Scheme & Syllabus of UG

Engineering Program

Bachelor of Technology

(B.Tech.)

Electronics & Communication Engineering

2021-22

IPS ACADEMY

INSTITUTE OF ENGINEERING & SCIENCE, INDORE

(A UGC Autonomous Institute affiliated to RGPV)

IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)

Scheme Based on AICTE Flexible Curriculum

Department of Electronics & Communication Engineering

Bachelor of Technology (B.Tech.) VI Semester

S.No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem.	Mid Sem. Exam.	Quiz/Assignment	End Sem	Term work / Lab Work & Sessional		L	T	P	
1.	PCC-EC601	PCC	Embedded System & Robotics	70	20	10	30	20	150	3	0	2	4
2.	PCC-EC602	PCC	Antenna & Wave Propagation	70	20	10	30	20	150	2	1	2	4
3.	PCC-EC603	PCC	Internet of Things and it's Applications	70	20	10	-	-	100	3	0	0	3
4.	PEC-EC601	PEC	Professional Elective Course-2	70	20	10	-	-	100	3	0	0	3
5.	OEC-EC601	OEC	Open Elective Course-2	70	20	10	-	-	100	3	0	0	3
6.	PCC-EC604	PCC	Android App. Development	-	-	-	30	20	50	0	0	2	1
7.	PCC-EC605	PCC	Electronics Workshop – IV(Prototype Development & Introduction to Python)	-	-	-	30	20	50	0	0	4	2
8.	PROJ-EC601	PROJ	Seminar I	-	-	-	-	50	50	0	0	2	1
9.	PROJ-EC602	PROJ	To be completed anytime during sixth semester with minimum 90 hrs. Its evaluation/credit to be added in seventh semester.										
			Total	350	100	50	120	130	750	14	1	12	21

Departmental Electives	Open Electives
PEC-EC601 (A) Machine Learning & Artificial Intelligence	OEC-EC601 (A) Data Structure
PEC-EC601 (B) Voice Communication and Switching Techniques	OEC-EC601 (B) Entrepreneurship
PEC-EC601 (C) Probability and Stochastic Process	OEC-EC601 (C) 3D Printing & Application

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	1 Credit	1 Credit

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PCC-EC601	Embedded Systems & Robotics	3L: 0T: 2P (04 hrs.)	Credits: 04

Prerequisite: Fundamentals of microprocessors, microcontrollers, programming and interfacing.

Course Objective: The objective of this course is that students can learn fundamental concepts of Robotics and advanced microcontrollers like PIC, AVR and ARM.

MODULE I **(7 hrs.)**
Introduction & Fundamentals of Robotics: Introduction and classification of robots. Robotics Sensors: Position Sensors, robot calibration by optical encoder, proximity sensors, Ultrasonic & IR sensors, Force and Torque sensors, Touch and Slip sensors, Temperature and Humidity sensors, Light and Sound sensors, Pressure and Gas sensors, Acceleration sensors. Sensor Communication Protocols: I2C, SPI, CAN, USART.

MODULE II **(7 hrs.)**
Robotics Actuators: Relays and their types, Specifications and characteristics of Stepper motors, AC motors, DC motors and servo motors. Power driving circuit and Power management for actuators, Torque and speed relationship of motors, Motor speed controlling techniques.

MODULE III **(8 hrs.)**
Classification of Robots, Basics of matrices, Rotations & transformations, Introduction to D-H parameters and its physical significance, Orientation of gripper, Trajectory planning.

MODULE IV **(9 hrs.)**
8-bit PIC (1PICF877) Microcontroller Architecture, memory technologies, timing circuit, power- up& reset, parallel ports, ADC, interrupts, PWM, counters & timers, Instruction set, Memory mapping, Peripherals, Software development environment, programming tools.AVR (ATMEGA328) Features, Architecture, Instruction Set, Peripherals, Programming Interfaces, Programming in embedded C.

MODULE V **(9 hrs.)**
Interfacing of PIC and AVR: LED, LCD, 7 segment display, motor driver, ADC, DAC, memory, timers, delays, keyboard, GSM. Introduction to ARM microcontroller.

