Maharaja Agrasen Institute of Technology
Department of Electronics and Communication Engineering

Course Outcomes Summary
Practicals

	Course Name: Applied Physics Lab- I
	Upon completion of the course, the student will be able to:
C.151.1	Understand how to use various measuring instruments
C.151.2	Demonstrate the various optical phenomenon with the help of various designed instruments in the laboratory.
C.151.3	Analyze the oscillatory behaviour of particles in various physical systems which will explain the hardware designing of computers.
C.151.4	Define the properties of a designed light source .i.e. the laser beam in contrast to the other light producing gadgets in the laboratory.
C.151.5	Define the application of various optical phenomenon in measuring various physical parameters
C.151.6	Develop and fabricate engineering tools pertinent to their stream of mechanical, electronic, electrical & information technology.
	Course Name: Electrical Technology LAB
	Upon completion of the course, the student will be able to:
C.153.1	Understand the operation and application of CRO.
C.153.2	Identify various items used in preparation of wiring and the knowhow.
C.153.3	Define linearity and how to simplify a complicated and large network to get easiest solution.
C.153.4	Demonstrate the use of Ammeter, Voltmeter and Wattmeter and their application for measuring Power and Power Factor
C.153.5	Develop an understanding of transformer operation and equivalent circuit parameter.
C.153.6	Illustrate the start, run and control operations of DC Shunt Motor and Induction Motor.
	Course Name: Applied Chemistry Lab-I
	Upon completion of the course, the student will be able to:
C.161.1	Identify and calculate the viscosity, surface tension, hardness and alkalinity of water samples and infer the methodology in analytical work.

C.161.2	Illustrate the practical skills in the volumetric and instrumental analysis and can plan projects.
C.161.3	Develop an understanding of how to follow lab procedures safely and develop, construct, solve and interpret the experimental data.
C.161.4	Analyze chemical processes and make use of them in transforming raw materials into useful commercial products.
C.161.5	Define the methodologies and calculations to produce useful materials or devices.
C.161.6	Implement and build experimental processes logically in research & training programs.
	Course Name: ENGINEERING PHYSICS LAB-II
	At the completion of this course, student will be able to:
C.152.1	Understand about the electric /electronics instrumentation in the laboratory and their usage.
C.152.2	Illustrate how a semiconductor chip made in the laboratory can be checked for the various characteristics .
C.152.3	Analyse the methodology of signal propagation through an optical fibre.
C.152.4	Identify the quantum behaviour of electromagnetic radiation through simple semiconductor devices.
C.152.5	Demonstrate the theoretical concepts of resistance-capacitance circuits.
C.152.6	Analyse the cathode ray oscilloscope as calibrator .
	Course Name: Introduction to Programming
	At the end of the course, a student will be able to:
C.154.1	Write, compile and debug programs in C language.
C.154.2	Classify conditional expressions and looping statement to solve problems associated with conditions and repetitions.
C.154.3	Demonstrate the programs using arithmetic and relational operators.
C.154.4	Understand the concept of breaking big problem into smaller segments by the use of array and Functions.
C.154.5	Implement the concept of various string handling functions.
C.154.6	Classify programming components that efficiently solve computing problems in real-world.
	Course Name: Electronic Devices Lab
	At the completion of this course, student will be able to:
C.156.1	Develop the ability to work upon the Bread Board kit, CRO, Multimeter and Function Generator.

C.156.2	Analyze the characteristics of basic PN junction diode and zener diode.
C.156.3	Understand the applications of diodes and create various circuits based on diodes.
C.156.4	Identify the characteristics of semiconductor bipolar and field effect transistors.
C.156.5	Demonstrate usage of integrated circuits (ICs) as components and verify the working of various logic gates.
C.156.6	Implement the logic gate ICs as Boolean expressions for various applications.
	Course Name: ENGINEERING MECHANICS
	At the completion of this course, student will be able to:
C.158.1	Define the polygon law of using universal force table.
C.158.2	Identify and interpret the law of movement using the parallel force apparatus and bell crank lever.
C.158.3	Demonstrate the triangle law by using Jib Crane.
C.158.4	Understand and determine the coefficient of friction using inclined plane and centre of gravity of an object.
C.158.5	Illustrate the Concept of law of simple lifting machine (wheel and axle, worm and worm wheel , screw jack and winch crab.
	Course Name: Environmental Studies Lab
	At the completion of this course, student will be able to:
CO.160.1	Demonstrate the practical skills to analyze and outline the environment related parameters.
CO.160.2	Develop an inter-disciplinary approach towards the environment.
CO.160.3	Identify and solve the environmental problems which prepares them for leadership role in society.
CO.160.4	Illustrate the technological skills needed in environmental management and safety for industrial development.
CO.160.5	Understand the importance of practical activities and sustainable development to conserve the environment.
CO.160.6	Analyze the chemical reactions in air, water and land and their impacts on the environment.
	Course name: Analog Electronics-1 Lab
	Upon completion of the course, the student will be able to:
C.251.1	Demonstrate the input output characteristics of BJT transistor, transfer and output

