Department of Electronics and Communication Engineering
Bhagat Phool Singh Mahila Vishwavidyalaya, Khanpur Kalan (Sonepat), Haryana-131305
(A state university established by govt. of Haryana vides Act no. 31 of 2006)
www.bpswomenuniversity.ac.in

Course Structure for B. Tech Fourth Semester (Second Year)									
S. No.	**Code**	**Course Title**	**Hrs/Week**			**Total Credits**	**Internal Marks**	**External Marks**	**Total Marks**
			L	**T**	**P**				
Subjects									
1.	ECL-240	Analog and Digital Communication	3	0	0	3	20	80	100
2.	ECL-242	Analog Circuits	3	0	0	3	20	80	100
3.	ECL-244	Microprocessor and Microcontroller	3	0	0	3	20	80	100
4.	*	BS/ES/HS-5	4	0	0	4	20	80	100
5.	**	BS/ES/HS-6	4	0	0	4	20	80	100
6.	**HSMC-246**	**Universal Human Values**	**3**	**0**	**0**	**3**	**20**	**80**	**100**
Labs									
7.	ECP-240	Analog and Digital Communication Lab	0	0	2	1	10	40	50
8.	ECP-242	Analog Circuits Lab	0	0	2	1	10	40	50
9.	ECP-244	Microprocessor and Microcontroller Lab	0	0	2	1	10	40	50
10.	ECP-246	Electronics Project Workshop – II	0	0	2	1	10	40	50
11	**# HSMC-240**	**#Logical Reasoning/ Generic Open Elective**	**2**	**0**	**0**	**0**	**50**	**0**	**50#**
Total			**22**	**0**	**8**	**24**	**160**	**640**	**800**

***BS/ES/HS-5**		****BS/ES/HS-6**	
Code	**Subject**	**Code**	**Subject**
ESC-240	Solar Photovoltaic System and Technology	ESC-246	PC Interfacing and Data Acquisition
ESC-242	Design and Simulation Tools	ESC-248	ICT for Development
ESC-244	Data Base Management System	HSMC-244	Basic of Corporate Law
HSMC-242	Innovation & Entrepreneurship	BSC-242	E-waste management
BSC-240	Energy Audit Conservation and Management	******	MOOC / NPTEL Course

Note:

1. # **Logical Reasoning/Generic Open Elective (HSMC-240)** shall be non credit, mandatory and qualifying paper in which the students will be required passing marks in theory. The marks of the same will not be counted in grand total and towards award of degree.
2. At the end of 4th semester every student has to undergo 4-6 weeks Professional training/Internship. The assessment and viva-voce for the same will be conducted in the first four weeks of the opening of the academic session by the department in next semester.
3. Minimum passing marks for any subject (paper) shall be 40% in the external examination and 40% in the aggregate of internal and external examination of the subject.

Analog and Digital Communication

ECL-240 **Total Credits: 3**
L T P **Internal Marks: 20**
3 0 0 **External Marks: 80**
Total Marks: 100

Course Objective: The objectives of course are to:

- Familiarize with basic concepts like AM, FM, PM and digital modulation.
- Differentiate between the working of transmitter and receiver of various analog and digital modulation techniques.
- Design and rectify various communication gadgets and remove/reduce effects of noise on their working.
- Suggest up gradation in the existing communication systems with lesser radiation output and better signal quality for the betterment of human kind.

Pre-requisite: Signals and Systems, Transmitter & Receivers and stochastic process

Course Outcomes: After successful completion of the course student will be able to:

- Understand the use of communication in electronic systems, computers, and automation.
- Analyse and apply different modulation techniques as per the design requirements.
- Analyse different parameters of analog and digital communication techniques.
- Apply the knowledge of signals and system and evaluate the performance of digital communication system in the presence of noise.

Contents

UNIT-I	**12 Hours**
Introduction to Communication System: Source of information, Communication channels, Base band pass band signals, Representation of signals and systems Modulation, Demodulation, Radio Frequency Spectrum, Signals & their classification, Limitations & Advantages of a Communication System, Comparison of Analog & Digital Communication Systems, Historical Perspective, Modes & Medias of Communication, Applications of Communication systems. **Noise:** Sources of Noise, External & Internal Noise, Noise Calculations, Noise Figure, Noise in Communication Systems, Signal in presence of Noise, Noise in Modulation Systems, Pre-Emphasis & De-Emphasis.	
UNIT-II	**12 Hours**
Linear Modulation: Time and frequency domain expression of AM, Basic definition for Modulation & Modulation Index, Modulation & Demodulation of AM, Suppressed Carrier Modulation: SSB-SC, DSB-SC, VSB Modulation & Demodulation, Comparison of various AM Systems, Generation of AM waves, Coherent demodulation and envelope detection. **Angle Modulation:** Basic definition and derivation for Modulation & Modulation Index, Generation of FM waves, Frequency Spectrum of FM, B.W. & required spectra, Types of FM, Multiple FM, Demodulation of FM waves, Demodulation of PM waves, Comparison between AM & FM.	
UNIT-III	**10 Hours**
Transmitters & Receivers: Classification of Radio Transmitters, Basic Block Diagram of Radio Transmitter, Effect of Feedback on operation of Transmitter, FM Transmitter using	

Reactance Modulator, Armstrong FM Transmitter, Radio Receivers, Classification, TRF Receiver, Super Heterodyne Receiver, Image Rejection & Double Spotting, Choice of IF, Tracking & Alignment of Receivers, AGC.	
UNIT-IV	**8 Hours**
Pulse Analog Modulation: Sampling theory, TDM, FDM, PAM, PWM, PPM, Modulation & Demodulation techniques of above all. **Pulse Digital Modulation:** Elements of Pulse Code Modulation, Bandwidth of PCM Systems, Measure of Information, Channel Capacity, Channel Capacity of PCM System, Differential Pulse Code Modulation (DPCM). Delta Modulation (DM).	
Text/Reference Book(s):	
1.	Communication Systems: By Simon Haykins – Wiley
2.	Electronic Communication Systems: By Kennedy – TMH.
3.	Communication Systems: By Singh & Sapre – TMH.
4.	Communication System Engineering: By John G. Proakis and Masoud Salehi, Pearson Education, 2015.
5.	Analog Communication: By P. Chakarbarti – DR & Co.
6.	Communication Systems: By Manoj Duhan – I. K. International
Other useful resource(s):	
1.	https://nptel.ac.in/courses/108104091 by Prof. Aditya K. Jagannatham Department of Electronics and Communication Engineering, IIT Kanpur.
2.	https://ocw.mit.edu/courses/6-450-principles-of-digital-communication-i-fall-2009/ by Prof. Soheil Feizi-Khankandi and Prof. Muriel Medard.
3.	https://ocw.mit.edu/courses/16-36-communication-systems-engineering-spring-2009/ by Prof. Eytan Modiano.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Analog Circuits

