Walchand Institute of Technology, Solapur
(An Autonomous Institute)

Affiliated to
Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Choice Based Credit System (CBCS)

Structure and Syllabus
for
S.Y. B.Tech. Electronics & Computer Engineering
W.E.F. 2025-26

Dr. Mrs. M. A. Mirgude
Dean Academics

HEAD
Electronics Department
Walchand Institute of Technology
SOLAPUR-413006

WALCHAND INSTITUTE OF TECHNOLOGY WIT SOLAPUR (Autonomous)

Department of Electronics Engineering

Vision

- To be a distinguished centre for nurturing the holistic development of competent young engineers in the Electronics and Information Technology fields.

Mission

- **M1:** To inculcate and stimulate Electronics & Computer proficiency amongst students through quality education and innovative educational practices.
- **M2**: To create engineering professionals with social consciousness
- **M3:** To foster technical skills of students through creativity and critical thinking
- **M4**: To enhance soft skills set of students which is crucial for career success through effectual training

Electronics and Computer Engineering

Program Educational Objectives (PEOs)

- Graduates will have a successful professional career in Electronics & Information Technology fields.
- Graduates will Leverage his fundamental knowledge to pursue higher education and will continue his professional development in Electronics & Information Technology fields.
- Graduates will Exhibit professional ethics, team spirit and effective communication skills to be successful leader and manager with a holistic approach.
- Graduates will be sensitive to ethical, societal & environmental issues while conducting his professional work.

Knowledge and Attitude Profile (WK)

WK1	A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.
WK2	Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.
WK3	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.
WK4	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
WK5	Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.
WK6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.
WK7	Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.
WK8	Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9	Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.
Program Outcomes (POs)	
PO 1	**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem Analysis: Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO 3	**Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Engineering Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO 6	**The Engineer and The Society (World):** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities, relevant to the professional engineering practice.
PO 7	**Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO 8	**Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO 9	**Communication:** Communicate effectively and inclusively within the

	engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning difference
PO 10	**Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO 11	**Life-long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Program Specific Outcomes (PSOs)

1. **Algorithms** : Graduate will able to develop, realize and validate algorithms for different electronic systems and programming applications
2. **Systems:** Graduate will able to develop, implement and test different electronic systems and computer applications
3. **Self-Learning:** Graduate with his sound fundamentals is prepared to comprehend applications of the Electronics and Computer engineering through self-learning mode.

Electronics and Computer Engineering

Legends Used	
L	Lecture Hours / week
T	Tutorial Hours / week
P	Practical Hours / week
FA	Formative Assessment
SA	Summative Assessment
ESE	End Semester Examination
ISE	In Semester Evaluation
ICA	Internal Continuous Assessment
POE	Practical and Oral Exam
OE	Oral Exam
MOOC	Massive Open Online Course
HSS	Humanity and Social Science
NPTEL	National Programme on Technology Enhanced Learning
F.Y.	First Year
S.Y.	Second Year
T.Y.	Third Year
B. Tech.	Bachelor of Technology

Electronics and Computer Engineering									
Course Code Format									
2	**1**	**E**	**C**	**U/P**	**2**	**C**	**C**	**1**	**T/L**
Year of Syllabus revision		Program Code		U-Under Graduate P-Post Graduate	Semester No./ Year1/2/3/…8	Course Type		Course Serial No1-9	T- Theory L-Lab session A-Tutorial P –Programming / Design

Program Code	
EC	Electronics and Computer Engineering
Course Type	
BS	Basic Science
ES	Engineering Science
HU	Humanities & Social Science
MC	Mandatory Course
CC	Programme Core Compulsory Course
SN*	Self-Learning (**N*** *indicates the serial number of electives offered in the respective category)*
EN*	Programme Core Elective Course (**N*** *indicates the serial number of electives offered in the respective category)*
SK	Skill-Based Course
SM	Seminar
MP	Mini project
PR	Project
IN	Internship
ON*	Open Elective (**N*** *indicates the serial number of electives offered in the respective category)*
MD	Multidisciplinary Minor
EM	Entrepreneurship/Economics/Management Courses
FP	Community Engagement Project / Field Project
AE	Ability Enhancement Course
VE	Value Education Course
IK	Indian Knowledge System
VS	Vocational & Skill Enhancement Course
RM	Research Methodology
HN	Honors' Degree Course
HR	Honors Research
Sample Course Code	
24ECU3CC1T	Digital Techniques

Electronics and Computer Engineering

B. Tech. Semester III

Course Code	Name of Course	Engagement Hours			Credits	SA		FA		Total
		L	T	P		Theory	OE/ POE	ISE	ICA	
24ECU3CC1T	Digital Techniques	2	-	-	2	60		40	-	100
24ECU3CC2T	Analog and Digital Communication	2	-	-	2	60		40	-	100
24ECU3CC3T	Analog Electronic Circuits	2	-	-	2	60		40	-	100
24##U3N*4T	Open Elective I	2	-	-	2	60		40	-	100
24##U3N*4A	Open Elective I (Tutorial)	-	1	-	1	-		-	25	25
24CMU3EM5T	Entrepreneurship Development	1	1	-	2	-		-	50	50
24##U3MD6T	Multidisciplinary Minor I	2	-	-	2	60		40	-	100
24CMU3VE7T	Universal Human Values	2	-	-	2	50*		-	-	50
	Sub Total	**13**	**2**		**15**	**350**		**200**	**75**	**625**
	Laboratory Courses									
24ECU3CC1L	Digital Techniques Lab	-	-	2	1	-	-	-	25	25
24ECU3CC2L	Analog and Digital Communication Lab	-	-	2	1				25	25
24ECU3CC3L	Analog Electronic Circuits Lab	-	-	2	1		25		25	50
24ECU3CC8P	Programming with C++	1	-	2	2		50	25	25	100
24ECU3FP9L	Community Engagement Project / Field Project	-	-	4	2	-	-	-	50	50
	Sub Total	**1**	**-**	**12**	**7**	**350**	**75**	**25**	**150**	**250**
	Grand Total	**14**	**2**	**12**	**22**	**425**		**225**	**225**	**875**

Electronics and Computer Engineering

B. Tech. Semester IV

Course Code	Name of Course	Engagement Hours			Credits	SA		FA		Total
		L	T	P		Theory	OE/ POE	ISE	ICA	
24ECU4CC1T	Microcontrollers	2	-	-	2	60		40	-	100
24ECU4CC2T	Data Structures	2	-	-	2	60		40	-	100
24ECU4CC3T	Computer Networks	2	-	-	2	60		40	-	100
24ECU4EM4T	Information Systems and Management	2	-	-	2	60		40	-	100
24##U4N*5T	Open Elective II	2	-	-	2	60		40	-	100
24##U4N*5A	Open Elective II (Tutorial)	-	1	-	1	-		-	25	25
24##U4MD6T	Multidisciplinary Minor II	1	-	-	1	-		50	-	50
24CMU4AE7T	General Proficiency	1	1	-	2	-		-	50	50
24CMU4VE8T	Professional Ethics	2	-	-	2	-		50	-	50
Sub Total		**14**	**2**	**-**	**16**	**300**		**300**	**75**	**675**
Laboratory Courses										
24ECU4CC1L	Microcontrollers Lab	-	-	2	1	-	25	-	25	50
24ECU4CC2L	Data Structures Lab	-	-	2	1	-	-	-	25	25
24ECU4CC3L	Computer Networks Lab	-	-	2	1	-	-	-	25	25
24##U4MD6L	Multidisciplinary Minor II Lab	-	-	2	1	-	-	-	25	25
24ECU4CC9P	Programming with Python	1	-	2	2	-	50	-	25	75
24ECU4VE10P	Software Simulation Tools	1	-	2	2	-	-	-	50	50
Sub Total		**2**	**-**	**12**	**8**	**75**		**-**	**175**	**250**
Grand Total		**16**	**2**	**12**	**24**	**375**		**300**	**250**	**925**
Second Year (Sem III and Sem IV)		**30**	**4**	**24**	**46**	**800**		**525**	**475**	**1800**

Mandatory Course: Environmental Studies course will be taught in both Semester III and IV whereas the assessment will be in Semester IV as End Semester Examination.

Course Code	Name of Course	Engagement Hours			Credits	SA		FA		Total
		L	T	P		Theory	OE/ POE	ISE	ICA	
24CMU4MC2T	Environmental Studies	1	-	-	-	50	-	-	-	50

Note:

- *Examination will be MCQ based.
- N*indicates the serial number of electives offered in the respective category
- ##indicates program code of offering Programme
- Internal Continuous Assessment (ICA): ICA shall be a continuous process based on the performance of the student in assignments, class tests, quizzes, attendance and interaction during theory and lab sessions, journal writing, report presentation, etc., as applicable.
- Students must pass Environmental Studies course to become eligible for the award of degree
- **List of Open Elective I (Semester-III)**

Sr. No.	Couse Code	Name of Course
1	24GEU3O14T	Higher Engineering Mathematics
2	24GEU3O24T	Advanced Engineering Mathematics
3	24GEU3O34T	Applied Mathematics
4	24GEU3O44T	Statistics and Fuzzy logic
5	24GEU3O54T	Applied Statistics

- **List of Open Elective II (Semester-IV)**

Sr. No.	Couse Code	Name of Course
1	24CEU4O15T	Managerial Economics
2	24MAU4O25T	Renewable Energy
3	24ETU4O35T	Sustainable Development
4	24CSU4O45T	Management Information Systems
5	24ECU4O55T	Fundamentals of Digital Marketing
6	24ITU4O65T	Cyber Laws

- For **Open Elective (OE)- III (MOOC)** in Semester V in T.Y.