	characteristics of FET transistor and V-I characteristics of SCR.
C.251.2	Implement the different type of biasing for single stage BJT amplifiers and calculate the "Q point".
C.251.3	Identify the principal of small signal amplifier and calculate the gain of the single stage BJT amplifier.
C.251.4	Analyze the effect of coupling in two stage BJT amplifier and the effect on the gain.
C.251.5	Observe the effect on gain of single stage BJT amplifier by frequency variation and calculate the bandwidth of BJT amplifier circuits.
C.251.6	Demonstrate the effect of negative feedback on single stage BJT amplifier parameters.
	Course name: Switching Theory and Logic Design Lab
	Upon completion of the course, the student will be able to:
C.253, 355.1	Identify IC's and build simple connection on breadboard for verification of Gates.
C. 253, 355.2	Design and analyze small combinational circuits using basic gate IC's.
C.253, 355.3	Develop and make use of combinational circuits like adders, subtractors, multiplexer, demultiplexer or any other function using universal gates or with Mux IC.
C.253, 355.4	Design and demonstrate various sequential circuits like latches, flip flops, master slave flip flop using basic or universal gates IC's etc.
C.253, 355.5	Model different counters using flip flop IC's or translate their working with the help of Kits.
C.253, 355.6	Implement small projects related to digital Circuitry.
	Course name: Data Structure lab
	At the end of the course, a student will be able to:
C.255.1:	Explain the various operations on 1-D and 2-D arrays.
C.255.2	Develop the concept of dynamic memory allocation through linked list
C.255.3	Describe stack and queue with contiguous and non-contiguous data storage mechanism.
C.255.4	Classify the various operations on binary tree.
C.255.5	Analyze & explain traversal techniques in graph.
C.255.6	Implement sorting on 1-D array using different techniques.
	Course name: Electronic Instruments and Measurement Lab

	Upon completion of the course, the student will be able to:
C.257.1	Analyze and calculate various electrical parameters of different circuits for precise level.
C.257.2	Identify and calibrate various electrical measuring instruments according to specifications and multirange circuits and compose different circuits to improve performance.
C.257.3	Illustrate the use of RLC meter to measure capacitances and inductances of different circuits.
C.257.4	Define the relation among various forms of energy, develop model for conversion of analogue quantities like pressure, temperature, distance and optical energy to electrical energy.
C.257.5	Demonstrate the use of D.S.O for calculation of different electrical parameters.
C.257.6	Develop and propose solutions to present day engineering problems.
	Course name: Signals and Systems Lab
	Upon completion of the course, the student will be able to:
C.259.1	Classify and plot continuous-time signals and discrete-time signals .
C.259.2	Determine the output of linear time-invariant systems for both continuous and discrete time.
C.259.3	Demonstrate mathematical and graphical correlation of signals and systems.
C.259.4	Analyze the magnitude and phase of signals in transform domains for complex engineering problems.
C.259.5	Verify properties of Fourier Transform for mathematical problem analysis.
	Course name: Applied Mathematics Lab
	Upon completion of the course, the student will be able to:
C.252.1	Develop basic programs in Scilab.
C.252.2	Implement mathematical problems based on matrices, differential equations, definite integrals, Algebraic and Transcendental equations using Scilab
C.252.3	Plot and demonstrate curves using Scilab for various engineering applications.
C.252.4	Develop codes using Scilab for many physical world problems based on electrical circuits, fluid dynamics and data mining.
	Course name: AE-II LAB
	Upon completion of this course, the student will be able to:
C.254.1	Demonstrate the concept of negative feedback for designing Op-amp as amplifier.