ECL-242 **Total Credits: 3**
L T P **Internal Marks: 20**
3 0 0 **External Marks: 80**
Total Marks: 100

Course Objective: The objectives of course are to:

- Apply knowledge of electronic devices to construct electronic circuits with better applications for our real time causes.
- Handle higher power capacity devices which will enhance the existing power handling capacity of electronic circuits.
- Design various power supplies for different circuit requirements in turn help in reducing size of batteries.
- Design same electronic circuits with another very important device i.e. operational amplifier with higher gain and easy design facilities.

Pre-requisite: Basic understanding of Electronics and Electrical Circuit Analysis

Course Outcomes: On successful completion of teaching-learning and valuation activities, at the end of the course the students would be able to:

- Analyse and design various feedback circuits catering different requirements.
- Develop skills to analyze and design various amplifiers and address the related issues.
- Design and analyze the linear and non-linear applications of Operational amplifier.
- Understand and compare the working of multivibrators using special application IC 555 and general purpose opamp.

Contents

UNIT-I	**10 Hours**
High Frequency Analysis of BJT and Multistage Amplifier: Hybrid Pi model, CE short circuit gain, Frequency response, Alpha cut off frequency, Gain bandwidth product, Emitter follower at high frequencies. RC coupled transistor amplifier, Lower & upper cut off frequency, Frequency response curve & bandwidth, Transformer coupled amplifier, Direct coupled amplifier, Cascade amplifier, Darlington pair amplifier, Distortion in amplifiers. **Feedback:** Positive and negative feedback properties. **Feedback Amplifiers:** Feedback topologies-voltage series, current series, voltage shunt and current shunt. Analysis and design of discrete circuits in each feedback topology - Voltage, Current, Transconductance and Transresistance amplifiers, its loop gain, input and output impedance, Stability of feedback circuits. Effect of feedback on amplifier poles, frequency compensation- Dominant pole and Pole-zero.	
UNIT-II	**6 Hours**
Oscillators- Barkhausen criteria, sinusoidal oscillators –phase shift, wein bridge, Hartley, colpitts and crystal. **Power Amplifier:** Definition, Application & types of power amplifiers, Amplifier classes of efficiency (Class - A, B, AB, C), Push pull amplifiers, Distortion in simple & push pull amplifier, Complementary push pull amplifier, Integrated circuit power amplifier, Class D power amplifier.	
UNIT-III	**12 Hours**
Voltage Regulators: Voltage Regulation, Basic Series Regulators, Basic Shunt Regulators, Power Supply Parameters, Basic Switching Regulators, Step up Configuration, Step down	

Configuration, IC Voltage Regulator, SMPS.

Integrated Circuit Fabrication Process: oxidation, diffusion, ion implantation, photolithography, etching, chemical vapor deposition, sputtering, twin-tub CMOS process

UNIT-IV	**6 Hours**

Operational Amplifier Fundamentals: Block diagram representation, Ideal OP-AMP, OP-AMP Equivalent Circuit, Ideal Voltage Transfer Curve, Input Offset Voltage, Input Bias Current, Input Offset Current, Output Offset Voltage, Thermal Drift, Effect of Variation in Power Supply Voltages on Offset Voltage, Common Mode Configuration and CMRR, Frequency Response of OP-AMP: Open Loop Response, Close Loop Response, Input and Output Impedances, Effect of Finite Gain Bandwidth Product, Slew Rate.

Operational Amplifier Applications: Linear and non-linear applications-ADC and DAC, Multivibrators, Oscillator using Opamp, Astable Multivibrator, Monostable Multivibrator, Bistable Multivibrator, 555 Timer, Monostable & Astable Operation with 555 Timer.

Text/Reference Book(s):

1.	Robert L. Boylestad and Lois Nashelsky, "Electronic Devices and Circuit Theory", 9th Edition, PHI, 2007.
2.	Sedra & Smith, "Microelectronic Circuits", Oxford University Press, 5th Edition, 2012.
3.	R. Gayakwad, "Op-amps and Linear Integrated Circuits", 4th edition, Prentice Hall of India Ltd.
4.	D. Roy Choudhary S. Jain, "Linear Integrated Circuits", 4th edition, New Age International (P) limited.
5.	Jacob Milman&Taub, Pulse Digital & Switching waveforms, 3/e, 20011, Tata McGraw Hill ISBN.
6.	Paynter, Introductory Electronics Devices and Circuits 7/e, 2008,Pearson Education
7.	Horenstein, Microelectronics Circuits & devices, Prentice-Hall India, 2/e, 2009.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Microprocessor & Microcontroller

ECL-244
L T P
3 0 2

Total Credits: 3
Internal Marks: 20
External Marks: 80
Total Marks: 100

Course Objectives:

- To introduce students with the architecture and operation of typical microprocessors and microcontrollers.
- To familiarize the students with the programming and interfacing of microprocessors and microcontrollers.
- To provide strong foundation for designing real world applications using microprocessors and microcontrollers.

Pre-requisite: Data and number system, Boolean algebra, Combinational and Sequential circuits.

Course Outcome: At the end of the course, a student will be able to:

- Assess and solve basic binary math operations using the microprocessor and explain the microprocessor's and Microcontroller's internal architecture and its operation within the area of manufacturing and performance.
- Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller.
- Compare accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) and Microcontroller to meet specified performance requirements.
- Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller.
- Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.
- Evaluate assembly language programs and download the machine code that will provide solutions real-world control problems.