List of Experiments:

1. Write a program in embedded C to read temperature from LM35 and display on LCD.
2. Write a program in embedded C to read data from keypad & display on LCD.
3. Write a program in embedded C to control speed of motor.
4. Write a program in embedded C to control servo motor.
5. Write a program in embedded C to control IR sensor.
6. Code a sequence in Robotic software to pick and place an object by Robotic hand.
7. Code a sequence in Robotic software to control hands of a humanoid Robot.
8. Code a sequence in Robotic software to control legs of a humanoid Robot.
9. Code a sequence in Robotic software to make a Robot walk.
10. Code a sequence in Robotic software to make a Robot dance.

Assessment: Internal viva, Continuous evolution of experiments, Journal write-up, Quiz and End semester exam.

Course Outcome:

Students should be able to:

1. Understand the fundamentals of Robotics and explain working of sensors and their types.
2. Define different types of Actuators used in Robotics and illustrate concepts about their working.
3. Classify types of Robots in different applications and define various concepts related to their movements.
4. Understand PIC & AVR microcontroller architectures and programming in Robotics and embedded systems.
5. Design automated embedded systems by interfacing different Modules with advance controllers. Illustrate overview of ARM microcontroller architectures.

Text/ Reference Books:

1. Muhammad Ali Mazidi, "The avr microcontroller and embedded system using assembly and c", 3rd edition, Pearson, 2010.
2. Rajesh Singh, "Embedded System Based on Atmega Microcontroller: Simulation, Interfacing & Projects", Alpha Science, 2016.
3. Morton John, "PIC Microcontroller: Your Personal Introductory Course", 3rd edition, English, Paperback, 2005.
4. Phillip John McKerrow, "Introduction to Robotics", 1st edition, Paperback.
5. Dr. Kevin Klein, "Robotics: Discover the Robotic Innovations of the Future - An Introductory Guide to Robotics", 1st edition, Paperback, 2016.
6. Muhammad Ali Mazidi, "PIC Microcontroller and Embedded Systems: Using assembly and C for PIC 18", 1st edition, Pearson, 2008.

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PEC-EC601 (A)	**Artificial Intelligence & Machine Learning**	**3L: 0T: 0P (03 hrs.)**	**Credits: 03**

Recommended Prerequisite: Engineering Mathematics, Electronics

Course Objective: To learn understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc. and strong foundation of fundamental concepts in Artificial Intelligence.

MODULE I **(8 hrs.)**

Introduction to machine learning, scope and limitations, regression, probability, statistics and linear algebra for machine learning, convex optimization, data visualization, hypothesis function and testing, data distributions, data preprocessing, data augmentation, normalizing data sets, machine learning models, supervised and unsupervised learning.

MODULEII **(8 hrs.)**

Linearity vs non linearity, activation functions like sigmoid, ReLU, etc., weights and bias, loss function, gradient descent, multilayer network, back propagation, weight initialization, training, testing, unstable gradient problem, auto encoders, batch normalization, dropout, L1 and L2 regularization, momentum, tuning hyper parameters.

MODULE III **(8 hrs.)**

Convolutional neural network, flattening, sub sampling, padding, stride, convolution layer, Pooling layer, loss layer, dance layer 1x1 convolution, inception network, input channels, Transfer learning, one shot learning, dimension reductions, implementation of CNN like tensor flow, keras etc

MODULE IV **(8 hrs.)**

General problem solving, production systems, control strategies forward and backward chaining, exhaustive searches depth first breadth first search. Hill climbing, branch and bound technique, best first search & A* algorithm, AND / OR graphs, problem eduction & AO* algorithm, constraint satisfaction problems.

MODULE V **(8 hrs.)**

First order predicate calculus, skolemization, resolution principle & unification, interface mechanisms, horn's clauses, semantic networks, frame systems and value inheritance, scripts, conceptual dependency. Parsing techniques, context free grammar, recursive transitions nets (RNT), augmented transition nets (ATN), case and logic grammars, semantic analysis.

Assessment: Mid-term test, Assignment, Tutorial, Quiz and End semester exam.

Course Outcomes:

Students earning credits will develop ability to:

1. Apply knowledge of computing and mathematics to machine learning problems, model and algorithms.
2. Analyze a problem and identify the computing requirements appropriate for its solution.
3. Design, implement, and evaluate an algorithm to meet desired needs.
4. Learning of general issues and overview of AI.
5. Design of different problem solving, search and control strategies in AI.

