2003
3. Vasuki Belavadi, Video Production, Oxford University Press India; 2nd Edition
4. Ted Alspach, Jennifer Alspach, Illustrator CS Bible, John Wiley & Sons, 1st edition
5. Ranjan Parekh, Principles of Multimedia, TMH, 2nd Edition, 2017
6. Ralf Steinmetz and Klara Nahrstedt, Multimedia: Computing, Communication and applications, Springer, 2004

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Course Code: EIGC 504
Course Title: Introduction to Multimedia Technology Lab

Number of Credits:03 **Total Hours: 42** **Total Marks: 75**

Prerequisites for the course

Interest to develop multimedia skills with practical's

Objectives of Course

Learning : processing of the different types of multimedia files, graphics editing through a graphic manipulation tool, recording and manipulate audio files, capturing and process video streams, computer based animations

Course Content

Exp.1: Graphics capturing
Exp.2: Conversion from one format to another
Exp.3: Audio recording
Exp.4: Audio storage and conversion
Exp.5: Audio mixing
Exp.6: Video Capturing and Editing
Exp.7: Video Effects and transitions
Exp.8: Video composition
Exp.9: story boarding, rendering
Exp.10: 2D/3D character modelling
Exp.11: 2D/ 3D Animation Techniques
Exp.12: Watermarking Graphics, Audio, Video and animations.

Pedagogy

Lectures/Tutorial/Assignments

Course Outcome

1. Explain the various image editing features on images.
2. Design and edit audio streams
3. Capture videos and apply different editing effects on videos
4. Design 2D, 3D animations

References/Readings

1. Ranjan Parekh, Principles of Multimedia, TMH, 2nd Edition, 2017
2. Brie Gyncild, Adobe Photoshop CS6,Pearson Education
3. Adobe Creative Team, Adobe Audition CS6 Classroom in a Book, Adobe
4. Ted Alspach, Illustrator Bible, John Wiley & Sons
5. Robert Reinhardt, Macromedia Flash 8 Bible, John Wiley & Sons Web

Course Code: EISC 501 **Course Title: Microcontroller**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Basic understanding of digital electronics		
Objectives of Course		
To introduce students with the architecture and operation of typical microcontrollers.To provide foundation for designing real world applications		
Course Content		
Unit I	**Introduction toMicrocontroller**	**5 Hours**
Definition of microcontroller, block diagram, internal parts: CPU, RAM, ROM, Timers, I/O ports, Serial port.Basicsofadvanced microprocessor		
Unit II	**Architecture**	**8 Hours**
Special Function Registers (SFRs), I/O Pins Ports and Circuits, Instruction set, Addressing modes		
Unit III	**Programming**	**10 Hours**
Serial Port Programming, Interrupts Programming, LCD & Keyboard Interfacing, ADC, DAC & Sensor Interfacing, External Memory Interface, Stepper Motor and Waveform generation		
Unit IV	**Memory Interfacing and I/O interfacing**	**10 Hours**
Parallel communication interface, Serial communication interface**,** D/A and A/D Interface, Timer, Keyboard /display controller, Programming and applications Case studies: Traffic Light control, and Alarm Controller.		
Unit V	**Advanced microprocessors**	**9 Hours**
Introduction to Raspberry pi, Architecture, Functionality of Raspberry pi board, Interfacing and basics of programming.		
Pedagogy		
Lectures/Tutorial/Assignments/		
Course Outcome		
Design electrical circuitry to the microcontroller I/O ports in order to interface to the external devices. Solve basic binary math operations using the Microcontroller. At the end of this course student will basic architecture of the microcontrollers.		
References/Readings		
1. The 8051 microcontroller by Kenneth Ayala 2. The 8051 microcontroller and embedded system by Muhammad Ali Zaidi and Janice GillispieMazidi 3. 8051 microcontroller: An application based introduction by David Calcutt, Fred Cowan and Hassan Parchizadeh 4. 8051 microcontroller by Sampath K Venktesh 5. 8051 microcontroller by Udayshankara 6. Eben Upton and Gareth Halfacree, “Raspberry Pi User Guide”, August 2016, 4th edition, John Wiley & Sons. 7. Alex Bradbury and Ben Everard, “Learning Python with Raspberry Pi”, Feb 2014, JohnWiley& Sons.		