Contents

UNIT-I	**12 Hours**
8085 & 8086 Microprocessor: 8085 & 8086 architecture: 8086 architecture- functional diagram, Register organization, memory segmentation, programming model, Memory addresses, physical memory organization, Signal descriptions of 8086-common function signals, timing diagrams, Interrupts of 8086.	
UNIT-II	**12 Hours**
Instruction set and assembly language programming of 8086: Instruction formats. Addressing modes, instruction set, assembler directives. Macros, Simple programs involving logical, branch and call instructions. Sorting, evaluating arithmetic expressions, string manipulations.	
UNIT-III	**12 Hours**
I/O Interface: 8255 PPI, various modes of operation and interfacing to 8086, interfacing of key board, display. Stepper motor interfacing, D/A &A/D converter. Interfacing With advanced devices: Memory interfacing to 8086, Interrupts of 8086, Vector interrupt table,	

Interrupt service routine, Serial communication standards, serial data transfer schemes, 8251 USART architecture and Interfacing.	
UNIT-IV	**12 Hours**
Introduction to microcontrollers: Introduction to microcontrollers: overview of 8051 microcontroller, Architecture, I/O ports, Memory organization, addressing modes and instruction set of 8051, Simple programs,	
Text/ Reference Books	
1.	D.V.Hall, Microprocessors and Interfacing. TMGH, 2nd edition
2.	Kenneth.J.Ayala. The 8051 microcontroller, 3rd edition, Cengage learning,2010
3.	Advanced microprocessors and peripherals-A.K ray and K.M.Bhurchandani, TMH, 2nd edition 2006.
4.	The 8051 microcontrollers, architecture and programming and applications-K.Uma Rao, AndhePallavi., Pearson, 2009.
5.	Micro computer system 8086/8088 family architecture, programming and design- By Liu and GA Gibson, PHI, 2nd Ed.,

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Solar Photovoltaic System and Technology

ESC-240 **Total Credits: 4**
L T P **Internal Marks: 20**
4 0 0 **External Marks: 80**
Total Marks: 100

Course Objective: The basic objective of this course is to:

- Understand the fundamentals of solar energy conversion and familiarize with solar geometry.
- Design PV system and analyse the performance.
- Familiarize with solar energy policies.

Pre-requisite: None

Course Outcomes: At the end of the course, students will be able to:

- Understand the properties of solar energy resource, PV system operation and component specifications
- Compute circuit parameters, solar cell/array performance parameters
- Understand PV installations, government policies and costing
- Design of PV systems for domestic, commercial and industrial applications

Contents

UNIT- I	**10 Hours**
Solar Cell Fundamentals: Photovoltaic effect-Principle of direct solar energy conversion into electricity in a solar cell. Semiconductor properties, energy levels, basic equations. Solar cell, p-n junction, structure. PV Module, PV Array. PV module performance– Equivalent Circuit model of Solar cell, Modeling and Simulation of solar cell, module and array, I-V characteristics of a PV module, maximum power point, cell efficiency, fill factor, effect of irradiation and temperature.	
UNIT- II	**10 Hours**
Manufacturing of PV Cells & Design of PV Systems: Commercial solar cells - Production process of single crystalline silicon cells, multi crystalline silicon cells, amorphous silicon, cadmium telluride, copper indium gallium di selenide cells. Design of solar PV systems and cost estimation. Case study of design of solar PV lantern, stand alone PV system - Home lighting and other appliances, solar water pumping systems.	
UNIT- III	**10 Hours**
Classification of PV Systems and Components Classification - Central Power Station System, Distributed PV System, Stand alone PV system, grid Interactive PV System, small system for consumer applications, hybrid solar PV system, concentrator solar photovoltaic. System components - PV arrays, inverters, batteries, charge controls, net power meters. PV array installation, operation, costs, reliability.	
UNIT- IV	**10 Hours**
PV System Applications: Building-integrated photovoltaic units, grid-interacting central power stations, stand-alone devices for distributed power supply in remote and rural areas, solar cars, aircraft, space solar power satellites. Socio-economic and environmental merits of photovoltaic systems, Technological Barriers in implementing Solar PV system.	

Application of Solar Photovoltaic system in digital India, Government Initiatives and polices.	
Suggested Text Books	
1.	Chetan Singh Solanki., Solar Photovoltaic: Fundamentals, Technologies and Application, PHI Learning Pvt., Ltd., 2009.
2.	Jha A.R., Solar Cell Technology and Applications, CRC Press, 2010.
3.	H.P. Garg & Jai Prakash "Solar Energy: Fundamentals and Applications" , Tata McGraw Hill
4.	John R. Balfour, Michael L. Shaw, Sharlave Jarosek., Introduction to Photovoltaics, Jones & Bartlett Publishers, Burlington, 2011.
5.	Partain L.D., Fraas L.M., Solar Cells and Their Applications, 2nd edition. Wiley, 2010.
6.	S.P. Sukhatme, J.K.Nayak., Solar Energy, Tata McGraw Hill, New Delhi, 2010.
7.	G.N. Tiwari, "Solar Energy-Fundamentals, Design, Modeling and Applications", Narosa Publishers, 2002.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Design and Simulation Tool

ESC-242 **Total Credits: 4**
L T P **Internal Marks: 20**
4 0 0 **External Marks: 80**
Total Marks :100

Course Objectives: The course objectives of design and simulation tool are to:

- Focus on autonomous and active "learning by doing" using engineering problem solving methodology steps for simulation of various Electronics and Communication system.
- Design and simulation the various Electronics and Communication system block circuits using like textual and graphical programming environment.
- Use open source environment to simulate various Electronics and Communication system.

Prerequisites: Basic Programming skills in any programming languages:

Course Outcomes: The outcome of this course is to:

- Focus on autonomous and active "learning by doing" using engineering problem solving methodology steps for simulation of various Electronics and Communication system.
- Design and simulation the various Electronics and Communication system block circuits using like textual and graphical programming environment.
- Use open source environment to simulate various Electronics and Communication system.