Text/ Reference Books:

1. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer-Verlag New York Inc., 2nd Edition, 2011.
2. Tom M. Mitchell, "Machine Learning", McGraw Hill Education, First edition, 2017.
3. Elaine Rich and Kevin Knight, "Artifical Intelligence" - Tata McGraw Hill.
4. Dan W. Patterson "Introduction to Artifical Intelligence and Expert Systems", Prentice India
5. Aurelien Geon, "Hands-On Machine Learning with Scikit-Learn and Tensor flow: Concepts, Tools, and Techniques to Build Intelligent Systems", hroff/O'Reilly; First edition (2017).
6. Francois Chollet, "Deep Learning with Python", Manning Publications, 1 edition (10 January 2018).
7. Russell, S. and Norvig, N. "Artificial Intelligence: A Modern Approach", Prentice HallSeries in Artificial Intelligence. 2003.
8. Clocksin&C.S.Melish "Programming in PROLOG", Narosa Publishing House.
9. M. Sasikumar, S. Ramani, "Rule based Expert System", Narosa Publishing House

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PEC-EC601 (B)	**Voice Communication and Switching Techniques**	**3L: 0T: 0P (03 hrs.)**	**Credits: 03**

Prerequisite: Communication System

Course objective: The objective is to understand basics of telephone networks, voice digitization, designing the switching structures and analyzing the telecommunication traffic models.

Module I **(5 hrs.)**

Telephone instruments and signals : Introduction, the subscriber loop, standard telephone set, basic call procedure, call progress tones and signals, cordless telephones, caller identification, electronic telephones. Telephone circuit - local subscriber loop, channel noise and s of power measurements, transmission parameters, voice frequency circuit arrangements, crosstalk.

Module II **(9 hrs.)**

Public telephone network: Introduction, transmission system environment, public telephone network, instruments, local loops, trunk circuits, telephone exchanges - local exchanges, automated central office switches and exchanges, telephone numbering plan, telephone services, telephone switching hierarchy, common channel signaling system evolution of SS7, signaling points, call setup, Multiplexing of telephone channels - frequency division multiplexing, FDM hierarchy, composite base-band signals, formation of groups, super groups, master groups and radio channel, wavelength division multiplexing.

Module III **(9 hrs.)**

Digital telephony: Introduction, advantages and disadvantages of digital voice network, voice digitization, time division multiplexing of PCM signals, digital carrier, Super- frame TDM format, Fractional T Carrier Service, Digital hierarchy, Master Group and Commercial TV, Picture Phone Terminal, Data Terminal, Digital Carrier Line Encoding, Duty Cycle, Bandwidth Requirement, Clock and Framing Bit Recovery, Error Detection, T Carrier System, T-1 Carrier System, Statistical TDM, Codec and Combo Chips.

Module IV **(8 hrs.)**

Digital switching: Switching function, space division switching, multistage switching, non-blocking switches, blocking probabilities, four wire switches, switch matrix control, time division switching – analog and digital, two dimensional switching, multi stage time and space switching, STS and TST switching, digital cross connect systems, digital switching in analog environment.

Module V **(6 hrs.)**

Traffic Engineering: Network Traffic load and parameters, Grade of service and blocking probability, Modeling Switching Systems, Incoming Traffic and Service Time Characterization, Blocking Models and Loss Estimates, Delay systems.

Assessment: Mid-term test, Assignment, Tutorial, Quiz and End semester exam.

Course outcome:

Students earning credits will develop ability to:

1. Understand the basics of telephone circuit and signals.
2. Understand the public switched telephone networks and multiplexing of telephone channels.
3. Understand the need for voice digitization and T1 Carrier systems.
4. Design multi stage switching structures involving time and space switching stages
5. Analyze the fundamental telecommunication traffic models

Text/ Reference Books:

1. W. Tomasi, "Advanced Electronic Communication Systems", 6th Edition, PHI, 2009.
2. W. Tomasi, "Electronic Communication Systems",4th Edition, Pearson Education, 2001.
3. John C. Bellamy, "Digital Telephony", 3rd Edition, Willey India Pvt. Limited, 2003.
4. Thiagrajan Vishwanathan, "Telecommunication Switching Systems and Networks", PHI. 1998
5. J.E. Flood, "Telecommunications Switching Traffic and Networks", Pearson Education, 2004
6. James Martin, "Telecommunication and Computers", PHI.
7. G. F. Snyder, "Introduction to Telecommunication Networks", Vikas Publishing House.