1. Students are required to enrol in one the courses of a minimum duration of 8 weeks offered on the SWAYAM/NPTEL platform, as approved by the Board of Studies each year.
2. List of MOOC's will be provided by the department depending on the availability of the courses in that semester under NPTEL / Swayam or Other recognized MOOC Platforms as per suggestions by the BoS.
3. Students may enroll for the course in Semester III, IV or V. They must complete all assignments and appear for the certification examination conducted by SWAYAM/NPTEL
4. Students must pass the examination by the end of Semester V. The marks earned by the student in final assessment of this MOOC will be appropriately scaled and transferred to **Open Elective III (MOOC)** in Semester V.

- **Multidisciplinary Minor (MDM) Courses**
  Student can choose one of the below mentioned Multidisciplinary Minor Program during the start of Semester III.

Sr. No.	*MDM Program*	*MDM I (Sem III)*	*MDM II (Sem IV)*	*MDM III (Sem V)*	*MDM IV (Sem VI)*	*MDM V (Sem VII)*
1	Information Technology	Principles Of Operating Systems	Web Technology (UI/ UX)	Software Engineering Principles	DevOps	Cyber Security
2	Mechanical and Automation Engineering	Manufacturing Processes and Mechanisms	Machine Drawing and 3D Modeling	Automotive Engineering and Robotics	Additive Manufacturing	Thermal Engineering
3	Civil Engineering	Smart Buildings	Geoinformatics	Environmental Impact Assessment	Infrastructural Systems	Disaster Preparedness and planning

24ECU3CC1T: Digital Techniques

Teaching Scheme		Examination Scheme	
Lectures	2 Hours/week, 2 Credits	**ESE**	60 Marks
Practical	2 Hours/week, 1 Credit	**ISE**	40 Marks
Credits	3	**ICA**	25 Marks

Introduction:

Digitization has spread to a wide range of applications, including information (computers), telecommunications, control systems and signal processing. This first course on digital electronics provides a thorough understanding of basic digital system design. The course intends to cover combinational and sequential circuit analysis and design. The course also introduces the finite state machine structures and state machines approach to solve problems. The course covers introduction to programmable logic device and programmable gate arrays.

Course Prerequisite:

Student shall have knowledge of binary number system and logic gates. Student shall also have knowledge about basic electronic devices – diodes, BJT and FET.

Course Objectives:

1. To introduce to student concepts of digital logic circuits like number systems, Boolean algebra, operation of various gates etc. along with their applications.
2. To make student design combinational and sequential circuit.
3. To introduce the student concept of synchronous state machines.
4. To make student understand programmable logic devices.

Course Outcomes:

After completing this course, student will be able to –

1. Explain underlined concepts of digital logic circuits and their applications.
2. Design combinational and sequential circuits.
3. Apply the concepts of synchronous state machines for solving digital design problems.
4. Use programmable logic devices for designing logic circuits.

Unit 1	**Number System and Codes**	**04 Hours**

Review of number system, BCD codes, Gray code, Representation of signed numbers, Error detecting and correcting codes - parity codes and hamming code, Introduction to logic families, Parameter definitions - noise margin, power dissipation, fan-in, fan-out, propagation delay, typical values for TTL, CMOS & ECL.

Unit 2	**Boolean Algebra and Logic Simplification**	**05 Hours**
Theorems of Boolean algebra, DeMorgan's law, Standard representation of logic functions – SOP, POS and canonical forms, Simplification of logic functions-Karnaugh maps, NAND and NOR Implementations.		
Unit 3	**Combinational Circuit Design**	**06 Hours**
Design of adder, subtractor , binary parallel adder, code convertor, multiplexers, demultiplexers, encoders, decoders , magnitude comparators and parity circuits.		
Unit 4	**Sequential Circuit Design**	**08 Hours**
Latches - SR latch, Flip- flops: SR, JK, D, T and Master-slave, triggering of flip-flops, Flip-flop characteristic equations and excitation tables. Counters and Registers.		
Unit 5	**Synchronous State Machine Design**	**04 Hours**
State machine structures - Mealy and Moore machines, Design of state machines- state table, state assignment, transition/excitation table, excitation maps and equations, logic realization.		
Unit 6	**Programmable Logic Devices**	**03 Hours**
PLDs, PROMs & applications, Programmable logic arrays & applications, Programmable array logic & applications.		

Internal Continuous Assessment (ICA)

ICA shall consist of minimum eight experiments and one mini-project based on following

1. Verification of truth table of basic and universal gates.
2. Implementation of universal gates using basic gates.
3. Code conversion using logic gates: binary to gray, gray to binary, binary to excess-3.
4. Implementation of any one combinational circuit using multiplexer.
5. Implementation of any one combinational circuit using de-multiplexer.
6. Design n-bit comparator using logic gates.
7. Perform 1's and 2's complement adder/subtraction using 4 bit parallel adder.
8. Convert J-K flip-flop to T (Toggle) flip-flop and D (Data) flip-flop.
9. Design and implement mod-n asynchronous counter.
10. Design and implement mod-n synchronous counter.
11. Design and implement a 4 bit bi-directional shift register.

Text Books
1. Digital Fundamentals, Thomas L. Floyd, Global Edition-Pearson Education Limited 2. Fundamental of Digital Circuits- Anand Kumar- Prentice Hall of India Pvt. Ltd. 3. Digital Design, M. Morris Mano, PHI, Third edition 4. Modern Digital Electronics, R. P. Jain , TMH, Third edition
Reference Books
1. Digital Design: Principles and Practices, Wakerly John F., Pearson Education, Forth edition. 2. Digital Principles & Applications, Leach, Malvino, Sixth edition.

24ECU3CC2T: Analog and Digital Communication

Teaching Scheme		Examination Scheme	
Lectures	2 Hours/week, 2 Credits	**ESE**	60 Marks
Practical	2 Hours/week, 1 Credit	**ISE**	40 Marks
Credits	3	**ICA**	25 Marks

Introduction:

This course on electronic communication which intends to introduce the concepts of analog and digital communication systems, and to equip students with various issues related to analog and digital communication such as modulation, demodulation, transmitters and receivers and noise performance. Also covers the concepts and techniques related to source coding, and error control coding.

Course Prerequisite:

Student shall have knowledge of basic mathematics, trigonometry, analog electronic circuit design and digital technique.

Course Objectives:

1. To introduce to student basic concept of analog communication system and demonstrate spectra of analog modulated signals.
2. To introduce to student sampling theorem pulse modulation techniques.
3. To make student understand different carrier modulation and detection techniques along with their performance analysis.
4. To make student understand about error detection and correction to produce optimum receiver.

Course Outcomes:

After completing this course, student will be able to –

1. Explain the principles of analog communication including AM, FM and PM, and SSB techniques, along with their applications.
2. Apply sampling theory and analyse various pulse and data modulation techniques for digital communication systems.
3. Compare different digital modulation schemes for their efficiency and bandwidth and can describe various optimum receiver techniques.
4. Calculate information content and coding efficiency using entropy concepts, and design basic source and error control codes.

Unit 1	Analog Communication	07 Hours
Introduction to Communication Systems, Modulation, Need for Modulation, Types of communication systems , Theory of Amplitude Modulation, Evolution and Description of SSB Techniques, Theory of Frequency and Phase Modulation, Comparison of analog Communication Systems. Generation and detection of AM and FM, applications of analog communication systems.		
Unit 2	**Pulse and Data Communication**	**08 Hours**
Digital communication system blocks, sampling theory, Nyquist rate, aliasing, PAM, PTM, PCM-generation and reconstruction, quantization, PCM bandwidth, ISI, eye diagram, differential pulse code modulation, adaptive differential pulse code modulation, delta modulation, adaptive delta modulation.		
Unit 3	**Digital Carrier Modulations and Detection**	**08 Hours**
Binary ASK, FSK, PSK, BPSK, DPSK, QPSK, QAM- methods of generations, signal space representation, spectrum and detection. Comparison of various digital communication modulation. Baseband Transmission and Optimal Reception of Digital Signal: A Baseband Signal Receiver, Probability of Error, Optimum Receiver, Coherent Reception.		
Unit 4	**Source and Error Control Coding**	**07 Hours**
Discrete message and information content, entropy, information rate, source coding to increase average information- Shannon Fanon coding, Huffman coding, Shannon's theorem, channel capacity, error control coding- linear block codes.		