Contents

Unit – I	**8 Hours**
Engineering Problem Solving Methodology: Introduction and steps of engineering problem solving methodology, Usage of Engineering Problem Solving Methodology in Electronics and Communication Engineering, Brief overview of open source and commercial simulation tools, Introduction to various textual and graphical Simulation and Design tools for Electronics and Communication Engineering, feature and their usage**.**	
Unit – II	**12 Hours**
Elements of MATLAB Programming: Introduction, handing of arrays and matrices, string, cell array and structure, file I/O, handling two dimensional plotting, loop and control statement, polynomial, Matlab programming using m file script and function, MATLAB programming application in engineering problem solving, writing efficient MATLAB code, parallel MATLAB, Elements of MATLAB programming, Writing m files for Electronics and Communication System Simulation. Input, export, I/O and application program interface, memory usage, debugger and profiler, efficient coding using vectorization technique, calling C-function, object oriented programming, symbolic processing, report generation. **Elements of Scilab Programming:** Introduction, Scilab Environment, Handing of arrays and matrices, string, cell array and structure, file I/O, Menus and dialog boxes, string, Handling plotting, Loop and control statement, polynomials, Application of Scilab programming in Engineering Problem Solving, Writing SCI files for Electronics and Communication System Simulation.	
Unit – III	**10 Hours**
Problem Solving Using Graphical Programming: Overview of commercial and open source graphical programming environment, problem solving using graphical programming environment Simulink, Overview of Simulink block libraries and their component, Modelling	

and simulation of dynamic system using Simulink, subsystem and masking, Creation of customized functionality using S-function implementation, Simulink example for analog and digital and communication, signal processing, circuit and system.		
Unit – IV		**10 Hours**
Virtual Instrumentation Using LabView: Graphical system design overview using LabView, modular programming, repetition and loops, arrays, plotting data, structure, file I/O, Date acquisition IMAQ, GSD application. Introduction of Xcos, palettes, Dynamic system modelling using Xcos. Application of graphical programming environment Simulink/LabView/Xcos in Electronics and Communication system simulation.		
Suggested Text Books		
1.	Stephen L. Campbell et al., Modelling and Simulation in Scilab/Xcos, Springer.	
2.	James, B. Dabney, Thomas, L Harman: Mastering Simulink, Pearson Education, 2004.	
3.	Steven, T. Karris: Introduction to simulink with engineering applications, Orchard publications, 2006.	
4.	Misza Kalechman: Practical MATLAB applications for engineers, CRC Press, 2009.	
5.	Palamids, A., Veloni, A.: Signals and systems laboratory with MATLAB, CRC Press, 2010.	
6.	Jain, S.: Modeling and simulation using MATLAB-Simulink, Wiley India, 2011.	
7.	Klee Harold, Aleen Randal: Simulation of dynamical system with MATLAB and Simulink, 2nd edition, CRC Press, 2011.	
8.	Michal, A., Gray: Introduction to the simulation of dynamics using Simulink, Chapman & Hall/CRC, 2011.	
9.	Hema Ramachandran and Achuthsankar S. Nair, Scilab, S. Chand, 2012	
10.	Bober, W., Stevens, A.: Numerical and Analytical Methods with MATLAB for Electrical Engineers, CRC Press, 2013.	
11.	Jovitha Jerome, Virtual Instrumentation Using LabView, PHI Learning Private Ltd, 2010.	

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Data Base Management System

ESC-244 **Total Credits: 4**
L T P **Internal Marks: 20**
4 0 0 **External Marks: 80**
Total Marks :100

Course Objectives: The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.
Prerequisites: Basic Programming skills in any programming languages:
Course Outcomes: The outcome of this course is to:

- Write relational algebra expressions for the query and optimize the developed expressions and design the databases using ER method and normalization for a given specification of the requirement
- Construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2 for a given specification
- Determine the transaction atomicity, consistency, isolation, and durability for a given transaction-processing system
- Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

Contents

Unit – I	**8 Hours**
Basics of Database system: Architecture of DBMS, Applications of DBMS, Advantages and Disadvantages of DBMS. Categorization of DBMS, Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). **Data models:** introduction to network model, Hierarchical model, Relational Model and object oriented data model. Key components of E-R Model. Specifying different constraints on E-R Models. Specialization and generalization.	
Unit – II	**12 Hours**
Relational Model: formal definition of relational model, Relational model Design. **Query Language:** introduction to Tuple and domain relational calculus, operations of Relational algebra, Introduction to SQL, Implementation of relational algebra operations in SQL. Introduction to Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.	
Unit – III	**10 Hours**
Refinement of Database Design: Domain and data dependency, types of functional dependencies. Armstrong's axioms, Normal forms, Dependency preservation, Lossless design.	
Unit – IV	**10 Hours**
Transaction processing: Concurrency control, ACID property, Serializability of schedules, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery **Advance Topics in DBMS:** Distributed databases, Data warehousing and data mining, Object oriented and object relational databases.	
Suggested Text Books	
1.	Database System Concepts, 6th Edition by Abraham Silberschatz, Henry F. Korth, S.

	Sudarshan, McGraw-Hill
2.	Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.
3.	Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education
4.	Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley
5.	An introduction to Database Systems. Author : C J Date. Publisher : Wesley

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Innovation & Entrepreneurship

HSMC: 242 **Total Credits:4**
L T P **Internal Marks: 20**
4 0 0 **External Marks: 80**
Total Marks: 100

Course Objective: The aim of this course is to:

- Learn importance of studying entrepreneurship development.
- Lean how their own business can be started.
- Learn how the government helps SSI for their growth and developments.

Pre- requisites: To enhance the urge for becoming Entrepreneur.

Course Outcomes: At the end of the course, students will be able to:

- Learn importance of studying entrepreneurship development.
- Lean how to start someone own business.
- Learn how the government helps SSI for their growth and developments.

Contents

Unit – I	**12 Hours**
Introduction: Concept of Entrepreneurship; Role of Entrepreneurship in Economic Development; Factors Impacting Emergence of Entrepreneurship; Types of Entrepreneurs. Characteristic Of Successful Entrepreneurs; Qualities Required for Entrepreneur, Entrepreneurship Process; Women Entrepreneurs; Social Entrepreneurship; Entrepreneurial Challenges.	
Unit – II	**12Hours**
Entrepreneurship Development and Leadership: Entrepreneurial class Theories; Entrepreneurial training; Characteristics of entrepreneurial leadership, Components of Entrepreneurial Leadership; International Entrepreneurship- Opportunities and challenges; Entrepreneurial Challenges	
Unit – III	**10 Hours**
Entrepreneurship Project Development: Idea generation; Developing a Marketing plan,, steps in marketing research;, perspectives in business plan preparation, elements of a business plan; Business plan failures	
Unit – IV	**12Hours**
Govt. support to new enterprise; Entrepreneurship Development Programmes and financing of new ventures; Role of various institutions in developing entrepreneurship in India. International entrepreneurship- opportunities and challenges; Intrapreneurship. Govt. support to new enterprise.	
Suggested Text Books	
1.	Lall, Madhurima and Shikha Sahai," Entrepreneurship", Excell Books, New Delhi.
2.	Charantimath, Poornima, "Entrepreneurship Development and Small Business Entrprises", Pearson Education, New Delhi.
3.	Dutta, B. (2009). Entrepreneurship Management (Text and Cases) (1 ed.). New Delhi: Excel Book
4.	Hisrich, Robert d; Michael Peters and Dean Shephered, "Entrepreneurship", Tata Mc