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Course Code: EISC 502 **Course Title: Microcontroller Lab**		
Number of Credits: 03	**Total Hours: 84**	**Total Marks: 75**
Prerequisites for the course		
Understanding of digital electronics and basics of microcontrollers		
Objectives of Course		
To familiarize the students with the programming and interfacing of microcontrollers.		
Course Content		**84 Hours**
Expt. 1: Interfacing LEDs using 8051 **Expt. 2:** Interfacing Keyboards using 8051 **Expt. 3:** Interfacing Seven-Segment Displays using 8051 **Expt. 4:** Interfacing LCD Displays using 8051 **Expt. 5:** Interfacing stepper motors using 8051 **Expt. 6:** Read sensor data using microcontroller using 8051 **Expt. 7:** Home automation using Raspberry pi **Expt 8:** Speed control of motor using Raspberry pi **Expt 9:** Sensor interfacing to using Raspberry pi **Expt 10**: IoT Applications based on pi		
Pedagogy		
Lab experiments		
Course Outcome		
Design electrical circuitry to the microcontrollers I/O ports in order to interface the external devices. Provide solutions to real world control problems.		

Course Code: EISC 503 **Course Title: Computer Programming**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Fundamentals of computer, Fundamentals of IT, Logical thinking		
Objectives of Course		
To learn the theory of Python Programming language		
Course Content		
Unit I	**Python programming set-up**	**8 Hours**
Introduction to Python Language : What is Python, Uses of Python Programming Language / Python Applications, Python for Software development, Python for Networking, Python for Automated Testing, Features of Python Programming Language, Implementations of Python, and Python career opportunities. **Download & Install Python :**Download your operating system compatible Python Interpreter, install Python, set environment variable, customize Python shell, write & execute Python programs using Interactive mode and script mode. Python PyCharm or IDE, set Python for PyCharm IDE, configure PyCharm IDE, write & execute Python programs. **Python Language Syntax :** Modes of Programming in Python, Interactive mode programming, Script mode programming, Creating Python program file, Python Identifiers, Python keywords, Lines and Indentation, Spilt Python statements, Join Python Statements, Writing code blocks, Comments in Python, and Quotation in Python.		

Python Keywords and Identifiers: Python keywords or Reserved words, Python keywords define the syntax and structure of the Python language, Python keywords are case sensitive, Python literals (True, False, Null), Python Identifiers, class names, variable names, function names, method names, and Identifier naming rules.

Python Comments : Purpose/use of comments in Computer Programming, Comments for Understanding Python code, Python Comment Syntax, Python Single line comment, Multiline comment in Python, and writing Python comments.

Unit II	**Data Types and Input/Output Operators**	**10 Hours**

Python Variables : Introduction, Declaration of Variables, Assign Values to Variables, Initialization, Reading, Variable naming restrictions, and Types of Python Variables.

Python Data Types : Introduction**,** Implicit Declaration of Data Types,

Python Operators : Python Arithmetic, Comparison/Relational Operators, Increment Operators, Logical operators, Python Identity Operators, and Python Operators Precedence.

Python Numbers : integers, floats, and complex numbers

Python Strings : Alphabets, Numbers, and Special Characters. Operations on Strings, Finding String length, Concatenating Strings, print a String multiple times, Check whether the String has all numeric characters, Check whether the String has all alphabetic characters

Unit III	**Python Control Flow**	**8 Hours**

Decision Making : Simple If Structure, if-else structure, if else-if structure, and nested If Structure. Execute a block of Statements when the condition is true, execute a block of Statements when a compound condition is true, Execute a block of Statements when the condition is true otherwise execute another block of Statements, Decide among several alternates(else-if), and Execute a block of Statements when more than one condition is true (Nested if))

Flow – Looping : Python while loop, Python for loop, Python range (), Python Nested Loop Structures, and Inserting conditions in Loops and vice versa.

Flow – Branching: break, continue, pass

Unit IV	**Functions**	**8 Hours**

Python user-defined Functions

Python Built-in Functions

Unit V	**Storage Classes**	**8 Hours**

Python – Modules

Python User Input: input() built-in function, read as a string and assign to a variable.

Python Lists : Python Data Structures, Create Python Lists, Update Python Lists, Delete Elements from Python Lists, and Built-in Functions & Built-in Methods for Python Lists.

