

BOOKLET - BATCH 2K26

Annex D - Batch 2K26													
Semester	Subject	SDGs	PLO-1	PLO-2	PLO-3	PLO-4	PLO-5	PLO-6	PLO-7	PLO-8	PLO-9	PLO-10	PLO-11
Semester 1	Functional English	4								1:A2	2:A3		3:A1
	Calculus and Analytical Geometry	4	1:C3				2:C4						
	Electronic Engineering Drawing and Workshop Practices (Lab)	9	1:P1				2:P2 3:P3						
	Linear Circuit Analysis	9	1:C2			2:C3							
	Linear Circuit Analysis (Lab)	9								1:P3			
	Applications of ICT	4	1:C1 2:C2		3:C3								
	Applications of ICT (Lab)	4					1:P3						
	Applied Physics	4	1:C1 2:C2	3:C3									
	Applied Physics (Lab)	4		1:P3									
	Islamic Studies	10,16							1:A3		2:C3		
	Ethics	10,16						1:C2		2:C3			
Semester 2	Linear Algebra and Differential Equations	4	1:C2	2:C3 3:C3									
	Discrete Mathematics	4	1:C2	2:C3									
	Communication and Presentation Skills	8									1:A3 2:A3		3:A2
	Pakistan Studies	5,16						1:C1	2:C5				
	Computer Programming	4	1:C2		2:C3								
	Computer Programming (Lab)	4					1:P3						
	Electronic Devices and Circuits	9	1:C2			2:C3							
	Electronic Devices and Circuits (Lab)	9								1:P3			
	Understanding of Holy Quran-I (Lab)	10,16										1:P2 2:P3 3:P3	
	History-I (Alternative)	10,16						1:C2	2:C2				3:C3
	Philosophy 1	4,12,16						1:C2	2:C5				3:C3
Semester 3	Complex Variables and Transforms	4	1:C1 2:C2	3:C3									
	Occupational Health and Safety	3,13		1:C2		2:C4							
	Digital Logic Design	9	1:C1	2:C3	3:C3								
	Digital Logic Design (Lab)	9				1:P4							
	Data Structures and Algorithms	8,9	1:C2	3:C3	2:C4								
	Data Structures and Algorithms (Lab)	8,9				1:P3							
	Electrical Network Analysis	4,9	1:C4	2:C3									
	Electrical Network Analysis (Lab)	4,9			1:P2								
	Civics and Community Engagement	3							2:C4	1:C3			3:C5
	Understanding of Holy Quran-II (Lab)	10,16										1:P3 2:P4 3:P4	
	History-II (Alternative)	10,16						1:C2	2:C4				3:C5
	Philosophy 2	4,12,16		1:C4				2:C3		3:C5			

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Semester 4	Probability and Statistics for Engineers	4	1:C1	2:C3		3:C4							
	Engineering Mechanics	9	1:C2	2:C2									
	Electromagnetic Field Theory	4	1:C2	2:C4	3:C4								
	Signals and Systems	8	1:C2	2:C3	3:C5								
	Signals and Systems (Lab)	8					1:P3						
	Electronic Circuit Design	9	1:C1	2:C2	3:C3								
	Electronic Circuit Design (Lab)	9				1:P3							
	Ideology and Constitution of Pakistan	4,5							1:C4				2:C5
	Introduction to Cooperative Housing Societies	8,11						1:C2	2:C2				3:C3
Semester 5	Instrumentation and Measurements	4	1:C2 2:C2		3:C3								
	Instrumentation and Measurements (Lab)	4					1:P3						
	Microprocessors and Interfacing	4		1:C2	2:C3								
	Microprocessors and Interfacing (Lab)	4					1:P3						
	Communication Systems	4						1:C3			2:C4		
	Communication Systems (Lab)	4					1:P3						
	Control Systems	4	1:C2	2:C4				3:C6	4:C5				
	Control Systems (Lab)	4	1:P4	2:P5	3:P6								
	Engineering Management	8,12								1:C2	2:C4	3:C5	
Semester 6	Expository Writing	4									1:C3	2:C3	3:C5
	Computer Communication and Networks	4			1:C2	2:C4				3:C5			
	Computer Communication and Networks (Lab)	4					1:P4						
	Power Electronics	4,7	1:C2	2:C4	3:C6	4:C5							
	Power Electronics (Lab)	4,7	1:P4	2:P5	3:P6								
	Electrical Machines	4	1:C2	2:C2		3:C4							
	Electrical Machines (Lab)	4					1:P3						
	Digital Signal Processing	4						1:C2			2:C3		3:C4
	Digital Signal Processing (Lab)	4					1:P3						
Semester 7	Renewable Energy Systems	7,11,13						1:C4			2:C4		3:C5
	Artificial Intelligence	9,17		1:C2	2:C3	3:C4							
	Robotic Engineering	8,9						1:C2			2:C4		
	Robotic Engineering (Lab)	8,9					1:P4						
	Embedded Systems	9,11			1:C2	2:C4							
	Embedded Systems (Lab)	9,11				1:P4							
	Project Management	4						1:C2				2:C4	3:C5
	Final Year Project-I	4, 9, 12	1:C2	2:C4	4:P7	3:C6	3:C6	7:A4	5:A5	5:A5	5:A5	5:A5	6:C6
	Entrepreneurship	1,2						3:C3				2:C6	1:C5