C.254.2	Develop linear and non-linear applications of the Op-amp and analyze their results.
C.254.3	Design sine wave oscillator's and calculate the condition of oscillation and frequency of oscillation.
C. 254.4	Design and understand Low Pass, High Pass, Band Pass and Band Reject filters by calculating their cut-off frequency, gain and bandwidth.
C. 254.5	Design the multi-vibrators, square wave generator and triangular wave generator using Op-amp and calculate their frequency of oscillation.
C. 254.6	Demonstrate the working of 555 timer IC and develop their basic circuits.
	Course name: Communication System Lab
	Upon completion of the course, the student will be able to:
C.256.1	Demonstrate the concept of Amplitude Modulation by learning different Amplitude Modulation techniques like DSB-FC, DSB-SC and SSB.
C.256.2	Demonstrate various types of Frequency Modulation and Demodulation techniques using CRO and DSO.
C.256.3	Develop the relation between Continuous and Discrete time Signals through different Sampling and Reconstruction techniques.
C.256.4	Examine the different Pulse Analog Modulation schemes like PAM,PWM and PPM by obtaining the waveforms on CRO and DSO.
C.256.5	Demonstrate the Analog and Digital Multiplexing techniques like TDM-PAM and FDM.
	Course name : Network Analysis And Synthesis Lab
	Upon completion of the course, the student will be able to:
C.258.1	Analyze the transient response of series RLC circuit for different types of waveforms using MATLAB.
C.258.2	Analyze the time response of a simulated linear system and verify the response of first order and second order, type 0, 1 system.
C.258.3	Determine current in various resistors connected in network by mesh current and node voltage analysis using MATLAB.
C.258.4	Identify the Z and Y parameters of the given two port network.
C.258.5	Understand the applicability of Reciprocity Theorem for the given two port network.
C.258.6	Evaluate the hybrid and ABCD parameters of two port network.
	Course name: Computer organization and architecture lab
	At the end of the course, a student will be able to:
C.260.1	Identify the basic elements and architecture of 8085 using the simulator GNU sim8085.
C.260.2	Analyze the basic instruction set of 8085 microprocessor.

C.260.3	Develop assembly language code dealing with the data transfers within the registers and memory.
C.260.4	Outline the concept of different addressing modes used for addressing the data and performing arithmetic operations on the data.
C.260.5	Implement various problems using logical Instruction in assembly language.
C.260.6	Analyze various problems using branching Instruction and implementing them using assembly language.
	Course name: Digital System Design Lab
	Upon completion of the course, the student will be able to:
C.351.1	Understand, analyze and design various combinational and sequential circuits .
C.351.1	Identify the basic requirements for a design application & evaluate them.
C.351.1	Develop skills to build, and troubleshoot digital circuits.
C.351.1	Design & classify synchronous and asynchronous circuits.
C.351.1	Model Melay and Moore Finite state machines.
C.351.1	Analyze & develop customized and complex circuits.
	Course Name: Communication Skills for Professionals Lab
	Upon completion of the course, the student will be able to:
C.351.1	Describe and learn the importance of verbal and non-verbal communication in the professional world to achieve a reasonably good level of competency.
C.351.2	Comprehend the habit of effective reading as well as listening and make use of RP to improve pronunciation.
C.351.3	Actively participate in group discussion.
C.351.4	Understand the importance of intonation, word and sentence stress and accent for improving communicative competence, identifying and overcoming pronunciation related problems.
C.351.5	Learn and evaluate the importance of syntax for cultivating effective language skills and imbibing the knowledge of effective classroom speaking and presentations.
C.351.6	Present themselves confidently and influence a conversation with their refined and justified knowledge of communication skills.
	Course name: Microprocessors and Microcontrollers Lab
	Upon completion of the course, the student will be able to:
C.355.1	Explain Architecture and instruction Set of 8085, and use it develop and implement programs and compile using 8085 microprocessor kits.

C.355.2	Explain Architecture and instruction Set of 8086, and use it develop and implement programs and compile using 8086 microprocessor kits.
C.355.3	Develop and compile 8086 programs using MASM Assembler.
C.355.4	Interface 8086 microprocessor to various devices for simple applications.
C.355.5	Explain the architecture and instruction Set of 8051, and use it to develop and compile programs using 8051 microcontroller kits.
C.355.6	Develop and compile 8051 programs using KEIL.
	Course name: Control System Lab
	Upon completion of the course, student will be able to:
C. 355.1	Illustrate the use of LVDT for measurement of voltage and displacement and also summarize the basic potentiometer working with different excitations
C. 355.2	Demonstrate the relation between synchro transmitter and receiver outputs
C. 355.3	Develop the various system dynamics.
C. 355.4	Outline the effect of various types of inputs applied to a system for open loop and closed loop system
C. 355.5	Examine the working of PID controller and its applications
C. 355.6	Implement Matlab software for technical programming
	Course name: Digital Communication lab
	Upon completion of the course, the student will be able to:
C.357.1	Demonstrate the concept of Sampling and Quantization.
C.357.2	Experiment with different techniques of analog to digital conversion by inspecting the different performance criteria
C.357.3	Develop an understanding of digital multiplexing techniques
C.357.4	Demonstrate different digital modulation techniques
C.357.5	Compare and classify different line coding techniques
C.357.6	Implement the concept of M-ary digital modulation techniques.
	Course name: Industrial Training
	Upon completion of the course, the student will be able to:
C.359.1	Develop the ability to function in a multi-disciplinary team.
C.359.2	Identify & learn to communicate effectively.