	Graw Hills.
5.	Barringer, Brace R; and Duane, R: Ireland, “Entrepreneurship”, prentice Hall, New Jersy.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Energy Audit, Conservation & Management

BSC- 240 **Total Credits: 3**
L T P **Internal Marks: 20**
3 0 0 **External Marks: 80**
Total Marks: 100

Course Objective: The aim of this course is to:

- To understand energy efficiency, scope, conservation and technologies.
- To design energy efficient lighting systems.
- To estimate/calculate power factor of systems and propose suitable compensation techniques.
- To understand energy conservation in HVAC systems.
- To calculate life cycle costing analysis and return on investment on energy efficient technologies.

Pre-requisite if any: None

Course Outcomes: At the end of the course, students will be able to:

- Explain energy efficiency, conservation and various technologies.
- Design energy efficient lighting systems.
- Calculate power factor of systems and propose suitable compensation techniques.
- Explain energy conservation in HVAC systems.
- Calculate life cycle costing analysis and return on investment on energy efficient technologies.

Contents

UNIT- I	**10 Hours**
Basic Principles of Energy Audit and management Energy audit, Definitions, Concept, Types of audit, Energy index, Cost index, Pie charts, Sankey diagrams, Load profiles, Energy conservation schemes and energy saving potential, Numerical problems, Principles of energy management, Initiating, planning, controlling, promoting, monitoring, reporting, Energy manager, Qualities and functions, Language, Questionnaire, Check list for top management.	
UNIT- II	**10 Hours**
Lighting: Modification of existing systems, Replacement of existing systems, Priorities: Definition of terms and units, Luminous efficiency, Polar curve, Calculation of illumination level, Illumination of inclined surface to beam, Luminance or brightness, Types of lamps, Types of lighting, Electric lighting fittings (luminaries), Flood lighting, White light LED and conducting Polymers, Energy conservation measures	
UNIT- III	**12 Hours**
Power Factor and energy instruments: Power factor, Methods of improvement, Location of capacitors, Power factor with non linear loads, Effect of harmonics on Power factor, Numerical problems. Energy Instruments, Watt hour meter, Data loggers, Thermocouples, Pyrometers, Lux meters, Tong testers, Power analyzer. **Space Heating and Ventilation:** Ventilation, Air-Conditioning (HVAC) and Water Heating: Introduction, Heating of buildings, Transfer of Heat, Space heating methods, Ventilation and air-conditioning, Insulation, Cooling load, Electric water heating systems, Energy conservation	

methods		
UNIT- IV		**10 Hours**
Economic Aspects and Analysis: Economics Analysis, Depreciation Methods, Time value of money, Rate of return, Present worth method, Replacement analysis, Life cycle costing analysis, Energy efficient motors (basic concepts). **Computation of Economic Aspects:** Calculation of simple payback method, Net present worth method, Power factor correction, Lighting, Applications of life cycle costing analysis, Return on investment.		
Suggested Text Books		
1.	Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications. 2012	
2.	Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd–2nd edition, 1995	
3.	Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.	
4.	Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1st edition, 1998.	
5.	Energy management hand book by W.C.Turner, John wiley and sons.	
6.	Energy management and conservation - kv Sharma and pvenkata seshaiah-I K International Publishing House pvt. Ltd., 2011.	
Useful Resources:		
1.	http://www.energymanagertraining.com/download/Gazette_of_IndiaPartIISecI-37_25-08-2010.pdf	

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

PC Interfacing and Data Acquisition

ESC-246 **Total Credits: 4**
L T P **Internal Marks: 20**
4 0 0 **External Marks: 80**
Total Marks: 100

Course Objective: The students will be able to

- Understand basic concept of PC interfacing and data acquisition.
- Learn concept of memory and mass storage devices.
- Understand concept of buses of communications.
- Familiarize with the concept of Local Area Network and various topologies used in LAN.
- Understand the concept of interfacing of computer with various cards.

Pre-requisite: Fundamental of computers.

Course Outcomes: After completion of this course, the students are proficient to:

- Demonstrate the fundamentals of PC interfacing and data acquisition.
- Demonstrate the concept of memory and mass storage devices.
- Compare structure and features of various buses.
- Analyze interfacing of DAQ cards with PC with the help of various buses and Local Area Networks.

Contents

UNIT- I	**09 Hours**
PC as a platform for Data Acquisition: Origin of PC, software-operating systems, programming languages, hardware components–mother board–microprocessors, chipsets and support circuits, functions, system control, peripheral control, memory control BIOS and its functions.	
UNIT- II	**12 Hours**
Memory and Mass Storage Devices: Memory, logical organization, mass storage devices, data organization, magnetic storage, optical storage, interfaces–AT attachments, SCSI parallel interface, keyboard, mouse, trackball, scanners, display systems, display adapters, audio systems, printers, ports-USB, Firewire, IrDA, Bluetooth, RS-232C serial port, parallel ports.	
UNIT- III	**08 Hours**
Buses and Communications: History, architecture, functions of various buses: ISA, PCI, PCI-X, PCI-Express, PCMCIA, Infinib and hyper transport.	
UNIT- IV	**10 Hours**
Interfacing: Local area networking-concepts, topologies, standards, hardware, telecommunication-analog and digital services, internet–addressing, Domain name systems, routing, design of DAS around PC, different DAQ cards and software, interfacing of add-on DAQ cards with PC using various buses.	
Suggested Text Books	
1.	Winn. L. Rosch, “Hardware Bible”, Techmedia, New Delhi.
2.	Mark Minasi, “The Complete PC maintenance and upgrade guide”, BPB publications.
3.	John Uffenbeck, “8086/8088 Programming”, PHI.
4.	Tanenbaum, “Structured Computer Organisation”, PHI.
5.	Gilmore, “Microprocessors”, Mc-Graw Hill.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

ICT for Development

ESC-248 **Total Credits:4**
L T P **Internal Marks: 20**
4 0 0 **External Marks: 80**
Total Marks: 100

Course Objective: The objective of this course is:

- To develop digital literacy skills that will enable them to function as discerning students in an increasingly digital society.
- To access various tools and applications for learning and skill development.
- Providing an opportunity to have a job oriented certification for making their livelihood.
- Developing a skillful youth community to address the needs of the digital society.
- Creating awareness on social, ethical and legal use of ICT.