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PEC-EC601 (C)	**Probability Theory and Stochastic processing**	**3L: 0T: 0P (03 hrs.)**	**Credits: 03**

Prerequisite: Probability Theory, Random Processes

Course Objective: The objective is to understand basics concepts of probability theory, random variables, density & distribution functions and stochastic processes.

THEORY:

MODULE I **(6 hrs.)**
Probability and Random Variable Probability: Probability introduced through Sets and Relative Frequency, Probabilities: Joint, conditional, total, Mathematical Model of Experiments, Bayes' Theorem, Distribution: Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh and Conditional,

MODULE II **(8 hrs.)**
Random Variable: Random Variable: Discrete, Continuous and Mixed Random Variables random variable. Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Transformations of a Random Variable: Monotonic and Non-monotonic transformations.

MODULE III **(9 hrs.)**
Multiple Random Variables and Operations, Distribution Function and properties: Equal and Unequal, Joint, Sum of Random Variables, Central Limit Theorem, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

MODULE IV **(8 hrs.)**
Stochastic Processes – Stationary & Non-stationary Process, Deterministic and Nondeterministic Processes, The Stochastic Process Concept, Distribution and Density Functions, First- Order, Second-Order, N^{th} Order and Wide-Sense Stationary process, Ergodicity: Mean, Correlation, Autocorrelation Function, Cross- Correlation and their functions and Properties, Covariance, Linear System Response: Mean and Mean squared Value, Autocorrelation, Cross- Correlation, Gaussian and Poisson random processes.

MODULE V **(6 hrs.)**
Spectral Characteristics of Power Spectrum and System Response: Properties, Relationship between power Spectrum and autocorrelation function, cross-power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross- Correlation Function,

Assessment: Mid-term test, Assignment, Tutorial, Quiz and End semester exam.

Course outcome:
Students earning credits will develop ability to:
1. Understand the random experiments, sample space and event probabilities
2. Study the random variables, density and distribution functions, moments and transformation of random variables.
3. Study operations on Multiple Random variables, Joint Distribution Function.
4. Understand Mean and covariance functions for simple random processes.

5. Explore the spectral characteristics of random processes.

Text/Reference Books:

1. Peyton Z. Peebles, "Probability, Random Variables & Random Signal Principles", 4Ed., TMH, 2001.
2. Scott Miller, Donald Childers, "Probability and Random Processes", 2 Ed, Elsevier, 2012.
3. Athanasios Papoulis and S. Unnikrishna Pillai, "Probability, Random Variables and Stochastic Processes, 4 Ed., TMH.
4. Pradip Kumar Gosh, "Theory of Probability and Stochastic Processes", University Press
5. Henry Stark and John W. Woods, "Probability and Random Processes with Application to Signal Processing", 3 Ed., PE.
6. George R. Cooper, Clave D. MC Gillem, "Probability Methods of Signal and System Analysis", 3 Ed., Oxford, 1999.
7. S.P. Eugene Xavier, "Statistical Theory of Communication", New Age Publications, 1997.

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PCC-EC602	**Antenna and wave propagation**	**2L: 1T: 2P (04 hrs.)**	**Credits: 04**

Prerequisite: Engineering Mathematics, Electromagnetic theory.

Course Objective: The objective of this subject is that the student must be familiar with the basic concept behind the radiation of energy by elementary antenna and designing of different kinds of antenna and antenna array to get desired radiation pattern.

THEORY:

MODULE I **(10 hrs.)**
Antenna terminologies and fundamentals: Radiation pattern, radiation power density, radiation intensity, directivity, gain, antenna efficiency, half power beam width, bandwidth, antenna polarization, input impedance, antenna radiation efficiency, effective length, effective area, reciprocity, Friis Transmission equation, Antenna Temperature. Solution of Maxwell's equations: Radiation Integrals: Vector potentials **A, J, F, M**, Electric and magnetic fields electric and magnetic current sources, solution of inhomogeneous vector potential wave equation, far field radiation.