Annex D - Batch 2K26													
Semester	Subject	SDGs	PLO-1	PLO-2	PLO-3	PLO-4	PLO-5	PLO-6	PLO-7	PLO-8	PLO-9	PLO-10	PLO-11
Semester 8	FPGA-Based System Design	8,9		3:C3	1:C2 2:C5								
	FPGA-Based System Design (Lab)	8,9								1:P3			
	Industrial Electronics	8,9	1:C6	2:C4		4:C5		3:C6					
	Industrial Electronics (Lab)	8,9	1:P4	2:P5	3:P6								
	Final Year Project-II	4, 9, 12	1:C2	2:C4	4:P7	3:C6	3:C6	7:A4	5:A5	5:A5	5:A5	5:A5	6:C6
	Total Number of PLOs		25	23	19	15	14	17	11	11	11	8	15

First Year - First Semester



Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro



Subject Name	: Functional English
Credit Hours	: 3+0=3
Course Code	: Theory (HUM26-110)
Effective	: 2K26-BE(E)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48
Marks	: Theory (100)
Instructor Name	: Ms. Murk

DESCRIPTION

Functional English focuses on developing practical language skills for effective communication in academic, professional, and everyday contexts. It emphasizes listening, speaking, reading, and writing to help students use English accurately and confidently in real-life situations.

Mapping of SDGs

SDG 4: Quality Education	4.4: Substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs, and entrepreneurship.
	4.6: Ensure that all youth and a substantial proportion of adults achieve literacy and numeracy.
	4.7: Ensure that learners acquire the knowledge and skills needed to promote sustainable development, global citizenship, and appreciation of cultural diversity.

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Demonstrate effective written and spoken English communication using correct grammar and sentence structure.	Affective	A2	8	40
	2	Express information, ideas, and opinions effectively in written and spoken English.	Affective	A3	9	30
	3	Recognize intercultural variations in the use of English language and adapt communication style according to diverse cultural and social contexts.	Affective	A1	11	30

COURSE OUTLINE (THEORY)

Vocabulary building (contextual usage, synonyms, antonyms and idiomatic expressions), Communicative grammar (subject-verb agreement, verb tenses, fragments, run-ons, modifiers, articles, word classes, etc.) Word formation (affixation, compounding, clipping, back formation, etc.) Sentence structure (simple, compound, complex and compound-complex) Sound production and pronunciation, Understanding purpose, audience and context. Contextual interpretation (tones, biases, stereotypes, assumptions, inferences, etc.). Reading strategies (skimming, scanning, SQ4R, critical reading, etc.). Active listening (overcoming listening barriers, focused listening, etc.). Principles of communication (clarity, coherence, conciseness, completeness, correctness, etc.). Structuring documents (introduction, body, conclusion and formatting). Inclusivity in communication (gender-neutral language, stereotypes, cross-cultural communication, etc.). Public speaking (overcoming stage fright, voice modulation and body language). Presentation skills (organization of content, visual aids and engaging the audience). Informal communication (small talk, networking and conversational skills). Professional writing (business e-mails, memos, reports, formal letters, etc.).