Python Tuples: differences between tuples and lists

Python Sets

Python Dictionaries

Pedagogy

Lectures/Tutorial/Assignments

Course Outcome

The theory of pythonProgramming language will be learnt

References/Readings

1. Python Crash Course, 2nd Edition: A Hands-On, Project-Based Introduction to Programming
2. Learning Python, 5th Edition
3. Automate the Boring Stuff with Python, 2nd Edition: Practical Programming for Total Beginners
4. Python for Everybody: Exploring Data in Python 3
5. Python (2nd Edition): Learn Python in One Day and Learn It Well. Python for Beginners with Hands-on Project. (Learn Coding Fast with Hands-On Project Book 1)
6. Python Pocket Reference: Python In Your Pocket
7. Elements of Programming Interviews in Python: The Insiders' Guide
8. Head First Python: A Brain-Friendly Guide

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Course Code: EISC 504 **Course Title: Computer Programming Lab**		
Number of Credits: 3	**Total Hours: 84**	**Total Marks: 75**
Prerequisites for the course		
Fundamentals of computer, Fundamentals of IT, Logical thinking		
Objectives of Course		
To implement and practice the theoretical concepts in Python programming language		
Course Content		
Exp.1: Write program for understanding the concept of Constants, Integer Constants, Real Constants, Character Constants, String Constants, Backslash Character Constants, Concept of an Integer and Variable, Rules for naming Variables and assigning values to variables **Exp.2:**Write programs for various Operators, **Exp.3:**Write program for Converting Integers to Floating-point and vice-versa, **Exp.4:**Write programs for all Python Control Flow **Exp.5:**Write program for Fibonacci series using Recursion Function. **Exp.6:**Write program for understanding the concept of Pointers, **Exp.7:**Write program for understanding Structures concept, Structures and Functions, Arrays of Structures, Pointers to Structures, Self-referential Structures, Unions. **Exp.8:**WAP to reverse a number, **Exp.9:**WAP to compute the factors of a given number. **Exp.10:**Write a program that swaps two numbers. **Exp.11:**WAP that prints a table. **Exp.12:**Write a program that computes the area and the circumference of the circle. **Exp.13:**Write a function that checks whether a given string is Palindrome or not. **Exp.14:**Write a function to find whether a given no. is prime or not.		
Pedagogy		
Lectures/Tutorial/Assignments/ Practice Sessions		
Course Outcome		
The theoretical concepts in C programming language were practised by implementing		

Course Code: EISC 505 **Course Title: Computer Networking- V**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**

Prerequisites for the course

Students should know the topics covered in Computer Networking I, II, III, IV

Objectives of Course

In this course you will explore information security through some introductory material and gain an appreciation of the scope and context around the subject. This includes a brief introduction to cryptography, security management and network and computer security that allows you to begin the journey into the study of information security and develop your appreciation of some key information security concepts.

Course Content

Unit I	**Computer Security**	**15 Hours**
Secure Password, Password manager, Two step verification, Antivirus, Firewall, Gateway, Internet browsing security, wireless security, social media security, Smartphone security, VPN		
Unit II	**Network Security**	**15 Hours**
Network Security, Principles of cryptography, Message Integrity and Digital Signatures, End point authentication, Securing Email, Securing TCP Connections: SSL, Network Layer Security, ACL, Securing wireless LAN, Operational Security : Firewalls and Intrusion Detection System		
Unit III	**Web Security**	**6 Hours**
Threats, Secure naming, Secure socket layer, Mobile code security		
Unit IV	**Security Management**	**6 Hours**
Security and Management: Conceptual Definitions, Philosophical and Legal basis of Security 3. Principles of Security. Basic Types of Security: Personnel, Physical, Information, Document Security, Important Assets and Threats to them. Historical perspective of Security: UK, USA, INDIA. Security Management Principles: Developing Security Policy, Organizing Security Resources, Implementing Security Plans / Programmes.		

Pedagogy

Lectures/Tutorial/Assignments

Course Outcome

On completion of the course, students will be able to:

1. Develop Concept of Security needed in Communication of data through computers and networks along with Various Possible Attacks
2. Understand Various Encryption mechanisms for secure transmission of data and management of key required for required for encryption
3. Understand authentication requirements and study various authentication mechanisms
4. Understandnetwork security concepts and study different Web security mechanisms.