C.359.3	Demonstrate the knowledge of contemporary issues and recognize the need for lifelong learning.
C.359.4	Develop the skills to practice & solve engineering problems.
C.359.5	Understand professional and ethical responsibility, along with the impact of engineering solutions to the society.
	Course name: Microwave Engineering Lab
	Upon completion of the course, the students will be able to:
C.352.1	Develop an understanding of microwave analysis methods. (Circuit & Wave Analysis)
C.352.2	Implement analysis methods to determine circuit properties of passive/active microwave devices.
C.352.3	Model and determine the performance characteristics of a microwave circuit or system.
C.352.4	Design various microwave components and microstrip antenna using HFSS Software.
C.352.5	Compare transmission and waveguide structures and their application in impedance matching and filter circuits.
C.352.6	Demonstrate Knowledge about Microwave Measurements.
	Course name: VLSI Design Lab
	Upon completion of the course, the student will be able to:
C.354.1	Develop the ability to demonstrate tool, apply and analyze mathematical methods of MOSFET.
C.354.2	Explain the basic requirement for design application and demonstrate DC analysis of NMOS and PMOS.
C.354.3	Explain and compare DC and Transient analysis of NMOS (Resistive load, Depletion, Linear and Saturation load), and elaborate CMOS inverter circuits.
C.354.4	Develop models of CMOS circuits to realize digital functions and logic gates.
C.354.5	Design combinational circuits using CMOS technology.
C.354.6	Implement sequential circuits using CMOS technology and contrast the lower area circuits using alternative methods.
	Course name: Digital Signal Processing Lab
	Upon completion of the course, the students will be able to:
C.356.1	Generate various continuous and discrete-time signals using user defined functions in SCILAB.
C.356.2	Compute the linear and circular convolutions and correlations of discrete-time sequences and demonstrate its applications.
C.356.3	Compute DFT of given sequence using user-defined functions in SCILAB.

C.356.4	Design and realize FIR and IIR filters to meet specific magnitude and phase requirements.
C.356.5	Develop an understanding of how to interface DSP processor with PC and demonstrate its applications.
C.356.6	Implement the concepts of Digital Signal Processing for minor and major projects.
	Course name: Data Communication Network Lab
	At the end of the course, a student will be able to:
C.358.1	Simulate the Discrete Event Systems using various network tools.
C.358.2	Design solutions for real life situations in form of communication networks.
C.358.3	Evaluate all the possibilities of wired as well as wireless networks (Zigbee, Wi-Max,Wi-PAN, IEEE 802.11 a,b,c,g) by using routers, switches and various topologies.
C.358.4	Analyze and evaluate the network results using different open source logger tools (Wireshark, TcpDump and NS3 NetAnim package).
C.358.5	Implement Sliding window and congestion avoidance protocols.
C.358.6	Explore the possible research opportunities and difficulties within the course scope.
	Course name: Inhouse Training
	Upon completion of the course, the student will be able to:
C.360.1	Develop the ability to work in a multi-disciplinary team.
C.360.2	Demonstrate the ability to communicate effectively.
C.360.3	Develop the knowledge of contemporary issues and recognize the need for lifelong learning.
C.360.4	Develop an understanding of actual working environment including rules, regulations and safety practices.
C.360.5	Develop inter personal relationship to understand professional and ethical responsibility, and provide engineering solutions to the society.
	Course name: Optical and Wireless Communication Lab
	Upon completion of the course, the student will be able to:
C.451.1	Develop the ability to understand, analyze and work upon the Transmission links.
C.451.2	Work on various modulation techniques using optical transmission.
C.451.3	Measure and visualize the factors causing optical losses.
C.451.4	Analyze and compute optical power.