Pre-requisite: None

Course Outcomes:

- Familiarize the students with main theories and conceptual frameworks in the field of ICT for development
- Help students learn potential of both information and communication technologies in different areas such as health, education, agriculture, finance, gender equality and climate change.
- Familiarized students with the existing innovative business models and other applications in the above mentioned areas with reference to India and other developing countries.

UNIT- I	**08 Hours**
Introduction to ICTs for sustainable Development Introduction to Information and Communication Technology (ICT); Role of ICTs in Sustainable Development; Current Status of ICTs in Sustainable Development, Global and India Scenario. Potential of ICTs in various fields, impact of Information Technologies on GDP growth, Information Technology Act and regulation, awareness about cyber crime	
UNIT- II	**12 Hours**
Understanding information needs, Traditional vs. contemporary knowledge systems, information processing and retrieval; Understanding means of communication in different areas, developing an effective communication strategy Case	
UNIT- III	**10 Hours**
The hardware and software, the physical infrastructure, satellite, wireless solutions, telecommunication technologies, mobiles, fixed line, internet and world wide web, community radio, technology-user interface, design of relevant ICT products and services.	
UNIT- IV	**10 Hours**
Types of Sensors, How sensor works?, Moisture sensor, tilt sensor, smoke sensor, Temperature Sensor, Pressure Sensor, Level Sensor Fibre Optic Sensors etc,, Basics of Internet of Things (IoT), Concept of Smart Home, Smart Meter, Smart Mobility, Smart Public Safety, Smart Sanitation, Smart Security and Surveillance,	
Suggested Text Books	
1.	Principles of geographical information systems", P. A. Burrough and R. A.

2.	Remote sensing of the environment", J. R. Jensen, Pearson.

Contents

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Basics of Corporate law

HSMC-244 **Total Credits: 4**
L T P **Internal Marks: 20**
4 0 0 **External Marks: 80**
Total Marks: 100

Course Objective: The basic objective of this course is:

- The objective of this course is to provide the students with practical legal knowledge of general business law issues.
- It aims at providing a rich fund of contemporary knowledge , time tested principles, basic concepts, emerging ideas, evolving theories, latest technique , ever changing procedures & practices in the field of Law.

Pre-requisite: None

Course Outcomes: At the end of the course, students will be able:

- At the end of the course students would be able to understand the basic concepts and laws of business.
- Students would be able to understand the Intellectual Property Rights and Consumer Protection Laws and developments.

Content

UNIT- I	**10 Hours**
Introduction: Company- Meaning and Characteristics; Features of company; Types of companies, advantages and disadvantages of incorporation; Lifting of corporate veil	
UNIT- II	**12 Hours**
Formation of Company: Promotion of company; Functions of promoter; importance of promoter; Promoter's remuneration; legal status of Promoter; Rights of promoters; Duties of promoters; Procedure and Formalities of Reservation of Companies	
UNIT- III	**12 Hours**
Memorandum of Association: Meaning; importance; clauses of memorandum of association and their Alteration; Introduction to Consumer Protection Law in India – Consumer Councils –Redressal Machinery – Rights of Consumers – Consumer Awareness	
UNIT- IV	**12 Hours**
Corporate Finance: Nature, meaning and objectives, Role of RBI and SEBI in Corporate Governance, Corporate Social Responsibility, Protection of interest of Investors	

Suggested Text Books

1.	L.C.B. Gower : Principles of Modern Company Law, Eastern Book Company
2.	Taxmann's A.K. Majumdar, : Company Law and Practice,
3.	Penningoton : Principles of Company Law
4.	N.D.Kappor,"Elements of Mercantile Law",2015,Sultan Chand &Co
5.	Dr. L.C. Dhingra : Principles of Company Law
6.	Dr. Avtar Singh : Indian Company Law, Bright Law House, 1994

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

E-Waste Management

BSC-242 **Total Credits: 4**
L T P **Internal Marks: 20**
4 0 0 **External Marks: 80**
Total Marks: 100

Course Objective: The objective of this course is:
- To understand scenario of E-waste
- To discuss key elements of E-waste management
- To understand key terms associated with E- waste
- Imparting life skills about E waste management in routine daily life to minimize the hazards and to understand the regulations to contribute in effective management throughout the society

Pre- requisites: Basic understanding of environmental related issues

Course Outcomes: On completion of this course, students will be able to learn:
- Learn about the various aspects of E-waste
- Understand the role of various stakeholders-producers, manufactures etc.

Contents

Unit – I	**10 Hours**
What is E-Waste, Indian and global scenario of e-Waste, Growth of Electrical and Electronics industry in India, E-waste generation in India, Composition of e-waste, Possible hazardous substances present in e waste, Environmental and Health implications.	
Unit – II	**12Hours**
Regulatory regime for e-waste in India, The hazardous waste(Management and Handling) rules 2003, Ewaste management rules 2015, Regulatory compliance including roles and responsibility of different stakeholders – producer, manufacturer, consumer etc., Proposed reduction in the use of hazardous substances(RoHS), Extended producer responsibility (EPR).	
Unit – III	**15 Hours**
Historic methods of waste disposal – dumping, burning, landfill;Recycling and recovery technologies – sorting, crushing, separation; Life cycle assessment of a product – introduction; Case study – optimal planning for computer waste	
Unit – IV	**12Hours**
Emerging recycling and recovery technologies, Guidelines for environmentally sound management of e-waste, Environmentally sound treatment technology for e-waste, Guidelines for establishment of integrated e-waste recycling and treatment facility, Case studies and unique initiatives from around the world	
Suggested Text Books	
1.	Johri R., "E-waste: implications, regulations, and management in India and current global best practices", TERI Press, New Delhi.
2.	Fowler B. 2017. Electronic Waste – 1st Edition (Toxicology and Public Health Issues). Elsevier
3.	Hester R.E., and Harrison R.M. 2009. Electronic Waste Management. Science, RSC, Publishing

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Universal Human Values

HSMC-246 **Total Credits: 3**
L T P **Internal Marks: 20**
3 0 0 **External Marks: 80**
Total Marks: 100

Course Objective: The objective of this course is:

- To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Value based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with Nature.