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Betty Schramper Azar, "Understanding and Using English Grammar," Pearson Education, latest ed.
- [2] Raymond Murphy, "English Grammar in Use," Cambridge University Press, latest ed.
- [3] Jane Straus, "The Blue Book of Grammar and Punctuation," Jossey-Bass, latest ed.
- [4] Tom Hutchinson and Alan Waters, "English for Specific Purposes: A Learning-Centered Approach," Cambridge University Press, latest ed.
- [5] Colm Downes, "Cambridge English for Job-hunting," Cambridge University Press, latest ed.
- [6] Michael Swan, "Practical English Usage," Oxford University Press, latest ed.
- [7] Missy James and Alan P. Merickel, "Reading Literature and Writing Argument," Pearson Education, latest ed.



Department of Electronic Engineering
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Subject Name : Calculus and Analytical Geometry
Credit Hours : 3+0=3
Course Code : Theory (NS26-118)
Effective : 2K26-BE(EE)
Pre-Requisites : Nil
Weeks/Lectures/Labs : 16/48
Marks : Theory (100)
Instructor Name : Mr. Rahat Ali Langha

DESCRIPTION

Calculus is used in various fields, including physics, engineering, economics, and computer science, to model and solve problems involving motion, optimization, and rates of change.

Mapping of SDGs

SDG 4: Quality education	4.3: ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university.
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	DESCRIPTION	Domain	Taxonomy level	PLO	Marks
Theory	1	Apply fundamental calculus concepts to solve engineering and scientific problems.	Cognitive	C3	1	50
	2	Analyze mathematical problems using graphical, analytical, and computational techniques.	Cognitive	C4	5	50

COURSE OUTLINE (THEORY)

Review of vectors, scalars and vector products, Three-dimensional coordinate system and equation of straight line and plane. Review of functions and graphs, Limits & Continuity, Techniques of Finding Limits. Limits of Sine and Cosine and Exponential Functions
 Differentiation: Introduction to Derivatives, Examples of Derivatives, Derivative as Rate of Change Derivative's Rules, Implicit Differentiation, Higher order derivative, Leibnitz, Theorem Applications of Derivatives, Monotonic functions, Optimization problems, Relative, Absolute extrema, First and second derivative tests, Point inflection, Concavity, Curvature, Indeterminate Forms and L' Hospital rule, Differentials. Integrals and Properties of Integrals Techniques of Integration, Integration by Parts Definite Integrals, Integration of Trigonometric, Exponential and

Inverse Functions Integration by Partial Fractions Reduction Rules. Area under the curve Area between curves Solids of Revolution Volume of Solids of revolution by disk washer. Cylindrical shell & Cross Section Methods Center of Pressure and Depth of Center of Pressure Center of mass, Arc length improper. Improper Integral, Integrals and Singularities, Convergence of improper integrals Sequence and Infinite Series, Convergence and Divergence of sequences and series positive-term series, Integral Test.

Alternating series, Absolute and Conditional Convergence Power and Taylor Series: Power series Maclaurin and Taylor Series and its Applications

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] George B. Thomas Jr., Maurice D. Weir, and Joel R. Hass, "Thomas' Calculus," Pearson Education, latest ed.
- [2] Earl W. Swokowski, Michael Olinick, and Dennis Pence, "Calculus," PWS Publishing, latest ed.
- [3] Robert T. Smith and Roland B. Minton, "Calculus," McGraw-Hill, latest ed.
- [4] James Stewart, "Calculus: Early Transcendentals," Brooks/Cole, latest ed.



Department of Electronic Engineering
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Subject Name	: Electronic Engineering Drawing and Workshop Practices (Lab)
Credit Hours	: 1+0=1
Course Code	: Practical (EE26-117)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/16
Marks	: Practical (50)
Instructor Name	: Engr. Abdul Manan

DESCRIPTION

This Lab course includes the basic understanding about the electronics component used for electronics circuit design such as resistors, capacitor, inductors, transformers and also learn about the computer aided engineering drawing tool for the sketching the drawing.