Internal Continuous Assessment (ICA)

ICA shall consist of minimum ten experiments based on following

1. AM modulation and demodulation techniques.
2. FM modulation and demodulation techniques.
3. Spectrum analysis of modulation using spectrum analyzer.
4. Radio receivers.
5. Sampling theorem.
6. Pulse Modulation (PAM, PWM, PPM)
7. PCM, DPCM, DM, ADM.
8. ASK, FSK, PSK, BPSK.
9. Error control coding using simulation.
10. Eye pattern using simulation.

Text Books

1. Principles of Communication Systems, Herbert Taub, Donald L Schilling, Goutam Saha, 4th edition, McGraw Hill Education (India) Pvt. Ltd.
2. Digital Communication Systems Design, Martin S. Roden, Prentice- Hall International Inc.
3. Communication Systems, Analog & Digital, R P Sing, S D Sapre, 2 nd Edition, Tata McGraw Hill Education Pvt. Ltd
4. Communication Electronics –Principles and Applications, Lois E. Frenzel, Tata McGraw Hill Education Pvt. Ltd; Third edition.

Reference Books
1. Digital Communication, Simon Haykin, John Wilely & Sons (Asia) Pvt. Ltd. 2. Digital Communications, Fourth Edition, John G. Prokis, McGraw Hill International Edition. 3. Digital Communications Fundamentals and Applications, Bernard Skalar, 2nd Edition, Pearson Education.

WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR
(An Autonomous Institute)
Second Year B.Tech (Electronics and Computer Engineering) Semester-III

24ECU3CC3T: Analog Electronic Circuits

Teaching Scheme		**Examination Scheme**	
Lectures	2 Hours/week	**ESE**	60 Marks
Practical	2 Hours/week	**ISE**	40 Marks
Credits	3	**ICA**	25 Marks
		POE	25 Marks

Introduction:

This course equips students to explain and analyse analog circuits such as power supplies, regulators, amplifiers, and op-amp-based systems. They will apply circuit theory to design regulated power supplies, single stage common emitter amplifier, and waveform generators. Students will evaluate circuit performance parameters like gain, stability, and frequency response.

Course Prerequisite:

Students should have a basic understanding of electrical circuit theory and semiconductor fundamentals. Familiarity with passive components, diode characteristics, and simple transistor operation is essential. Basic skills in circuit analysis and interpretation of circuit behaviour are recommended.

Course Objectives:

1. To make students analyze performance of filter circuits and design of regulated DC power supply.
2. To introduce to students need of biasing, simplification of BJT circuit and its ac & dc analysis.
3. To make students understand principles, configurations, specifications of ideal- practical Op-Amp, linear and non-linear applications of Op-Amp.
4. To introduce to students IC 555 timer and its configuration as different pulse generating circuits.

Course Outcomes:

After completing this course, student will be able to -

1. Analyze performance of capacitor filter circuit and design regulated DC power supply using different filter circuit.
2. Design appropriate biasing circuit, construct simplified small signal equivalent circuit using h-model and analyze performance of BJT amplifier.
3. Compare performance of an ideal-practical Op-Amp, evaluate various linear and non-linear applications of Op-Amp.
4. Design timers and pulse generating circuits using IC555 timer.

Unit 1	**Unregulated and Regulated DC Power Supply**	**05 Hours**

Analysis of Bridge rectifier, description of capacitor, inductor and, LC filter connected to bridge rectifier. Analysis of unregulated DC power supply with bridge rectifier & capacitor filter. Design of regulated fixed voltage DC power supply using bridge rectifier, capacitor filter and three pin voltage regulators.

Unit 2	**Single stage BJT amplifier and BJT switch**	**05 Hours**
BJT configurations, BJT biasing, DC load line, operating point, thermal runaway, bias stabilization, generalized equation for finding stability factor of biasing circuit, analysis of voltage divider biasing method with expression for stability factor. Small signal analysis of BJT using hybrid model, amplification using BJT circuit using h-model, Frequency response of single stage common emitter amplifier and BJT application as switch.		
Unit 3	**Op-Amp Fundamentals**	**03 Hours**
Op-Amp block diagram, data sheet and characteristics of Op-Amp, equivalent circuit of Op-Amp, Practical Op-Amp input offset voltage, input bias current, total output offset voltage, offset minimization, common mode configuration, common mode rejection ratio, slew rate, open loop frequency response.		
Unit 4	**Linear Applications of Op-Amp**	**05 Hours**
Inverting, non-inverting amplifier, adder, subtractor, summing- scaling - averaging amplifier, instrumentation amplifier. integrator, differentiator.		
Unit 5	**Active Filters and Oscillators using Op-Amp**	**05 Hours**
First and second order high-pass, low pass Butterworth filters Non- Linear Applications of Op-Amp Schmitt trigger, Square wave , triangular wave generator Op-Amp comparator.		
Unit 6	**IC 555 Timer**	**05 Hours**
IC 555- pin diagram, internal block diagram astable and monostabe multivibrator design using IC 555.		

Internal Continuous Assessment (ICA)

ICA shall consist of minimum eight experiments and one mini-project based on following

1. Analysis of unregulated dc power supply using bridge rectifier and Capacitor filter.
2. Design of positive and negative and positive power supply using three pin regulator.
3. Analysis of single stage CE amplifier and its frequency response.
4. Inverting and non-inverting amplifier using IC 741.
5. Adder and subtractor using IC 741.
6. Comparator and zero crossing detector using IC 741.
7. Design of timer circuit using IC555.
8. Analysis of astable multivibrator using IC 555.

Text Books
1. Op-Amps and Linear Integrated Circuits, Ramakant A. Gayakwad, PHI Learning Pvt. Ltd., Fourth Edition. 2. Electronic Devices and Circuits, Allen Mottershed, PHI Publication. 3. Electronic Devices and Circuits, David A. Bell, Oxford University, Press India, Fifth edition.
Reference Books
1. An introduction to Operational Amplifiers, Lucas M. Faulkenberry, John Wiley & Sons, Second edition. 2. Operational Amplifiers, G.B. Clayton, English Language Book Society, Second edition. 3. Electronic Devices and Circuits, Robert Boylestad , Prentice Hall International. 4. Electronic Circuit Design, S.N. Talbar, T.R. Sontakke, Sadhu Sudha Publications.

24CMU3EM5T: Entrepreneurship Development

Teaching Scheme		Examination Scheme	
Lectures	1 Hour /week	**ICA**	50 Marks
Tutorial	1 Hour /week		
Credit	2		

Introduction:

Entrepreneurship education in India has gained relevance in today's context. Education in the area of entrepreneurship helps students to develop skills and knowledge, which could benefit them for starting, organizing and managing their own enterprises. Entrepreneurship education encourages innovation, fosters job creation, and improves global competitiveness. This course will focus on key attributes of Entrepreneurship: Qualities of a successful entrepreneur, Entrepreneurship Development Programmes, Ideation Techniques, Business Plan Formulation, and Different Support Systems. To sum up, the course will make students to have an understanding of the complete entrepreneurial ecosystem.

Prerequisite: This course requires familiarity with basic business terminology, management principles, and economics.

Course Objectives:

1. To familiarize with entrepreneurship and its significance in national development.
2. To develop skills required to establish and run a successful enterprise.
3. To acquaint with the options available with new entrepreneurs.
4. To formulate business plan/project report for a startup.
5. To acquaint with support system associated with entrepreneurial development.

Course Outcomes:

After completing this course, student will be able to -

1. Identify various characteristics of entrepreneurs & also various types of entrepreneurs.
2. Evaluate the challenges and limitations faced by Entrepreneurship Development Programmes (EDPs) in achieving their goals.
3. Generate business ideas and prepare a comprehensive entrepreneurial project report
4. Compare different structures, ownership forms, funding options & interpret the role of government support systems in promoting entrepreneurship.

Unit 1	**Entrepreneur**	**03 Hours**

Concept, meaning and definitions of entrepreneur, need of entrepreneur, social entrepreneur, qualities of entrepreneurs, types of entrepreneurs.

Unit 2	Entrepreneurship Development	04 Hours
Concept of entrepreneurship, Entrepreneurship Development Programmes (EDPs) - meaning & need of EDPs, course content & curriculum of EDPs, phases of EDPs, problems of EDPs.		
Unit 3	**Entrepreneurial Project Development**	**04 Hours**
Idea generation–sources and methods, preparation of a project report/ business plan including: market plan, financial plan, operational plan, HRS plan, working capital management, break even analysis etc.		
Unit 4	**Small-Medium Enterprises and Support Systems**	**03 Hours**
Meaning and definition of Micro, Small & Medium Enterprises, forms of business ownership, Funding options available, role of government organization to support business.		

Internal Continuous Assessment (ICA)

Students in batch should be divided into groups (not more five members) to carry below tasks:

1. Two case studies on successful entrepreneurs.
2. Two case studies on failure of businesses.
3. Idea generation & selection of an idea for business.
4. Preparation of project report / business plan for starting a small unit and presentation on the same.