References/Readings

1. Hill D.A & Rockley I.E, 1981, Security: Its management and control, Business Books.
2. Haldar, Dipak, 1986, Industrial Security in India, Ashish Publishing House.
3. Sabharwal, O.P., 2006, Security Management, Alpha Publications, New Delhi.
4. William Stallings: Cryptography and Network Security, Pearson 6th edition. 2013
5. V K Pachghare: Cryptography and Information Security, PHE ,2013.
6. Castoldi, & Mario. (2018). *Cybersecurity - Protecting Critical* (Issue May).
7. Pande, J. (2017). *Introduction to Cyber Security (FCS)*. http://uou.ac.in
8. D-Link Certified, DCS Switching Training Guide
9. D-Link Certified, DCS Switching Lab Manual
10. Cisco Certified Network Associate Training Guide
11. Lehto, M., &Neittaanmaki, P. (2015). Cyber Security: Analytics, Technology and Automation. In *Intelligent Systems, Control and Automation: Science and Engineering* (Vol. 78).

Course Code: EISC 506 **Course Title: Computer Networking- V Lab**		
Number of Credits: 03	**Total Hours: 84**	**Total Marks: 75**
Prerequisites for the course		
Students should know the topics covered in Computer Networking I, II, III, IV Lab		
Objectives of Course		
1. To know Network security 2. To Implement Computer security 3. To implement Web security 4. To implement Browser security 5. To understand Wireless security		
Lab Content		
Exp.1 : Configuring DHCP Server on SWR11 and SWR12 Switches **Exp.2 :** Configuring Access Control list **Exp.3 :** Configuring LLDP **Exp.4 :** System Maintenance **Exp.5 :** Install and Configure Antivirus software **Exp.6 :** Wireless Security **Exp.7 :** Web security **Exp.8 :** Smartphone security **Exp.9 :** Internet browser security **Exp.10 :** Firewall		
Pedagogy		
Experiments		
Course Outcome		
On completion of the course, students will be able to: 1. To know Network security 2. To Implement Computer security 3. To implement Web security 4. To implement Browser security 5. To understand Wireless security		

Course Code: EISC 507 **Course Title: Operating Systems**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Students should know the basics of computer system.		
Objectives of Course		
1. To learn and understand the Concepts of operating system 2. To Learn and understand operating system services 3. The core structure, functions and design principles of operating system 4. Interposes communications and basic concepts of virtualization		
Course Content		
Unit I	**Introduction**	**3 Hours**

Architecture, Goals & Structures of O.S, Basic functions, Interaction of O. S. & hardware architecture, System calls, Batch, multiprogramming. Multitasking, time sharing, parallel, distributed & real -time O.S.		
Unit II	**Process Management**	**7 Hours**
Process Concept, Process states, Process control, Threads, Uni-processor Scheduling: Types of scheduling: Pre-emptive, Nonpreemptive, Scheduling algorithms: FCFS, SJF, RR, Priority, Thread Scheduling, Real Time Scheduling. System calls like ps, fork, join, exec family, wait.		
Unit III	**Concurrency control**	**7 Hours**
Concurrency: Principles of Concurrency, Mutual Exclusion: S/W approaches, H/W Support, Semaphores, pipes, Message Passing, signals, Monitors, Classical Problems of **S**ynchronization: Readers-Writers, Producer Consumer, and Dining Philosopher problem. Deadlock**:** Principles of deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, System calls like signal, kill.		
Unit IV	**Memory Management**	**7 Hours**
Memory Management requirements, Memory partitioning: Fixed and Variable Partitioning, Memory Allocation: Allocation Strategies (First Fit, Best Fit, and Worst Fit), Fragmentation, Swapping, and Paging. Segmentation, Demand paging. Virtual Memory: Concepts, management of VM, Page Replacement Policies (FIFO, LRU, Optimal, Other Strategies), Thrashing.		
Unit V	**I/O management &Disk scheduling:**	**6 Hours**
I/O Devices, Organization of I/O functions, Operating System Design issues, I/O Buffering, Disk Scheduling (FCFS, SCAN, C-SCAN, SSTF), RAID, Disk Cache.		
Unit VI	**Inter Process Communication**	**6 Hours**
Basic Concepts of Concurrency, Cooperating process, Advantage of Cooperating process, Bounded- Buffer - Shared-Memory Solution, Inter-process Communication (IPC), Basic Concepts of Inter-process Communication and Synchronization		
Unit VII	**Multi-Processor Based and Virtualization Concepts**	**6 Hours**
Virtual machines; supporting multiple operating systems simultaneously on a single hardware platform; running one operating system on top of another. Reducing the software engineering effort of developing operating systems for new hardware architectures. True or pure virtualization. Para virtualization; optimizing performance of virtualization system; hypervisor call interface.		
Pedagogy		
Lectures/Tutorial/Assignments		
Course Outcome		
On completion of the course, students will be having understanding of following concepts of Operating System: 1. Process Management 2. Memory Management 3. File & I/O Management		
References/Readings		
1. Operating System Concepts, 9th edition Peter B. Galvin, Greg Gagne, Abraham Silberschatz, John Wiley & Sons, Inc. 2. Modern Operating Systems -By Andrew S. Tanenbaum (PHI) 3. Operating Systems 5th Edition, William Stallings, Pearson Education India 4. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley 5. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.		

6. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education/PHI
7. Operating System A Design Approach- Crowley, TMH.
8. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
9. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
10. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

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Course Code: EISC 508
Course Title: Operating Systems Lab

Number of Credits: 03	**Total Hours: 84**	**Total Marks: 75**

Prerequisites for the course

Students should know the basics of computer system.

Objectives of Course

1. To learn and understand the Concepts of operating system
2. To Learn and understand operating system services
3. The core structure, functions and design principles of operating system

Lab Content

Exp.1 : Basics of Unix Commands
Exp.2 : Program for system calls of unix operating system (fork, getpid, exit)
Exp.3 : C programs to simulate UNIX commands like cp, ls, grep.
Exp.4 : Simple shell programs
Exp.5 : CPU scheduling algorithms- Priority, Round Robin Scheduling, FCFS, SJF Scheduling,
Exp.6 : IPC using shared memory
Exp.7 : Algorithms for Deadlock
Exp.8 : Threading & synchronization applications
Exp.9 : Memory allocation methods
Exp.10 : Page replacement algorithm
Exp.11 : File organization technique
Exp.12 : File allocation strategies

Pedagogy

Experiments

Course Outcome

On completion of the course, students will be able to:
1. Identify different PC Components and their connection
2. Understand basic concepts of different OS
3. Use different system utilities

Semester VI

Course Code: EIGC 601 **Course Title: Entrepreneurship**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Interest to explore and learn the requirements to begin entrepreneurship		
Objectives of Course		
to understand the concepts and validity of various entrepreneurship development programs		
Course Content		
Unit I	**Introduction**	**10 Hours**
Entrepreneurship: Meaning and Importance, Evolution of term, Factors, Characteristics of an entrepreneur. Types of entrepreneurs: based on Business, Use of Technology, Motivation, Growth, Stages. New generations of entrepreneurship viz. social entrepreneurship, Health entrepreneurship, Tourism entrepreneurship, Women entrepreneurship etc.,Barriers to entrepreneurship		
Unit II	**Creativity**	**10 Hours**
Creativity and entrepreneurship, Steps in Creativity, Innovation, and inventions, using left brain skills to harvest right brain ideas, Legal Protection of innovation, Skills of an entrepreneur, steps in decision making and Problem Solving.		
Unit III	**Organization Assistance**	**12 Hours**
Assistance to an entrepreneur, New Ventures. Meaning, features &examples: Industrial Park, Special Economic Zone. Financial assistance: by different agencies, to MSME. Modernization assistance to small scale unit,Government Stores Purchase scheme (e-tender process). Excise exemptions and concession, Exemption from income tax, Export oriented units, Incentives and facilities to exports entrepreneurs, Export oriented zone,Registration categories, Registration Procedure. Environmental Clearance. Institutions supporting small business enterprise		
Unit IV	**Tutorials on Entrepreneurship Development Programme**	**10 Hours**
Case studies on Men/Women entrepreneurs, Seminar on successful entrepreneurs, small business project formulation: Meaning, contents, formulation, planning, commissions guidelines & specimen of a project report,Problems of entrepreneurs.		
Pedagogy		
Lectures/Tutorial/Assignments/ Practice Sessions		
Course Outcome		
The various entrepreneurship development programs will be understood		
References/Readings		
1. Entrepreneurship Development and Small Business Enterprises, Poornima M. Charantimath, 2e, Pearson, 2014. 2. Entrepreneurship, A South – Asian Perspective, D. F. Kuratko and T.V.Rao, 3e, Cengage, 2012. 3. Entrepreneurship, Arya Kumar, 4 e, Pearson 2015. 4. The Dynamics of Entrepreneurial Development and Management, Vasant Desai, Himalaya Publishing House, 2015.		