Pre- requisites: None

Course Outcomes: By the end of the course, students are expected:

- To become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
- They would have better critical ability.
- They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
- It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Contents

Unit – I	**10 Hours**
Need for Value Education: Introduction to Value Education, Understanding Value Education, Self-exploration as the Process for Value Education, Sharing about Oneself, Continuous Happiness and Prosperity – the Basic Human Aspirations, Right Understanding, Relationship and Physical Facility, Exploring Human Consciousness, Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations, Exploring Natural Acceptance	
Unit – II	**12 Hours**
Harmony in the Human Being: Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, Body as an Instrument of the Self, Understanding Harmony in the Self, Exploring Sources of Imagination in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health,. **Harmony in the Family and Society**: Harmony in the Family, Values in Human-to-Human Relationship, 'Trust' – the Foundational Value in Relationship, ,'Respect' – as the Right Evaluation, Understanding Harmony in the Society, Vision for the Universal Human Order	
Unit – III	**15 Hours**
Harmony in the Nature/Existence: Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature,	

Exploring the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence, Exploring Co-existence in Existence	
Unit – IV	**12 Hours**
Implications of the Holistic Understanding: Professional Ethics, Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence, Models in Education, Holistic Technologies, Production Systems and Management Models, Strategies for Transition towards Value-based Life and Profession	
Suggested Text/Reference Books	
1.	A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2.	The Teacher's Manual Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2
3.	JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
4.	Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Analog and Digital Communication Lab

ECP-240 **Total Credits: 1**
L T P **Internal Marks: 10**
0 0 2 **External Marks: 40**
Total Marks: 50

Course Objective: The objectives of the analog and digital communication lab are:

- Students will get hands on practical exposure to concepts of AM, FM and PM
- Students will be able to understand the basics of PAM, PPM and PWM.
- Students will be able to analyze various digital carrier modulation and demodulation techniques
- They can analyze noise and disturbance in modulated signals.

Pre-requisite: Understanding of the basic building blocks, principles and applications of communication systems.

Course Outcomes: At the end of the course, students will be able to:

- Acquire competence associated with the knowledge of different Communication Blocks and basic principles and applications of Analog and Digital Communication systems.
- Get hands on practical exposure to concepts of AM, FM and PM
- To understand the basics of PAM, PPM and PWM.
- To analyze various digital carrier modulation and demodulation techniques
- To analyze noise and disturbance in modulated signals.

List of Experiments

1.	To study and waveform analysis of amplitude modulation and determine the modulation index of amplitude modulation.
2.	To study and waveform analysis of amplitude demodulation by any method.
3.	To study and waveform analysis of frequency modulation and determine the modulation index of frequency modulation.
4.	To study and waveform analysis of frequency demodulation by any method.
5.	To study Amplitude Shift Keying (ASK) modulation.
6.	To study Frequency Shift Keying (FSK) modulation.
7.	To study Phase Shift Keying (PSK) modulation.
8.	To study and waveform analysis of phase modulation.
9.	To study Phase demodulation.
10.	To study Pulse code modulation.
11.	To study Pulse amplitude modulation and demodulation.
12.	To study Pulse width modulation.
13.	To study Pulse position modulation.
14.	To study delta modulation.
15.	To deliver a seminar by each student on Advance Communication System techniques.
Suggested Text Books:	
1.	Electronic Communication Systems By Kennedy – TMH
2.	Communication Systems By Singh & Sapre – TMH
3.	Communication Systems By Manoj Duhan – I. K. International.

Note: At least 10 experiments are to be performed by students in the semester. Out of which at least eight experiments should be performed from the above list, remaining two experiments may either be performed from the above list or designed and set by the concerned faculty as per the scope of the syllabus.

Analog Circuits Lab

ECP-242 **Total Credits: 1**
L T P **Internal Marks: 10**
0 0 2 **Internal Marks: 40**
Total Marks: 50

Course Objective: The objectives of course are to:

- To design the amplifiers using BJT & FET and analyze their frequency responses.
- To design the power supplies for different circuit requirements.
- To provide students basic experimental experiences in analyzing, designing, amplifier, linear and non-linear applications of operational amplifier.

Pre-requisite: Fundamental understanding of Electronics and Electrical Circuit Analysis

Course Outcomes: At the end of the course the students would be able:

- To foster ability to identify, analyze and different amplifiers and oscillator circuits.
- To nurture ability to analyze, design and simulate various linear and non linear applications of operational amplifier circuits
- To study the frequency response of BJTs and FETs RC coupled amplifier.
- To learn generation of different kind of waveforms using 555 timer and op amps.
- Simulation of electronic circuits using SPICE/Proteus/other environment.

S.No.	List of Experiments
1.	To analyze and study frequency response of RC coupled amplifier.
2.	To analyze and study different types of feedback topology.
3.	To analyze and study RC phase shift oscillator.
4.	To analyze and study Wein bridge oscillator.
5.	To analyze and study crystal oscillator.
6.	To analyze and study three terminal IC voltage regulator.
7.	To study amplifying circuits (i) Simple common emitter amplifier configuration- gain and bandwidth-with and without emitter bypass capacitor. (ii) Common source amplifier- with and without source bypass capacitor.
8.	To analyze and study CE amplifier and calculate its gain.
9.	To analyze and study 555 timer as a square wave generator.
10.	To analyze and study SMPS power supply.
11.	To analyze and study working of Push-Pull amplifier.
12.	To familiarize with the use and characteristics of a 741 Op-Amp, as an inverting amplifier, non-inverting amplifier, and voltage follower.
13.	Simulation of experiments listed above using SPICE/Proteus/other environment. (It is desirable to carry out the implementation followed by simulation)
Suggested Text Book(s):	
1.	Robert L. Boylestad and Lois Nashelsky, "Electronic Devices and Circuit Theory", 9th Edition, PHI, 2007.
2.	Sedra Smith, "Microelectronic Circuits", 5th Edition, Oxford Press, 2012.
3.	R. Gayakwad, "Op-amps and Linear Integrated Circuits", 4th edition, Prentice Hall of India.