Text Books

1. Entrepreneurial Development, Dr. S. S. Khanka, S. Chand Publications.
2. Small-Scale Industries and Entrepreneurship - Vasant Desai, Himalaya Publishing House.
3. Entrepreneurship, Alpana Trehan, Dreamtech Press.
4. E-resources : https://archive.nptel.ac.in/courses/127/105/127105007/

Reference Books

1. Dynamics of Entrepreneurial Development and Management - Vasant Desai, Himalaya Publishing House.
2. Entrepreneurship & Small Business, Michael Schaper, Thierry Volery, Pauli Weber, Kate Lewis, Wiley Publication.
3. Entrepreneurship, Robert Hisrich, Michael Peters, Dean Shepherd, Sabyasachi Sinha, McGraw Hill Publication.

24CMU3VE7T:Universal Human Values

Teaching Scheme		Examination Scheme	
Lectures	2 Hours/week	**ESE**	50* Marks
Practical	-	**ISE**	-
Credits	2	**ICA**	-

Introduction:

The salient features of this course are:

1. It presents a universal approach to value education by developing the right understanding of reality (i.e. a worldview of the reality "as it is") through the process of self-exploration.
2. The whole course is presented in the form of a dialogue whereby a set of proposals about various aspects of the reality are presented and the students are encouraged to self-explore the proposals by verifying them on the basis of their natural acceptance within oneself and validate experientially in living.
3. The prime focus throughout the course is toward affecting a qualitative transformation in the life of the student rather than just a transfer of information.
4. While introducing the holistic worldview and its implications, a critical appraisal of the prevailing notions is also made to enable the students discern the difference on their own right.

Course Prerequisite:

This course requires basic communication and comprehension skills, open-mindedness and willingness to reflect, general awareness of social issues.

Course Objectives:

This introductory course input is intended:

1. 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?
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value based living in a natural way. Holistic, Value-Based Education for Realizing the Aspirations articulated in NEP2020
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

   Thus, this course is intended to provide a much-needed orientation input in value education to the young enquiring minds.

Course Outcomes:

After completing this course, the student will be able to -

1. Distinguish between values and skills
2. Explain the harmony in the self and human being.
3. Analyze the harmony in the family, society, and nature leading to an understanding of the holistic perception of harmony.
4. Explain harmonious relationships in the family and society through discussions, case studies, and value-based reflections.
5. Identify human responsibilities toward nature and propose value-based actions that promote environmental harmony.

Unit – I	**Introduction** - Need, Basic Guidelines, Content and Process for Value Education:	**07 Hours**

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self-Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations.
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority.
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations understanding and living in harmony at various levels.

Unit – II	**Understanding Harmony in the Human Being** - Harmony in Myself!	**07 Hours**

1. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
2. Understanding the needs of Self ('I') and 'Body' –Sukh and Suvidha
3. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
4. Understanding the characteristics and activities of 'I' and harmony in 'I'
5. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail.
6. Programs to ensure Sanyam and Swasthya

Unit – III	**Understanding Harmony in the Family and Society**- Harmony in Human Relationship	**08 Hours**

1. Understanding Harmony in the family – the basic unit of human interaction
2. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship
3. Understanding the meaning of Vishwas; Difference between intention and competence
4. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship

5. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals
6. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family

Unit – IV	**Understanding Harmony in the Nature and Existence** - Whole existence as Coexistence	**08 Hours**

1. Understanding the harmony in the Nature
2. Interconnectedness and mutual fulfillment among the four orders of naturere cyclability and self-regulation in nature
3. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space
4. Holistic perception of harmony at all levels of existence

Text Books

1. A foundation course in Human Values and professional Ethics by R.R Gaur, R Sangal, G P Bagaria, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2
2. The teacher's manual A foundation course in Human Values and professional Ethics – by R.R Gaur, R Sangal, G P Bagaria Teachers Manual, Excel books, New Delhi, 2010

Reference Books

1. Indian Ethos and Modern Management, by B L Bajpai, 2004, New Royal Book Co., Lucknow. Reprinted2008.
2. Science and Humanism by PL Dhar, RR Gaur, 1990, Common wealth Purblishers.
3. How the Other Half Dies by Sussan George, 1976, Penguin Press. Reprinted 1986, 1991
4. Energy & Equity by Ivan Illich, 1974 The Trinity Press, Worcester, and HarperCollins, USA
5. Limits to Growth, Club of Rome's Report, by Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. BeHrsens III, 1972, Universe Books.
6. How to practice Natural Farming by SubhasPalekar, 2000, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
7. Jeevan Vidyaek Paricha by A Nagraj, 1998, Divya Path Sansthan, Amarkantak.
8. Small is Beautiful: a study of economics as if people mattered by E.F. Schumacher, 1973, Blond & Briggs, Britain.
9. Human Values by A.N. Tripathy, 2003, New Age International Publishers.

e-Resources (Relevant websities, Movies And Documentaries)

1. Value Education websites, http://uhv.ac.in,http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charlie Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story
6. Gandhi A., Right Here Right Now, Cyclewala Productions
7. AICTE On-line Workshop on Universal Human Values Refresher Course-I Handouts
8. UHV-I handouts
   https://drive.google.com/drive/folders/16eOka8AoBpLGlCDajRvk4MXgfXQWzFCB?usp=sharing
9. UHV-II handouts
   https://drive.google.com/drive/folders/15eHkMVguzRBDrb65GFi7jMN6UEP5JEk1?usp=sharing

24ECU3CC8P: Programming with C++

Teaching Scheme		Examination Scheme	
Lectures	1 Hours/week	**ISE**	25 Marks
Practical	2 Hours/week,	**ICA**	25 Marks
Credits	2	**POE**	50 Marks

Introduction:

This course is designed to bridge the gap between procedural programming and modern software development by introducing students to the object-oriented programming (OOP) paradigm using the C++ language. This course equips students with core object-oriented concepts such as encapsulation, data hiding, inheritance, and polymorphism, empowering them to design software that is reusable, extendable, and easier to debug and maintain.

Course Prerequisite:

Student shall have an adept knowledge of programming with C.

Course Objectives:

1. To introduce to student features of object oriented language.
2. To make student understand concept of data hiding implemented using class.
3. To introduce to student concept of constructors and destructors.
4. To make student understand different types of inheritance
5. To make student understand compile type polymorphism and run time polymorphism
6. To make student analyze a given problem and implement by using suitable features of C++

Course Outcomes:

After completing this course, the student will be able to -

1. Compare C and C++ in terms of data hiding and class
2. Design and implement object oriented programming paradigms using C++
3. Implement constructors, destructors, and various types of inheritance to develop structured C++ programs.
4. Analyze and implement compile-time and run-time polymorphism to build efficient C++ applications

Unit – I	**Introduction to C++**	**02 Hours**

Basic concepts of object oriented programming, class, object, encapsulation, data abstraction, inheritance, polymorphism, data hiding; structure of C++ program, tokens, keywords, identifiers & constants, operators in C++, scope resolution operator; declaration of functions, input/output operators

Unit – II	**Classes and Objects**	**03 Hours**
Declaration of a class, defining member functions, creating objects, concept of public, private and protected visibility labels, private member functions, arrays within a class, static data members, static member functions, inline functions, friend functions		
Unit – III	**Constructors and Destructors**	**03 Hours**
Structure of a constructor, types of constructor: default constructor, parameterized constructors, constructors with default argument, copy constructor, dynamic constructors, destructors		
Unit – IV	**Inheritance**	**03 Hours**
Structure of inheritance, defining a derived class, types of derivation: public, private and protected; types of inheritance: single, multilevel, multiple, hierarchical and hybrid; virtual base class		
Unit – V	**Polymorphism**	**05 Hours**
Types of polymorphism, function overloading, operator overloading, pointers to objects, this pointer, pointers to derived class, virtual functions		

- **Internal Continuous Assessment (ICA)**

ICA shall consist of minimum eight experiments and one mini-project based on following

1. Program using member function in a class using concept of private, public, and protected data members
2. Program using inline function
3. Program using function overloading.
4. Program using constructor.
5. Program using destructors.
6. Program using friend function.
7. Program on operator overloading
8. Program on single inheritance.
9. Program on multilevel inheritance.
10. Program using virtual base class.

Text Books

1. Object Oriented Programming with C++ ,E. Balagurusamy, Tata McGraw HillPublication, New Delhi
2. Object Oriented Programming in C++, Rajesh K. Shukla, Wiley Publications,New Delhi.
3. Object Oriented Programming with C++, Rohit Khurana, 2nd E dition, VikasPublications.

Reference Books

1. Programming with C++, Ravichandran D, 2nd Edition, Tata McGraw Hill Publication and New Delhi.
2. Turbo C++ Techniques and application, Scoot, Robert Ladd, BPB Publication,New Delhi
3. Mastering C++, K.R. Venugopal, T. Ravishankar, Rajkumar, Tata McGraw HillPublication, New Delhi.

WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR
(An Autonomous Institute)
Second Year B.Tech (Electronics and Computer Engineering) Semester-III

24ECU3FP9L: Community Engagement Project/ Field Project

Teaching Scheme		**Examination Scheme**	
Lecture	-	**ESE**	-
Practical	4 Hours/week	**ISE**	-
Credits	2	**ICA**	50 Marks

Introduction:

Community Engagement Project/ Field Project is an experiential learning strategy that integrates meaningful community engagement with instruction, participation, learning and community development. It applies the experience to personal and academic development. It is meant to link the community with the institutes for mutual benefit. The community will be benefited with the focused contribution of the students for the village/ local development. The institute finds an opportunity to develop social sensibility and responsibility among students and also emerge as a socially responsible institution.

Course Prerequisite:

This course requires basic communication and interpersonal skills, understanding of social and environmental issues, teamwork and collaboration skills, report writing and documentation skills.

Course Objectives:

1. To sensitize the students to the living conditions of the people who are around them
2. To help students to realize the harsh realities of the society
3. To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability
4. To make students aware of their inner strength and help them to find new /out of box solutions to the social problems
5. To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections
6. To help students to initiate developmental activities in the community in coordination with public and government authorities

Course Outcomes:

After completing this course, student will be able to -

1. Explain the problem in and around the society.
2. Explain the way to solve societal problems.
3. Communicate with society and other students working in the team.
4. Conduct various surveys and interpret the results.
5. Interact with non-government and government organizations.

Procedure:

- Form a group of not more than 5 students.
- A mentor/guide will be allotted for each group.
- Students should finalize a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay.
- Students may work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc. or with any NGO actively working in that habitation.
- Then, they should conduct a preliminary survey including the socio-economic conditions of the allotted habitation, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas.
- If required, a survey form based on the type of habitation (rural, urban etc.) should be prepared before visiting the habitation.
- The Governmental agencies, like revenue administration, corporation and municipal authorities and village secretariats may be aligned for the survey.
- Analysis of the collected data should be done.
- A solution should be proposed to the problem identified.

Students should prepare a report which should include following points.

- Introduction
- Primary Data obtained through survey/ field visit
- Analysis of collected data
- Proposed Solution

Students may take help from different government departments like –

- Agriculture
- Health
- Marketing and Cooperation
- Animal Husbandry
- Horticulture
- Fisheries
- Revenue and Survey
- Natural Disaster Management
- Irrigation
- Law & Order
- Excise and Prohibition
- Mines and Geology
- Energy

Examples of community engagement / field projects are as below:

- Solar Power Installation for Community Centers
- Smart Irrigation System for Local Farmers
- Energy-Efficient Lighting for Public Spaces
- Environmental Monitoring System
- Digital Literacy Programs for Underserved Communities
- Community-Based Mobile App Development
- E-Government Services Development

Internal Continuous Assessment (ICA):

ICA shall consist of field visit/survey report based on the above visited site.

WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR
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Second Year B.Tech. (Electronics and Telecommunication Engineering), Semester-I

24CMU4MC2T: Environmental Studies

Teaching Scheme		**Examination Scheme**	
Lectures	1 Hour/week	**ESE**	50 Marks

Introduction:

Environmental Studies is a multidisciplinary field that explores the relationships between humans and their natural surroundings. As the world facing environmental challenges such as climate change, pollution, resource depletion, and biodiversity loss, understanding the environment has never been more crucial. This course aims to provide students with a comprehensive foundation in the major concepts of environmental science, drawing from biology, chemistry, physics, economics, law, and technology. By adopting an interdisciplinary approach, a student understands environmental problems and evaluates the impact of human activities on air, water, food, and ecosystems. Environmental Studies equips students with the knowledge and tools to contribute meaningfully to sustainable solutions and responsible stewardship of our planet.

Pre-requisites:

This course requires basic understanding of science subjects from their higher secondary education, particularly in areas such as biology, chemistry, mathematics, physics, and geography. Familiarity with fundamental ecological concepts and general awareness about current environmental issues will be beneficial. Basic communication and analytical skills are also expected.

Course Objectives:

1. To introduce students to the multidisciplinary nature of environmental studies and the importance of environmental conservation for sustainable development.
2. To enable students to understand natural resources, ecosystems, biodiversity, and environmental pollution along with their causes, effects, and control measures.
3. To develop awareness about major environmental issues, related laws, and the role of individuals and society in addressing environmental challenges.

Course Outcomes:

At the end of this course, the student will be able to:

1. Explain the significance of environmental studies, identify various natural resources and their associated problems, and suggest strategies for their sustainable use.
2. Analyze the structure and functions of ecosystems, assess biodiversity and its conservation methods, and discuss various types of pollution and their preventive measures.
3. Demonstrate understanding of key environmental policies, social issues related to the environment, and individual responsibility towards environmental protection and sustainable living.

Unit – I	Nature of Environmental studies	2 Hours

a) Definition, scope and importance
b) Multidisciplinary nature of environmental studies, Need for public awareness

Unit – II	Natural resources and associated problems.	8 Hours

a) Forest, resources, use and over-exploration, disforestation, timber extraction, mining, dams and their effects on forests and tribal people.
b) Water resources, Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems
c) Mineral resources. And usage and exploitation, environmental effects of extracting and using mineral resources.
d) Food resources, world food problem, changes caused by agriculture effects of modern agriculture, fertilizer-pesticide problems
e) Energy resources, growing energy needs renewable and non-renewable energy sources, use of alternate energy sources
f) Land resources, land as a resource, land degradation man induced landslides, soil erosion and decertification
g) Role of an individuals in conservation of natural resources
h) Equitable use of resources for sustainable lifestyle

Unit – III	Ecosystems	6 Hours

a) Concept of an ecosystem
b) Structure and function of an ecosystem
c) Producers, consumers and decomposers
d) Energy flow in the ecosystem
e) Ecological succession
f) Food chains, food webs and ecological pyramids
g) Introduction types, Characteristics features, structure and function of the ecosystem:-
h) Forest ecosystem
i) Grassland ecosystem
j) Desert ecosystem
k) Aquatic ecosystems (ponds, streams, lakes, rivers , oceans, estuaries)

Unit – IV	Biodiversity and its conservations	6 Hours

a) Introduction-Definition, genetic, species and ecosystem diversity
b) Biogeographically classification of India
c) Value of biodiversity consumptive use, productive use, social, ethical aesthetic and option values
d) Biodiversity at global, national and local levels
e) India as a mega-diversity nation
f) Western Chat as a bio-diversity region
g) Hot –spot of biodiversity
h) Threats of biodiversity, habitual loss, poaching of wildlife, man wildlife conflicts
i) Endangered and endemic, species of India
j) Conservation of biodiversity, in-situ and Ex-situ conservation of biodiversity

24ECU4CC1T: Microcontrollers

Teaching Scheme		Examination Scheme	
Lectures	2 Hours/week	**ESE**	60 Marks
Practical	2 Hours/week	**ISE**	40 Marks
Credits	3	**ICA**	25 Marks
		OE	25 Marks

Introduction:

This course provides a thorough introduction to the architecture of Microcontroller 8051. The course also introduces assembly language programming and 'C' language programming concepts for 8051. The course enables student to write programs addressing fundamental programming skills and also interfacing with different peripherals.

Course Prerequisite:

Students should have a sound knowledge of basic electronics and digital design principles. Student should also have knowledge of C programming language.

Course Objectives:

1. To introduce to student architecture of 8051 microcontroller.
2. To make student write assembly language and C program for different applications of microcontroller.
3. To make student design electronic system for different applications using microcontroller.
4. To make student configure on chip peripherals for different applications.

Course Outcomes:

After completing this course, student will be able to -

1. Differentiate between fundamentals and characteristics of microprocessor and microcontroller.
2. Analyze the architecture of 8051 microcontroller, including its internal devices and peripherals.
3. Write programs for 8051 microcontroller using its instruction set and on-chip peripherals
4. Interface various memory and I/O devices with 8051 microcontroller for embedded system applications.

Unit – I	**Fundamentals of Microprocessors**	**07 Hours**

Fundamentals of 8086 microprocessor architecture, address, data and control bus, internal working of microprocessor, memory organization, classification of memory, introduction to microcontroller and its comparison with microprocessor.

Unit – II	**The 8051 Architecture**	**08 Hours**

8051-features, 8051 architecture- ALU, Boolean processor, oscillator, timing and control, registers in 8051, clock and reset circuits, stack and stack pointer, program counter, I/O ports, memory structures, data and program memory, pin configuration, addressing modes and instruction set.

Unit – III	8051 On-chip Peripherals	08 Hours
Port structure, timers and counters, serial port, interrupt structure, programming with on chip peripherals, Embedded C programming.		
Unit – IV	**Memory and I/O Interfacing**	**07 Hours**
Interfacing of different display devices like switches, LED's, seven segment display and LCD, data RAM and ROM, program memory, ADC 0808, DAC, stepper motor, and keypad		

Internal Continuous Assessment (ICA)

ICA shall consist of minimum eight experiments and one mini-project based on following

1. Arithmetic and Logic operations
2. Interfacing of Switches, LEDs and Buzzer.
3. Interfacing of Matrix Keyboard
4. Interfacing of LCD Display.
5. Interfacing of DAC 0808 and generation of various waveforms.
6. Interfacing of ADC 0808
7. Use of Timer for generation of time delays
8. Use of Timer as counter.
9. Interfacing of Stepper motor.
10. Speed control of DC Motor.
11. Use of Interrupts for any Application.
12. Serial communication.