Course Code: EIGC 602 **Course Title: Web designing**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Basic Programming Concepts		

Objectives of Course

To learn the concepts of web designing

Course Content

Unit I	**Introduction**	**10 Hours**

Introduction and Web Development Strategies, History of Web and Internet, Protocols governing Web, Writing Web Projects, Connecting to Internet, Introduction to Internet services and tools, Introduction to client-server computing.

Unit II	**Core Java**	**20 Hours**

Introduction, Operator, Data type, Variable, Arrays, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, Java Applet, String handling, Event handling, Introduction to AWT, AWT controls, Layout managers.
Programs for:Displaying a message "Welcome to JAVA", generates student grade sheet, prints Fibonacci series from 1 to 10, displaying factorial of a number.

Unit III	**Web Page Designing**	**16 Hours**

HTML: list, table, images, frames, forms, CSS, Document type definition, XML: DTD, XML schemes, Object Models, presenting and using XML, Using XML Processors: DOM and SAX, Dynamic HTML.
Create a basic HTML file, Create a static webpage using table tags of HTML, Create a static web page which defines all text formatting tags of HTML in tabular format, Create webpage using list tags of HTML, Create webpage to include image using HTML tag, Create employee registration webpage using HTML form objects, Apply style sheet in Web page. [inline, embedded and linked

Unit IV	**Internet & web browser**	**10 hours**

Web browser, Web search engine, electronic mail, Cloud computing

Write a script which creates and retrieves Cookies information, Create a dynamic web page which displays Ads using AdRotator Component.

Pedagogy

Lectures/Tutorial/Assignments

Course Outcome

Web designing concepts were learnt

References/Readings

1. Burdman, Jessica, "Collaborative Web Development" Addison Wesley
2. Xavier, C, " Web Technology and Design" , New Age International
3. Ivan Bayross," HTML, DHTML, Java Script, Perl & CGI", BPB Publication
4. Bhave, "Programming with Java", Pearson Education
5. Herbert Schieldt, "The Complete Reference:Java", TMH.
6. Hans Bergsten, "Java Server Pages", SPD O'Reilly
7. Tanveer Alam, Internet and Java Programming, Khanna Publishing House
8. Margaret Levine Young, "The Complete Reference Internet", TMH
9. Naughton, Schildt, "The Complete Reference JAVA2", TMH
10. Balagurusamy E, "Programming in JAVA", TMH
11. Greenlaw R and Hepp E "Fundamentals of Internet and www" 2nd EL, Tata McGrawHill, 2007.
12. Ivan Bayross, "HTML, DHTML, JavaScript, Perl CGI", 3rd Edition, BPB Publications. 13) D. Comer, "The Internet Book", Pearson Education, 2009. SUPPLEMENTARY READING
13. M. L. Young,"The Complete reference to Internet", Tata McGraw Hill, 2007
14. Godbole AS &Kahate A, "Web Technologies", Tata McGrawHill,2008
15. 16) B. Patel & Lal B. Barik, " Internet & Web Technology ", Acme Learning Publishers

Course Code: EIGC 603 **Course Title: Android Development**		
Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**
Prerequisites for the course		
Basic Programming Concepts		
Objectives of Course		
To construct an interface and handle the interactions at backend in Android		
Course Content		
Unit I	**Android Basics**	**11 Hours**
Overview, Environment Setup, Architecture. Resources: application components, Fragments, Intents/Filters,Broadcast Receivers. Services, Content Providers, Hello World Example		
Unit II	**Android User Interface**	**11 Hours**
UI design, UI layouts, UI Controls, UI Patterns. Event Handling,Styles and Themes, Custom Components		
Unit III	**Android Advanced Concepts**	**11 Hours**
Drag and Drop, Notifications, Location based services, Sending Email, SMS, Phone calls, Publishing Android Application		
Unit IV	**Android Examples**	**11 Hours**
Alert, Dialog, Custom Fonts, Auto Complete, Animations, Audio Capture, Camera, Clipboard, Image Effects, Media Player, Navigation: Login Screen, Progress bar, Push Notifications, Multitouch, Internal Storage		
Unit V	**Android Advanced Examples**	**12 Hours**
Network Connection, Google Maps, LinkedIn Integration, Twitter Integration. Bluetooth, Wi-Fi, Widgets. Data Backup, Best Practices		
Pedagogy		
Lectures/Tutorial/Assignments/ Practice Sessions		
Course Outcome		
Concepts to create a standard functional Android application for general use will be learnt		
References/Readings		
1. Headfirst Android Development by Dawn Griffiths 2. Android App Development For Dummies by Michael Burton 3. Hello, Android Introducing Googles Mobile Development Platform by Ed Burnette 4. Android Programming The Big Nerd by Brain Hardy 5. Busy Coder's Guide To Android Development – Mark M Murphy 6. Android Cookbook by Ian Darwin 7. Android Programming Pushing The Limits by Eric Hellman		