4.	D. Roy Choudhary S. Jain, "Linear Integrated Circuits", 4th edition, New Age International (P) limited.

Note: At least 10 experiments are to be performed by students in the semester. Out of which at least eight experiments should be performed from the above list, remaining two experiments may either be performed from the above list or designed and set by the concerned faculty as per the scope of the syllabus.

Microprocessor and Microcontroller Lab

ECP-244 **Total Credits: 1**
L T P **Internal Marks: 10**
0 0 2 **Internal Marks: 40**
Total Marks: 50

Course Objective: The objectives of course are:

- To familiar with the architecture and programming using 8086 microprocessor and 8051 microcontroller.

Pre-requisite: None

Course Outcomes: At the end of the course, students will demonstrate the ability to:

- Do basic assembly language programming of 8086.
- Do advance assembly language programming of 8086.
- Do basic assembly language programming of 8086 for interfacing of peripherals.
- Do advance assembly language programming of 8086 for interfacing of peripherals.

List of Experiments

1.	To study the architecture of 8086 microprocessor and 8086 microprocessor kit.
2.	To study the architecture of 8051 microcontroller.
3.	Write a program to add the contents of the memory location to the content of other memory location and store the result in 3rd memory location.
4.	Write a program to add 16 bit number using 8086 instruction set.
5.	Write a multiplication of two 16 bit numbers using 8086 instruction set.
6.	Write a program for division of two 16 bit numbers using 8086 instruction set.
7.	Write a program factorial of a number.
8.	Write a Program to transfer a block of data with & without overlap.
9.	Write a program to find the average of two numbers.
10.	Write a Program to check whether data byte is odd or even
11.	Write a program to find maximum number in the array of 10 numbers.
12.	Write a program to find the sum of the first ‘n’ integers.
13.	Write a program to generate a square wave.
14.	Write a program to generate a rectangular wave.
15.	Write a program to generate a triangular wave.
Suggested Text Book(s):	
1.	D. V. Hall, Microprocessors and interfacing, Tata McGraw-Hill, 2nd Edition, 2006.
2.	Ray A. K. and Burchandi, Advanced Microprocessors and Peripherals Architectures, Programming and Interfacing, Tata McGraw Hill, 2002.
3.	Brey, The Intel Microprocessors 8086- Pentium Processor, 8th Edition, Pearson Education.
4.	M. A. Mazidi, J. P. Maizidi and Danny Causey, The X86 PC: Assembly Language, Design and interfacing, 5th Edition, Pearson Education, 2017.
5.	B.Ram, Fundamentals of Microprocessor and Microcomputers, Dhanpat Rai Publications, 5th edition, 2008

Note: At least 10 experiments are to be performed by students in the semester. Out of which at least eight experiments should be performed from the above list, remaining two experiments may either be performed from the above list or designed and set by the concerned faculty as per the scope of the syllabus.

Electronics Project Workshop-II

ECP-246 **Total Credits: 1**
L T P **Internal Marks: 10**
0 0 2 **External Marks: 40**
Total Marks: 50

Course Objective: The aim of this course is to:

- To familiarize the students with electronics components.
- To introduce various tools for designing of PCB.

Pre-requisite: None

Course Outcomes: At the end of the course, students will be able to:

- Implement the basic analog and digital circuits using various components.
- Design, analyze and troubleshoot broad range of electronics components.
- PCB Designing for Electronics Circuits using Software and using hardware components in PCB design lab.

List of Experiments

1.	Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools (such as Dia or XCircuit), Interpret data sheets of discrete components and IC's, Estimation and costing.
2.	Testing of electronic components (Resistor, Capacitor, Diode, Transistor and JFET using multimeter.)
3.	Inter-connection methods and soldering practice. (Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions, soldering practice in connectors and general purpose PCB, Crimping.)
4.	Inter-connection methods and soldering practice. [Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions, soldering practice in connectors and general purpose PCB, Crimping.]
5.	To study double-sided PCB, familiarization with copper clad board, open source hardware, Arduino-board, Raspberry-Pi etc.

Note: Each student will individually carry out a project related to the implementation of an application based electronic and communication circuit covering the scope of above workshop. At least 10 experiments are to be performed by students in the semester from the above list or designed and set by the concerned faculty as per the scope of the syllabus.

Logical Reasoning

HSMC-240
L T P
2 0 0

Total Credits: 00
Internal Marks: 50
External Marks: 00
Total Marks: 50

Course objective: The objective of this course is:

- To create awareness about aptitude and its uses in Engineering.
- To prepare and explain the fundamentals related to various possibilities and probabilities related to Logical Reasoning.
- To critically evaluate numerous possibilities related to puzzles.
- To impart right knowledge, skill and aptitude to face competitive examination.

Pre-requisite: None

Course Outcomes: The student will be able to:

- Use their logical thinking and analytical abilities to solve Logical Reasoning questions from company specific and other competitive tests.
- Understand and solve puzzle related questions from specific and other competitive test.

Contents

Unit – I	**12 Hours**
Basic English grammar: tenses, articles, adjectives, prepositions, conjunctions, verb-noun agreement, and other parts of speech **Basic vocabulary:** words, idioms, and phrases in context Reading and comprehension Narrative sequencing	
Unit – II	**10 Hours**
Logic: deduction and induction, Analogy, Numerical relations and reasoning, Mirror Image and Water Image.	
Unit – III	**10 Hours**
Blood Relation, Directional Sense, Number and Letter Series, Coding – Decoding, classification, visual Reasoning	
Unit – IV	**8 Hours**
Calendars ,Clocks , Venn Diagrams, Seating Arrangement , Syllogism , Mathematical Operations	
Suggested Text Books	
1.	A K Gupta : Logical and Analytical Reasoning (Useful for All Competitive Exams) Ramesh Publishing House
2.	Sinha Nishit K.: Logical Reasoning and Data Interpretation for the CAT, Pearson Education India
3.	Anshul Saini : A Tricky Approach to Logical Reasoning, Invincible Publishers
4.	Jan von Plato : Elements of Logical Reasoning, Cambridge University Press

Note: The evaluation of the course Quantitative Aptitude is carried out throughout the semester in the analogy of internal assessment. The continuous assessment may be done at the Departmental level.