Text Books

1. 8051 and Embedded C Programming, Mazidi , Pearson Education, 2nd edition
2. Microcontrollers, Ajay Deshmukh, Tata McGRAW HILL

Reference Books

1. 8051 Microcontroller Architecture, Programming and Application', 3rd edition, Kenneth Ayala, West publication company.
2. The 8051 Microcontroller: A Systems Approach by Muhammad Ali Mazidi, Janice Gillispie Mazidi, and Rolin D. McKinlay.

WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR
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Second Year B.Tech (Electronics and Computer Engineering) Semester-IV

24ECU4CC2T: Data Structures

Teaching Scheme		**Examination Scheme**	
Lectures	2 Hours/week	**ESE**	60 Marks
Practical	2 Hours/week	**ISE**	40 Marks
Credits	3	**ICA**	25 Marks

Introduction:

This course emphasizes both theoretical concepts and practical applications of linear and non-linear data structures. Beginning with the fundamentals such as stacks and queues, students gradually progress to more complex structures like linked lists, trees, and graphs. Additionally, it equips learners with essential algorithmic tools for searching, sorting, and hashing, which are critical in a wide variety of software applications ranging from databases to real-time systems.

Course Prerequisite:

Student shall have an adept knowledge of programming with C.

Course Objectives:

1. To introduce to student data structure and its real life applications.
2. To make student understand, design and implement stack and queues.
3. To make student implement different types of linked lists
4. To make student implement non linear data structures like trees and graphs
5. To make student use searching methods and different sorting techniques efficiently.

Course Outcomes:

After completing this course, student will be able to -

1. Implement linear data structures like stack and queue
2. Implement different types of linked lists
3. Implement non-linear data structures
4. Analyze and implement various kinds of searching and sorting techniques
5. Analyze a given problem and implement by using suitable data structure.

Unit – I	**Stack and Queues**	**06 Hours**

Introduction to data structure, examples and real life applications, stack definition, operations on stack, static implementation using arrays, applications of stack; queue definition, operations on simple queue and circular queue using arrays, dequeue and priority queue

Unit – II	**Linked Lists**	**07 Hours**

Definition, representation and operations on linked list, types of linked lists: singly linked list, circular linked list, doubly linked list; stack using linked list, queue using linked list, applications of linked list.

Unit – III	Trees	05 Hours
Definition of trees, terminologies of trees, binary trees, types of binary trees, operations on the binary search tree, tree traversals, construction of binary search tree, threaded binary trees		
Unit – IV	**Graphs**	**05 Hours**
Definition and examples of graphs, types of graph, representation methods of graphs: adjacency matrix representation, adjacency linked representation and multi-list representation; graphs traversal methods: depth first search, breadth first search.		
Unit – V	**Searching and Sorting Techniques**	**07 Hours**
Linear search, binary search, definition of hashing, hashing functions, collision resolution techniques: open hashing, closed hashing; definition of sorting, bubble sort, selection sort, insertion sort, merge sort, quick sort, heap sort.		

Internal Continuous Assessment (ICA)

ICA shall consist of minimum eight experiments and one mini-project based on following

1. Static implementation of stack
2. Static implementation of queue
3. Static implementation of circular queue
4. Implementation of singly linked list
5. Implementation of circular linked list
6. Dynamic implementation of stack using linked list
7. Dynamic implementation of queue using linked list
8. Linear search and binary search
9. Bubble sort, selection sort and insertion sort.

Text Books

1. Data Structures -A Pseudocode Approach with C, Richard F.Gilberg, Behrouz A. Forouzan, Cengage Learning, Second edition
2. Data Structure using C & C++, Rajesh K. Shukla, WILEY India.
3. Data Structure through C in Depth, S.K. Srivastava, Deepali Srivastava, BPB Publications.

Reference Books

1. Fundamentals of Data Structures, Ellis Horowitz, Sartaj Sahni, Orient Blackswan publisher
2. Data Structures and Program Design in C, Robert L. Kruse, Easter Economy Edition, PHI Private Limited, Third Edition
3. Data Structure using C & C++, Y.Langsam, M.J. Augenstein, A.M Tanenbaum, Second Edition, Pearson India.
4. Introduction to Data Structures in C, Ashok N.Kamthane, Pearson Education
5. Understanding Pointers in C, Yashwant Kanetkar, BPB Publication, Third edition

24ECU4CC3T: Computer Networks

Teaching Scheme		**Examination Scheme**	
Lectures	2 Hours/week	**ESE**	60 Marks
Practical	2 Hours/week	**ISE**	40 Marks
Credits	3	**ICA**	25 Marks

Introduction:

This course introduces fundamentals of data communication and computer networking. It also focuses on issues handled by physical layer, data link layer, network layer and application layers to make reliable internet communication.

Course Prerequisite:

Students should have knowledge of computer systems and C programming language.

Course Objectives:

1. To introduce to student uses of computer network, issues need to be handled during data communication and functioning of OSI reference model.
2. To introduce to students different Data Link layer protocols and LAN.
3. To introduce to students TCP/IP reference model for internet communication and IPv4 addressing
4. To introduce to students different routing algorithm adopted in computer networking.
5. To introduce to students application layer protocol used in computer networking.

Course Outcomes:

After completing this course, student will be able to -

1. Describe different networking issues and OSI reference model.
2. Analyze functioning of data link layer protocols and implement LAN
3. Analyze functionality of TCP/IP and IP addressing.
4. Describe utility of routing protocol in providing reliable path for communication
5. Evaluate application protocols to provide services to the user.

Unit – I	**Data Communication**	**04 Hours**

Uses of computer networks, network hardware, network software, layered model, communication between layers, ISO-OSI reference model- description of each layer, physical layer- band limited signals, maximum data rate of a channel, packet switching, Manchester coding.

Unit – II	**Data Link Layer and Medium Access Control**	**06 Hours**

Data Link Layer issues- Framing, error control- error detection and error correction, flow control- Stop and Wait flow control, sliding window flow control , channel allocation problems, medium access control - ALOHA, CSMA, CSMA/ CD, collision free MAC protocols- bit-map, binary countdown.

Unit – III	**Local Area Networks**	**03 Hours**
Local area network - topology, IEEE 802.3 LAN, high speed LAN, gigabit LAN Network Devices- Repeater, bridge, hub, switches, routers and gateway .		
Unit – IV	**TCP/IP Reference Model**	**06 Hours**
TCP/IP reference model, encapsulation, de-capsulation, Transmission Control Protocol (TCP)–header format, three-way handshake, TCP communication, TCP congestion & its control, TCP timers, IPv4-header format, IP communication, addressing–sub netting & masking, classless addressing, NAT, User Datagram Protocol (UDP)–header format, checksum, UDP communication.		
Unit – V	**Network Layer**	**06 Hours**
Network layer design issues, routing algorithms: shortest path-Dijkstra- routing, packet flooding, distance vector routing, link state routing, OSPF.		
Unit – VI	**Application Layer**	**05 Hours**
TELNET, DNS, SMTP, DHCP, HTTP/HTTPS.		

Internal Continuous Assessment (ICA)

Students should perform minimum 8 experiments based on the following–

1. PC to PC communication using serial COM port.
2. Implementation of bit-stuffing operation during frame communication.
3. Implementation of CRC error detection algorithm.
4. Implementation of Hamming code mechanism for error correction.
5. Simulation of flow control protocol
6. Implementation of Star topology in IEEE 802.3 LAN.
7. Network commands.
8. Client server communication.

Text Books

1. Computer Networks; Andrew S. Tanen baum; 4th Edition; Prentice Hall.
2. TCP/IP Protocol Suite; BeHrsouz A. Forouzan; 4thEdition.
3. Data Communication and Computer Networks; P.C.Gupta; Prentice Hall India Publication.
4. Internet working with TCP/IP Vol III; Client-Server Programming &Applications; Douglas E. Comer; 4th Edition; Prentice Hall.

Reference Books

1. Data and Computer Communications; William Stallings-Pearson Education Asia Publication.
2. High Speed networks and Internets-Performance and Quality of service; William Stallings; Pearson Education.

24ECU4EM4T: Information Systems and Management

Teaching Scheme		Examination Scheme	
Lectures	2 Hours/week	**ESE**	60 Marks
Credits	2	**ISE**	40 Marks

Introduction:

This course provides the basic tactical and strategic principles of information technology uses for management information systems and its various applications to the organizations. It also addresses changing face of business with proliferation of electronic commerce and ethical & social issues arising with it.

Course Prerequisite:

Student shall have basic knowledge of computer hardware, software, programming and communication.

Course Objectives:

1. To introduce to student concepts of information systems and its impact on business and organization.
2. To make student comprehend necessity and fundamentals of data management and its benefits for business and organizations.
3. To show how e-commerce helps organization to increase productivity and competitive advantage.
4. To give overview of ethical and social issues concerning information systems.