Course Code: EIGC 604 **Course Title: Android Development Lab**		
Number of Credits: 3	**Total Hours: 84**	**Total Marks: 75**
Prerequisites for the course		
Handling any IDE of any programming language		
Objectives of Course		
To create a standard functional Android application for general use		

Course Content
Exp.1: Create Hello World application: to display “Hello World” in the middle of the screen in the emulator & in the middle of the screen in the Android Phone. **Exp.2:**Create- HELLO SKILLS, when the button is clicked **Exp.3:**Create 4 buttons which displays four values **Exp.4:** Create an application with login module. (Check username and password). **Exp.5:** Create spinner with strings taken from resource folder (res >> value folder) and on changing the spinner value, Image will change. **Exp.6:** Create a menu with 5 options and selected option should appear in text box. **Exp.7:** Create a list of all courses in your college and on selecting a particular course teacher-incharge of that course should appear at the bottom of the screen. **Exp.8:** Create an application with three option buttons, on selecting a button colour of the screen will change. **Exp.9:** Create and Login application as above. On successful login, pop up the message.
Pedagogy
Lectures/Tutorial/Assignments/ Practice Sessions
Course Outcome
A standard functional Android application for general use was created

Course Code: EISC 601
Course Title: Robotics

Number of Credits: 03	**Total Hours: 42**	**Total Marks: 75**

Prerequisites for the course

Students should know basic mathematics, basic electrical and electronic components, basic electrical and electronic concepts.

Objectives of Course

1. To learn and understand the Concepts of Robotics and its anatomy
2. Understand the various electronic controls in robotics
3. Understand sensor technology
4. Know basic python programming

Course Content

Unit I	**Basic Concepts in (fundamentals of) robotics**	**04 Hours**

Automation and robotics, Robots in history, Robots today, Robot applications, Laws of Robotics. Robot Classification: By application, coordinate system, actuation system, control method, programming method.

Unit II	**Robot anatomy**	**06 Hours**

Links and joints, joint notation scheme, degree of freedom, Robot resolution, accuracy and repeatability, concept of workspace

Unit III	**Drive Systems**	**10 Hours**

Pneumatic and hydraulic systems. Electric: Relation between torque and voltage, AC and DC Servo motors, Stepper motor, BLDC Motors.Electronic control of motors: controllers

Unit IV	**Sensors**	**08 Hours**

Characteristics of sensors, Classification, touch sensor, position sensors, potentiometer, LVDT, Optical encoder, Force/moment sensor, Range sensor, Proximity sensor: Inductive, capacitive, hall effect sensor, Passive sensor: RCC

Unit V	**Basics of Python for Robotics**	**10 Hours**

Essentials, conditional statements, loops, classes, writing simple codes.

Unit VI	**Robot End Effectors**	**04 Hours**

Grippers and tools

Pedagogy

Lectures/Tutorial/Assignments

Course Outcome

On completion of the course, students will be able to :

1. Identify different Robotic Components and their anatomy.
2. Understand basic concepts in Robotics.
3. Understand the various electronic controls in robotics.
4. Understand sensor technology.
5. Know basic python programming.

References/Readings

1. John J. Craig; Introduction to Robotics, Mechanics and control; Pearson Education Inc.
2. Roland Siegwart, Illah R. Nourbakhsh- Introduction to Autonomous mobile robots, MIT Press, 2nd Edition
3. S.K. Saha, Introduction to Robotics, 2nd Edition; McGrawHill
4. Peter Corke, Robotics Vision and Control; Springer
5. M.P. Groover, M. Weiss, R. N. Nagel, N. G. Odrey; Industrial Robotics Technology: Programming and Applications, McGrawHill
6. Mittal &Nagrath; Robotics and Control; McGrawHill