C.451.5	Calculate numerical aperture of optical fiber.
C.451.6	Verify and compare the characteristics of different Photodiodes.
	COURSE NAME: EMBEDDED SYSTEMS LAB
	Upon completion of this course, the student will be able to:
C.453.1	Understand the importance and working of various I/O pins of Microcontrollers and develop concepts of Totem pole / open drain I/O pins, sourcing/sinking capacity of I/O pins.
C.453.2	Design and develop the Interfacing of Microcontrollers with various devices like LEDs, 7 segments Displays, Stepper Motors etc.
C.453.3	Develop the knowledge of Firmware / software development, debugging techniques and architecture, Registers, Instruction sets of the Microcontrollers (8051, PIC, ARM).
C.453.4	Implement various Assembler programs.
C.453.5	Develop and experiment with various programs for Additions / Subtractions / Multiplications / Divisions of data strings.
C.453.6	Demonstrate experiments on built-in ADC using external DC voltage source and generate various waveforms.
	Course name: Radar and Navigation Lab
	Upon completion of the course, the student will be able to:
C.455.1	Describe how radars can be used to measure range with time-of-flight and radial velocity with Doppler shift
C.455.2	Implement the radar equations to calculate signal-to-noise ratios and received powers for various radar systems
C.455.3	Calculate of signal-to-clutter ratio and clutter-to-noise ratio
C.455.4	Define different parameters for describing a system's ambiguity function and calculate those numerically
C.455.5	Calculate required signal-to-noise ratio for a given probability of detection and probability of false-alarm.
C.455.6	Understand the trade-offs involved in design of radar systems for different applications
	Course name: Seminar
	Upon completion of the course, the student will be able to:
C.457.1	Discover the upcoming technological developments.
C.457.2	Assess and conclude the learning process.
C.457.3	Identify and interpret the acquired knowledge of contemporary issues recognizing the need for lifelong learning

C.457.4	Demonstrate and perceive the concepts of discussed topic.
C.457.5	Develop and understand professional and ethical responsibility.
	Course name :Minor Project
	Upon completion of the course, the student will be able to:
C.459.1	Learn and improve on the basics of report writing and professional presentation skills along with the idea of the significance of literature survey to bring out substantial contribution in their research/project work..
C.459.2	Incorporate and their own ideas in the existing technology.
C.459.3	Inculcate the concept of team spirit which would be further useful in adapting efficiently in their future professional lives.
C.459.4	Develop and demonstrate the social responsibility and would thus contribute towards the betterment of the society.
C.459.5	Extend and formulate their work to the next semester allowing a greater contribution of their knowledge, innovations and idea.
	Course name: Industrial Training
	Upon completion of the course, the student will be able to:
C.461.1	Choose the appropriate career option and find appropriate placement.
C.461.2	Adapt to the actual working environment including rules, regulations and safety practices.
C.461.3	Enhance, build and supplement their knowledge and skills.
C.461.4	Develop competence and interpersonal relationship.
C.461.5	Demonstrate and experiment with the acquired knowledge throughout the training tenure.
	Course name: Satellite & Antenna Communication Lab
	Upon completion of the course, the student will be able to:
C.452.1	Classify the methods of various parameters calculations with respect to earth station and the satellite in space & measure them.
C.452.2	Understand & explain the concepts related to budget link calculations.
C.452.3	Experiment with the various types of satellites and the topologies used with respect to them as well as the specific antennas used to communicate with a satellite.
C.452.4	Categorize different analog and digital modulation techniques with reference to satellite communication.
C.452.5	Develop an understanding of satellite monitoring procedures which includes telemetry, tracking and command, attitude control, etc.

	Course name: Mobile Computing Lab
	Upon completion of the course, the student will be able to:
C.454.1	Implement recent languages and tool kits for generating mobile applications such as WML, WML Script, XML, Java, WAP Developer tool kit and Android Studio.
C.454.2	Elaborate the concepts of Wireless Markup Language (WML) including the syntax of a WML page.
C.454.3	Develop WML pages including formatted text, images and tables.
C.454.4	Design WML pages with internal and external linking.
C.454.5	Compose WML pages using inputs, variables and events.
C.454.6	Design and develop interactive applications using WML and WML Script.
	Course name : Major Project
	Upon completion of the course, the student will be able to:
C.456.1	Learn and analyze the significance of literature survey to bring out substantial contribution in their research/project work..
C.456.2	Incorporate and create their own ideas in the existing technology.
C.456.3	Develop team spirit which would be further useful in their future professional lives.
C.456.4	Develop social responsibility and would thus help in constructing the better society for tomorrow.
C.456.5	Extend and elaborate their work in future learning allowing a greater contribution of their knowledge, innovations and idea.