MODULE II **(6 hrs.)**
Linear wire antenna: Current distribution on linear antennas, Infinitesimal dipole, Small dipole, Region separation, Finite length dipole, half wave dipole, Ground effects. Loop Antennas: Small Circular loop, Circular Loop of constant current, Circular loop with non uniform current.

MODULE III **(8 hrs.)**
Linear antenna array: Two element array, pattern multiplication N-element linear array, uniform amplitude and spacing, broad side and end-fire array, N-element array: Uniform spacing, non uniform amplitude, array factor, binomial and dolph chebyshev array.

MODULE IV **(6 hrs.)**
Aperture and slot antenna: Radiation from rectangular apertures, Uniform and Tapered aperture, Horn antenna, Reflector antenna, Aperture blockage, Feeding structures, Slot antennas.

MODULE V **(10 hrs.)**
Special antennas: lens antenna, turnstile antenna, V-antenna, rhombic antenna, beverage antenna Structural details, dimensions, radiation pattern, specifications, features and applications of following antennas: log periodic antenna, helical antenna, biconical antenna, folded dipole antenna, Yagi-Uda antenna. Resonant and travelling wave antennas for different wave lengths. Designing microstrip antenna.

Assessment: Mid-term test, Assignment, Tutorial, Quiz and End semester exam.

List of Experiments:

1. To perform & plot the radiation pattern of omni-directional antenna using AMS.
2. To study the radiation pattern of directional antenna.
3. To perform & plot the radiation pattern of dipole antenna using AMS.
4. To perform & plot the radiation pattern of folded dipole antenna using AMS.
5. To perform & plot the radiation pattern of monopole antenna using AMS.
6. To perform & plot the radiation pattern of rectangular loop antenna using AMS.
7. To perform & plot the radiation pattern of helical antenna using AMS.
8. To perform & plot the radiation pattern of collinear array antenna using AMS.
9. To perform & plot the radiation pattern of E- horn antenna using AMS.
10. To perform & plot the radiation pattern of patch antenna using AMS.

Assessment: Internal viva, Continuous evolution of experiments, Journal write-up, Quiz and End semester exam.

Course outcome:

Students earning credits will develop ability to:

1. Understand the basic terminologies and parameters related to antenna and also analyze Maxwell's equations in context of waves radiated by antenna.
2. Analyze the radiation pattern of an infinitesimal current element, half wave dipole etc. and derived the equation of E and H component of EM wave radiated by such antennas.
3. Analyze uniform antenna array and learn to design non uniform antenna array.
4. Understand analytical methods for analysis of aperture antenna and their application to various specific antennas.
5. Analyze some special antennas, their specifications along with their applications and design Micro strip patch antenna.

Text/Reference Books:

1. A. Balanis, "Antenna theory- analysis and design", 2nd Edition, Wileys, 2005.
2. J. D. Krauss, "Antennas", 4th Edition, McGraw Hill, 2010.
3. A. R. Harish, M. Sachhidanand, "Antennas and wave propagation" Oxford university press, 2010.
4. Chatterji, Rajeshwari, "Antenna theory and practice", New edge publication, 2006.
5. K. D. Prasad, "Antenna and wave propagation", Satyaprakashan, 2003.
6. G. S. N. Raju, "Antennas and wave propagation", Pearson education, 2008.
7. B. L. Smith, "Modern antennas", Springer India Pvt. Ltd., 2nd edition, 2008.

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PCC-EC603	**Internet of Things and its Applications**	**3L: 0T: 0P (03 hrs.)**	**Credits: 03**

Prerequisite:-Embedded C, Microcontroller Programming.

Course Objective: The purpose of this subject is to understand principles and foundations of IOT in electronics and communication.

MODULE I **(8 hrs.)**
Introduction: Definition, Characteristics of IOT, IOT Conceptual framework, IOT Architectural view, Physical design of IOT, Logical design of IOT, Application of IOT.