Course Code: EISC 602 **Course Title: Robotics Lab**		
Number of Credits: 03	**Total Hours: 84**	**Total Marks: 75**
Prerequisites for the course		
Students should know the basics of Robotics		
Objectives of Course		
1. To learn and understand the Concepts of Robotics 2. To implement basic mini projects to develop interest in Robotics field 3. To know the basics of Python programming		
Lab Content		
Expt. 1: Introduction to robotic components **Expt. 2:** Sensors in Robots **Expt. 3:** Line follower Robot **Expt. 4:** Simple codes on Python Programming I **Expt. 5:** Simple codes on Python Programming II **Expt. 8:** Simple Robotic Buggy/vehicle **Expt. 9:** Obstacle avoiding Robot **Expt. 10:** Line follower Robot **Expt. 11:** Human following Robot **Expt. 12:** Build an edge avoiding Robot **Expt. 13:** Pick and place Robot **Expt. 14:** Gesture controlled Robot		
Pedagogy		
Experiments		
Course Outcome		
On completion of the course, students will be able to: 1) Identify different Robotic Components and their connection 2) Understand basic concepts in Robotics 3) Implement mini Projects in Robotics 4) Know basic python programming		

Course Code: EISC 603
Course Title: Electric Vehicle and Battery Technology

Number of Credits: 03 **Total Hours: 42** **Total Marks: 75**

Prerequisites for the course

Basic understanding of the electrical concepts, working of motors

Objectives of Course

Explain the basics of electric and hybrid electric vehicles, their architecture, technologies and fundamentals. Analyze various electric drives suitable for hybrid electric vehicles

Course Content

Unit I	**Electric vehicle**	**6 Hours**

Componentsand layout of electric vehicles, comparison with internal combustion engine, Basics of the HEV, Basics of Plug-In Hybrid Electric Vehicle (PHEV), Basics of Fuel Cell Vehicles (FCVs). HEV Fundamentals: Introduction, Model, performance, types.

Unit II	**Power Electronics in HEVs**	**9 Hours**

Power electronics: AC-DC, DC-AC conversion, electronic devices and circuits for control and distribution of electric power, Thermal Management of HEV.

Unit III	**Electric Machines and Drives in HEVs**	**9 Hours**

Introduction, BLDC motors, Induction Motor Drives, Permanent Magnet Motor Drives, Switched Reluctance Motors, Doubly Salient Permanent Magnet Machines, Design and Sizing of Traction Motors.

Unit IV	**Integration of Subsystems**	**9 Hours**

Sizing of propulsion motor and power electronics, selecting the energy storage technology, Communications, supporting subsystems.Energy management strategies in hybrid and electric vehicle, different energy management strategies.

Unit V	**Batteries**	**9 Hours**

Ultracapacitor, Fuel Cells, Different batteries for EV, Battery Characterization, Comparison of Different Energy Storage Technologies for HEVs, Battery Charging Control.

Pedagogy

Lectures/Tutorial/Assignments/

Course Outcome

After completion of this course student will have a deeper understanding of electric vehicles, power electronics, motors, different types of batteries and fuel cell.

References/Readings

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press , 2003
2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press , 2004
3. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley , 2003
4. Chris Mi, M. Abul Masrur, David Wenzhong Gao, Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives, John Wiley & Sons Ltd. , 2011
5. Build your own electric vehicles by Seth Leitman and Bob Brant
6. Modern electric vehicles by C. C. Chan and K. T. Chau

Course Code: EISC 604 **Course Title: Electric Vehicle and Battery Technology Lab**	
Number of Credits: 03 **Total Hours: 84** **Total Marks: 75**	
Prerequisites for the course	
Understanding of electric vehicles, motors and high power electric components.	
Objectives of Course	
Hybrid electric vehicle architecture, design and component sizing and the power electronics devices used in hybrid electric vehicles. Study of different electronic components required for electric vehicles.	
Course Content	**84 Hours**
Expt. 1: Control circuit of induction motors **Expt. 2:** MOSFET based step-up and step-down chopper **Expt. 3:** Study of 3-phase induction motors **Expt. 4:** Battery monitoringandchargingcontrol **Expt. 5:** V/f control of three phase induction motors **Expt. 6:** Three phase induction motor control using IGBT **Expt. 7:** Speed control of DC motors using IGBT **Expt. 8:** Wiring diagram of electric vehicle **Expt. 9:** PWM inverter control **Expt. 10:** Speed control of BLDC motor	
Pedagogy	
Lab experiments	
Course Outcome	
After completing this course, students are expected to understand the major functional blocks of the electric vehicle. He/ She should be able to work on high power electrical components used in electrical vehicle.	

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