Course Outcomes:

After completing this course, student will be able to -

1. Evaluate changing face of business and importance of management information system for today's business.
2. Explain different e-commerce mechanisms along with the examples.
3. Describe necessity and benefits of data management for business and organizations.
4. Present examples of primary and higher organizational applications of information system.
5. Describe various social and ethical issues related to information Systems.

Unit – I	**Information Systems in Global Business Today**	**06 Hours**

Business in digital economy & information age, information concepts – data, information & knowledge, information systems: concepts and definitions, classification and types of information systems, how information systems impact organizational practices and support people.

Unit – II	**Databases and Information Management**	**06 Hours**
Data hierarchy, problems with traditional file environment, database approach, database management system, creating database, relational DBMS, logical vs physical view, DBMS components, data warehouse, data mart.		
Unit – III	**Global e-business and Collaboration**	**06 Hours**
Overview of e-business and e-commerce, major e-commerce and e- business mechanisms, e-Government and public sector IT trends, e-commerce supports services, infrastructure support required, e-payment systems.		
Unit – IV	**Modern Organizational Applications**	**06 Hours**
Management levels and information systems, OLTP, OLAP, enterprise content management, introduction to ERP and supply chain management.		
Unit – V	**Information Systems and Ethical & Social Issues**	**05 Hours**
Moral dimensions of information age, ethical principles, privacy, workplace behavior and health, de-skilling and alienation, telecommuting, e waste, green IT.		

Text Books

1. Information Technology for Management – Transforming Organizations into Digital Economy, Efraim Turban, Linda Volonino, Wiley Student Edition, Wiley India Pvt. Ltd.
2. Management Information Systems Managing the Digital Firm, Kenneth C. Laudon Jane P. Laudon, Pearson, Thirteenth Edition
3. Information Technology for Management - Advancing Sustainable, Profitable Business Growth, Efraim Turban, Linda Volonino, Gregory R Wood, Wiley, Ninth Edition.

Reference Books

1. Introduction to Information Technology, Turban, Rainer, Potter, Wiley Student Edition, 2nd Edition.
2. Information Systems, Ralph Stair, George Reynolds, Cengage Learning, 10th Edition.
3. Management Information System (MIS), Rahul De, Wiley India Pvt. Ltd.

WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR
(An Autonomous Institute)
Second. Year. B.Tech (Electronics and Computer Engineering) Semester-IV

24CMU4AE7T:General Proficiency

Teaching Scheme		**Examination Scheme**	
Lectures	1 Hours/week	**ICA**	50 Marks
Tutorial	1 Hours/week		
Credits	2		

Introduction:

In today's global and competitive professional environment, engineers need more than just technical Knowledge to succeed—they must also demonstrate strong communication, problem-solving, interpersonal, and leadership skills. The General Proficiency course has been carefully designed to help students transition smoothly from academia to industry by nurturing holistic development. Through a series of structured, experiential modules, this course sharpens student's employability skills, fosters responsible citizenship, and encourages physical and emotional well-being. It focuses on essential areas such as professional communication, aptitude training, soft skills, and social engagement—ensuring students are better prepared for placements and life beyond college.

Course Prerequisite:

The students need to have basic knowledge of communication language- oral and writing skill.

Course Objectives:

1. Teach students to create ATS-friendly, job-specific resumes and write professional emails using standard formats.
2. Help students participate effectively in group discussions by using clear communication, good body language, and time management.
3. Prepare students for interviews by improving self-introductions, nonverbal cues, and strategies for answering questions confidently.
4. Show students how to format and write clear notices, agendas, and meeting minutes with the right tone and language.
5. Raise students' awareness of different personality types and the importance of grooming, body language, time management and professional etiquette.

Course Outcomes:

At the end of this course, the student will be able to

1. Create job-specific, ATS-friendly resumes and write professional emails.
2. Contribute to group discussions using effective communication techniques.
3. Face mock interview with confidence by applying personal interview techniques.
4. Write clear and well-structured notices and meeting of minutes following professional standards.
5. Identify personality types.

Unit – I	**Professional Communication: -**	**04 Hours**
ATS friendly Resume preparation, Resume according to Job description, Tips to make an effective resume, Do's and Don'ts of Professional Email Writing		
Unit – II	**Group Discussion (GD) Skills**	**04 Hours**
Role of Group Discussion in selection process, Tips for effective GD participation, Dos and Don'ts of effective group participation. Body language and time management in Group Discussion		
Unit – III	**Personal Interview Techniques**	**02 Hours**
Self Introduction, Non-verbal communication: posture, power dressing, eye contact, tone, Common interview questions and strategies for answering them, Handling difficult or unexpected questions.		
Unit – IV	**Notices, Agendas and Minutes of Meeting**	**02 Hours**
Writing Notices, Format and layout, Language and tone, Sample notices for meetings, events, seminars, etc. Guidelines for effective 'minutes of meeting' writing, Do's and Don'ts of Minutes of Meeting		
Unit – V	**Personality Development for Engineering Students**	**02 Hours**
Types of personalities and dealing with them, Personality traits, Personal grooming , Body Language for Success, Personality depiction, Time Management , Discipline, Professional Etiquettes		

Internal Continuous Assessment (ICA)

Minimum 10 assignments from the below mentioned list

1. **Resume Creation**: Students will prepare a one-page ATS friendly resume tailored to their Job description
2. **Email and Letter Writing**: Each student will draft a formal email and a cover letter intended for a job application
3. **Notice, Agenda and Minutes of Meeting Writing :** Write the Notice, agenda and Minutes of Meeting in a business setting
4. **Public Speaking**: Just a Minute & Elevator pitch activities.
5. **Self-Grooming Journal:** Students will maintain a grooming and time-management journal for three consecutive days, documenting habits, self-discipline practices, and areas of improvement.
6. **SWOT Analysis of Personality**: Each student will perform a personal SWOT analysis to identify their strengths, weaknesses, opportunities, and threats in the context of personality development and employability.
7. **Mock Group Discussion**: Students will participate in mock GDs on current topics and after GD, performance of participants will be reviewed by peer assessment method
8. **Mock Personal Interviews:** Students will undergo mock HR, simulations in front of peers and instructors, followed by personalized feedback on performance and body language.
9. **Body Language:** Record the responses of students during the interview and instructor will analyse their body language and provide personalised feedback
10. **Grooming and Etiquette Demonstration**: In this session, students will observe and demonstrate

proper grooming standards, professional dress code, and social etiquettes suitable for interviews and corporate environments.

11. **Time Management Activity:** Students will be preparing Vision Board activity where they have to set their long term goal chronologically
12. **Leadership and Teamwork Exercise:** Solving and discussing Self and Business Case studies)

Text Books

1. Soft Skills: An Integrated Approach to Maximize Personality – Gajendra Singh Chauhan & Sangeeta Sharma, Wiley India Pvt. Ltd.
2. Communication Skills for Professionals – Nira Konar, PHI Learning, 3rdEdition, 2022.
3. On Writing Well – William Zinsser, Harper Resource Book, 2001.
4. Technical English – Dr. M. Hemamalini, Wiley India Pvt. Ltd.
5. Professional Speaking Skills – Aruna Koneru, Paperback, January 2018.
6. Group Discussion and Interview Skills – Priyadarshi Patnaik, Cambridge University Press India, 2nd Edition, 2015.

Reference Books

1. Soft Skills – K. Alex, S. Chand Publications.
2. Soft Skills: A Textbook for Undergraduates – Ajay R. Tengse, Orient Black Swan.
3. Communication Skills – Sanjay Kumar & Pushpa Lata, Oxford University Press.
4. Managing Soft Skills for Personality Development – B. N. Ghosh, McGraw Hill.
5. Soft Skills for Everyone – Jeff Butterfield, Cengage Learning.
6. Soft Skills for Managers – Dr. T. Kalyana Chakravarthi & Dr. T. Latha Chakravarthi, Biztantra Publication.

WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR
(An Autonomous Institute)
Second Year B.Tech (Electronics and Computer Engineering) Semester-IV

24CMU4VE8T: Professional Ethics

Teaching Scheme		**Examination Scheme**	
Lectures	2 Hours/week	**ISE**	50 Marks
Credits	2		

Introduction:

This course is designed to explore the principles and standards of moral and ethical conduct in professional settings. This course aims to equip students with the necessary tools to navigate complex ethical dilemmas and make informed decisions that uphold the integrity and ethical standards of their profession. It emphasizes the importance of ethical behavior in building trust, maintaining credibility, and fostering a positive professional environment.

Course Objectives:

1. To make student aware of Professional Ethics in engineering
2. To make student aware of various theories in Professional Ethics
3. To make student learn about safety, risk and responsibilities of an engineer
4. To make student learn about the global issues in Professional Ethics.

Course Outcomes:

After completing this course, student will be able to

1. Describe importance of Professional Ethics in his life.
2. Describe various theories in Professional Ethics.
3. Describe safety, risk and responsibilities of an engineer.
4. Describe consciously to global issues in Professional Ethics.