MODULE II **(8 hrs.)**
Machine-to-machine (M2M), SDN (software defined networking) and NFV (network function virtualization) for IOT, data storage in IOT, IOT Cloud Based Services.

MODULE III **(8 hrs.)**
Design Principles for Web Connectivity: Web Communication Protocols for connected devices, Message Communication Protocols for connected devices, MQTT, CoAP, SOAP, REST, HTTP Restful and Web Sockets. Internet Connectivity Principles: Internet Connectivity, Internet based communication, IP addressing in IOT, Media Access control.

MODULE IV **(8 hrs.)**
Sensor Technology, Industrial IOT and Automotive IOT, Actuator, Sensor data Communication Protocols, Radio Frequency Identification Technology, Wireless Sensor Network Technology.IOT Design methodology: Specification -Requirement, process, model, service, functional & operational view.IOT Privacy and security solutions, Raspberry Pi &arduinodevices.IOT Case studies: smart city streetlights control & monitoring.

MODULE V **(8 hrs.)**
Introduction to R, python, LORAWAN and IOT WIFI Modules like ESP8266 series, AT Commands, Interfacing with microcontroller, server, data transfer in IOT, Design of IOT systems like temperature logger, actuator etc.

Assessment: Internal viva, Continuous evolution of experiments, Quiz and End semester exam.

Course outcome:

Students earning credits will develop ability to:

1. Understand in depth about Internet of things.
2. Establish secure communication for his network for his devices connected in IOT.
3. Store his data securely on cloud and access it when required
4. Design web based application using various internet protocols and services

5. Use sensor technology and RFID and wireless networking for maintaining privacy and security concern in smart city and housing environmental considerations.

Text/Reference Books:

1. Vijay Madisetti and Arshdeep Bahga, "Internet of things(A-Hand-on Approach)"1st Edition , Universal Press 2014.
2. Francis dacosta "Rethinking the Internet of things: A scalable Approach to connecting everything", 1st edition, Apress publications 2013.
3. Hakima Chaouchi "The Internet of Things: Connecting Objects", 1st edition, Wiley publication 2010.
4. Donald Norris "The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and Beagle Bone Black", 1st edition, McGraw Hill publication 2015.

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PCC-EC604	**Android App. Development**	**0L: 0T: 2P (hrs.)**	**Credits: 01**

Prerequisite: Java, C, C++.

Course Objective: By the end of the course, student will be able to write simple GUI applications, use built-in widgets and components, work with the database to store data locally, and much more.

List of Experiments:

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

Assessment: Internal viva, Continuous evolution of experiments, Quiz and End semester exam.

Course Outcomes:

Students earning credits will develop ability to:

1. Analyze the different formats and GUI available in android OS.
2. Critically evaluate alternate assumptions, approaches, procedures, tradeoffs, and results during electronic circuit designing.
3. Design variety of electronic circuits using simulation software.
4. Demonstrate their design and able to present views.
5. Get skilled and deliver technical presentation.

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PCC-EC605	**Electronics Workshop – IV (Prototype Development & Introduction to Python)**	**0L: 0T: 4P (02hrs.)**	**Credits: 02**

Prerequisite: Mathematics, microcontrollers, Fundamental of Electronics and Electrical devices and circuits.

Course Objective: The purpose of this lab is to learn and implementation of electronic project using different circuits, embedded system and programming.

COURSE CONTENTS:

The student should select a topic for electronic project. He should do the literature survey, analyze the problem and propose some solution for the same. He should prepare a detailed (typed) report regarding the topic and should present the same at the end of the semester. The analysis of the problem may be done with the help of hardware and software in the lab.

Assessment: Internal viva, Continuous evolution of experiments, Quiz and End semester exam.

Course outcome:

Students earning credits will develop ability to:

1. Analyze the mathematical and physical foundations of electronics engineering.
2. Critically evaluate alternate assumptions, approaches, procedures, tradeoffs, and results related to engineering problems.
3. Design a variety of electronic and computer-based components and systems for applications including signal processing, communications, computer networks, VLSI and Embedded systems etc.
4. Lead a small team of student engineers performing a laboratory exercise or design project; to participate in various roles in a team and understand how they contribute to accomplishing the task at hand.
5. Use written and oral communications to document work and present project results.