Unit – I	**Introduction to Professional Ethics**	**03 Hours**

Introduction, Engineering and Professionalism, Two models of Professionalism, Three types of morality, Preventive Ethics, Aspiration Ethics

Unit – II	**Engineering Ethics**	**04 Hours**

Senses of engineering ethics, Variety of Moral Issues, Types of Inquiry, Recent developments towards ethics in engineering, MoralDilemmas-steps to solve moral dilemmas.

Unit – III	**Theories in Engineering Ethics**	**04 Hours**

Kohlberg's Theory, Gilligan's Theory, Consensus and Controversy, Models of Professional Roles, Theories about Right Action, Self interest, Customs and Religion, Uses of Ethical theories.

Unit – IV	**Engineering as Social Experimentation**	**04 Hours**
Engineering projects vs Standard projects, Engineers as responsible experimenters, code of ethics, Industrial standards.		
Unit – V	**Safety and Risk**	**04 Hours**
Concept of safety, Engineers and safety, Risk- Types of accidents, Risk Benefit analysis, Reducing risk, Risk Management.		
Unit – VI	**Responsibilities of an Engineer**	**04 Hours**
Collegiality, Loyalty, Respect of Authority, Collective Bargaining, Confidentiality, Conflict of Interest.		
Unit – VII	**Rights of an Engineer**	**03 Hours**
Professional Rights, Employee Rights, Whistle Blowing, Intellectual Property Rights, Discrimination, Preferential Treatment.		
Unit – VIII	**Global Issues**	**04 Hours**
Multinational Corporation, Ways of promoting morally just measures, Environmental Ethics, Computer Ethics, Weapons Development, Engineers as Managers, Expert Witnesses and Advisors, Moral Leadership, Corporate Social Responsibility.		

Text Books

1. A Text Book of Professional Ethics & Human Values by R.S. Naagarazan, New Age International, 2006.
2. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
3. Professional Ethics in Engineering by Dr. N. Venkateswaran, Sree Kamalamani Publications.

Reference Books

1. Engineering Ethics: Concepts and Cases by Charles E. Harris Jr., Michael S. Pritchard and Michael J. Rabins,4th Edition.

24ECU4CC9P: Programming with Python

Teaching Scheme		**Examination Scheme**	
Lectures	1 Hours/week	**POE**	50 Marks
Practical	2 Hours/week	**ICA**	25 Marks
Credits	2		

Introduction:

This course introduces the fundamentals of Python programming, focusing on essential concepts such as variables, control flow, functions, and core data structures like strings, lists, dictionaries, tuples, and sets. It provides a strong foundation for beginners to develop logical thinking and problem-solving skills using Python.

Course Prerequisite:

Basic understanding of computers and familiarity with any programming or logical problem-solving concepts is helpful but not mandatory.

Course Objectives:

To introduce to student the fundamentals of writing Python scripts.

1. To make student learn core Python scripting elements such as variables and flow control structures
2. To make student write Python functions to facilitate code reuse
3. To make student understand how to work with lists, tuples, sets and dictionaries

Course Outcomes:

After completing this course, the student will be able to -

1. Setup Python development environment and are able to write Python scripts.
2. Employ core Python scripting elements such as variables and flow control structures.
3. Apply Python functions to facilitate code reuse.
4. Create and manipulate Python programs by utilizing the data structures like lists,dictionaries, tuples and sets.

Unit – I	**Basics of Python Programming Language**	**03Hours**

Identifiers, keywords, statements and expressions, variables, operators (arithmetic, assignment, comparison, logical and bitwise), operator precedence, data types, indentation, comments,python software development environments: python idle, google colab

Unit – II	**Control Flow Statements and Functions**	**03 Hours**

If, if-else, if-elif-else statements, while and for loops, continue and break statements, exception handling using try and except blocks, use of built-in and module functions, defining functions and calling, return statement, recursive functions and the Lambda function

Unit – III	**Strings**	**03 Hours**

Creating and storing strings, basic string operations, basic inbuilt python functions for string, accessing characters in string by index[] operator, string slicing and joining, string methods

Unit – IV	Lists and Dictionaries	03 Hours
Creating lists, basic list operations, indexing and slicing in lists, modifying items in list, list methods, creating dictionary, accessing and modifying key: value pairs in dictionaries, dictionary methods, traversing dictionaries		
Unit – V	**Tuples and Sets**	**03 Hours**
Creating tuples, basic tuple operations, indexing and slicing in tuples, relation between tuples and lists, tuple methods, map and zip function, sets, set methods, set operations		

- **Internal Continuous Assessment (ICA)**

ICA shall consist of minimum eight experiments and one mini-project based on following

1. Program using decision control statements
2. Program using loops
3. Program using functions
4. Program using string manipulations using built-in functions
5. Program using lists
6. Program using dictionaries
7. Program using tuples
8. Program using sets

Text Books

1. Introduction to Python Programming, Gowrishankar S. and Veena A., Chapmanand Hall/CRC Press, New Delhi, 2019
2. Core Python Programming, R. Nageswara Rao, Dreamtech Press; Second edition(2018)
3. Programming and Problem Solving with Python, Ashok Kamthane and AmitKamthane, McGraw Hill Education (India) Private Limited
4. Data Structures and Algorithms Using Python, Necaise Rance D., Wiley IndiaPvt. Ltd

Reference Books

1. Introduction to Python, Y. Daniel Liang, Pearson publication, 2012.
2. Python Cookbook, Alex Martelli and David Ascher, O'Reilly Media, 2002
3. Python How to Program, Harvey M. Deitel, Paul J. Deitel, Jonathan P. Liperi andBen Wiedermann, Prentice Hall, 2002
4. Learn Python 3 the Hard Way, Zed A. Shaw, Pearson Education, 2017

WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR

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Second Year B.Tech (Electronics and Computer Engineering) Semester-IV

24ECU4VE10P: Software Simulation Tools

Teaching Scheme		**Examination Scheme**	
Lectures	1 Hour /week	**ICA**	50 Marks
Practical	2 Hours/week,		
Credits	2		

Introduction:

This course introduces students to the fundamentals of modeling and simulating electronic circuits using industry-standard platforms like MATLAB and Simulink. Students begin by learning MATLAB programming basics, including matrix operations, control structures and function handling, followed by data visualization techniques using 2D and 3D plots. As the course progresses, students apply these skills to simulate DC circuits, rectifiers, filters, and analog electronics circuits using Simulink's graphical modeling environment.

Course Prerequisite:

Student shall have an adept knowledge of programming with C

Course Objectives:

1. To make student understand the MATLAB environment along with basic programming constructs.
2. To make student use MATLAB and SIMULINK as a tool to simulate electronic circuits.
3. To make student understand system behavior using different analysis tools and functions available in MATLAB and SIMULINK

Course Outcomes:

After completing this course, student will be able to -

1. Write programs for mathematical operations using MATLAB.
2. Simulate electronic circuits consisting of diode and transistor using MATLAB.
3. Evaluate performance of AM, FM modulation and other communication systems by using MATLAB SIMULINK.

Unit – I	**MATLAB Fundamentals**	**03 Hours**

MATLAB Environment, constants, variables and expressions, operators, matrix operations, vectors, complex numbers, math functions, input–output fnctions, control structures-loops and branching.

Unit – II	**MATLAB Functions**	**02 Hours**

M files and script files, functions, sub programs, types of functions, errors and warnings

Unit – III	**MATLAB Graphics**	**04 Hours**
Two dimensional plots, multiple plots, sub plots, specialized two dimensional plots, three dimensional plots		
Unit – IV	**Problem Solving using MATLAB**	**02 Hours**
DC circuit analysis, loop analysis, verification of maximum power transfer theorem		
Unit – V	**Simulation using MATLAB and SIMULINK**	**04 Hours**
Introduction to SIMULINK, modeling, commonly used blocks, simulation using MATLAB and SIMULINK - rectifiers, filters, series and parallel circuits, any other circuits / concepts covered in course –Analog electronics circuit		

- **Internal Continuous Assessment (ICA)**

ICA shall consist of minimum eight experiments and one mini-project based on following

1. MATLAB Programming – Students shall solve/simulate simple electronic circuit related problems to learn various MATLAB features / concepts
2. Simulation of circuits / concepts covered in Analog Electronics Circuit course using MATLAB/ SIMULINK
3. It is recommended that with a group of 4/5 students, few lab sessions shall be utilized for carrying out a small project.

Text Books

1. MATLAB and its application in Engineering, R. K. Bansal, A. K. Goel and M. K. Sharma, Pearson Education.
2. MATLAB & Simulink, Agam Kumar Tyagi, Oxford University Press.
3. Getting starting with MATLAB-7, Rudra Pratap, Oxford University Press.
4. Electronics and Circuit Analysis using MATLAB, John O. Attia, CRC Press.
5. PSPICE and MATLAB for Electronics: An Integrated Approach, John O. Attia, CRC press.

Reference Books

1. MATLAB and SIMULINK manuals.