Mapping of SDGs

SDG 9: Industry innovation	9.5: encouraging innovation and substantially increasing the number of research and development workers.....
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LABORTORY LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Observe various discrete electronic components, describe their use in circuits and detect any trouble in simple electronic circuits.	Psychomotor	P1	1	15
	2	Achieve the ability to learn the working mechanism and gets some hands-on experience on basic electronic equipment and understanding of computer aided engineering command with their utilizations by sketching various drawing.	Psychomotor	P2	5	35

COURSE OUTLINE (PRACTICAL)

Introduction to technical facilities in a workshop including mechanical and electrical equipment. Concepts in electrical safety, safety regulations, earthing concepts, electric shocks and treatment.

Use of tools used by electricians, wiring regulations, types of cables and electrical accessories including switches, plugs, circuit breakers and fuses etc. UPS/ invertors and battery charging Industrial, domestic and auto wiring. Symbols for electrical wiring schematics. Wiring schemes of two-way, three-way and ringing circuits. Electric soldering/ de-soldering. PCB design, transferring a circuit to PCB, etching, drilling and soldering components on PCB.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Umesh Rathore and Naresh Kumar Sharma, “A Textbook of Electrical Workshop Practices,” S.K. Kataria & Sons, latest ed.
- [2] S. K. Choudhury, “Elements of Workshop Technology, Vol. 1,” Media Promoters & Publishers, latest ed.
- [3] W. A. J. Chapman, “Workshop Technology, Part II,” CBS Publishers & Distributors, latest ed.



Department of Electronic Engineering
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Subject Name	: Linear Circuit Analysis
Credit Hours	: 3+1=4
Course Code	: Theory (EE26-110)
	: Practical (EE26-111)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100)
	: Practical (50)
Instructor Name	: Engr. Dr. Mudasir Ahmed

DESCRIPTION

Linear Circuit Analysis introduces the fundamental principles and techniques for analyzing electric circuits. The course covers Ohm's Law, Kirchhoff's laws, network theorems, and methods such as mesh and nodal analysis to understand the behavior of linear electrical networks under DC and AC conditions.

Mapping of SDGs

SDG 9: Industry innovation	9.4: greater adoption of clean and environmentally sound technologies and industrial processes.....
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	DESCRIPTION	Domain	Taxonomy level	PLO	Marks
Theory	1	Explain the basic concepts, terms, theorems, laws, and analysis methods used in electric circuits	Cognitive	C2	1	50
	2	Apply circuit reduction techniques, including series-parallel combinations, source conversion, Mesh Analysis, Nodal Analysis, and network theorems to analyze static and transient circuits.	Cognitive	C3	4	50

LABORTORY LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	DESCRIPTION	Domain	Taxonomy level	PLO	Marks
Practical	1	To perform laboratory experiments under guidance and accurately record and compare experimental results with theoretical values for linear electrical circuits.	Psychomotor	P3	8	50

COURSE OUTLINE (THEORY)

Basic Electrical Concepts: Charge. Current. Voltage. Power, Voltage and Current sources
Voltage and Current Laws: Ohm's Law', Kirchhoff's Current Law, Kirchhoff's, Voltage Law, Voltage Division in series Current Division in Parallel, Series and Parallel Sources
Nodal and Mesh Analysis: Nodal Analysis and Super Node, Mesh Analysis and Super Mesh, Comparison between Nodal and Mesh Analysis Circuit Analysis Techniques, Linearity and Superposition, Source Transformation: Thevenin's and Norton's Theorem, Maximum Power Transfer, Delta-Wye, Transformation: Energy Storing Elements: The Inductor, The Capacitor, Physical construction and Mathematical Model First Order Circuits (RL and RC), Transient Response, Steady State Response

COURSE OUTLINE (PRACTICAL)

Study of DC series circuits, parallel circuits, Kirchhoff's current and voltage laws, current divider theorem, voltage divider theorem, network theorems, simple RLC circuits, and simulation of basic electrical circuits using PSPICE. Lab activity will be followed by semester project.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] William H. Hayt Jr. and Jack E. Kemmerly, "Engineering Circuit Analysis," McGraw-Hill Education, latest ed.
- [2] J. David Irwin, "Basic Engineering Circuit Analysis," Wiley, latest ed.
- [3] Delmar CCengage Learning, "Electric Circuit Fundamentals," latest ed.
- [4] Robert L. Boylestad, "Introductory Circuit Analysis," Pearson Education, latest ed.



Department of Electronic Engineering
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Subject Name : **Applications of ICT**
Credit Hours : 2+1=3
Course Code : Theory (CS26-112)
 : Practical (CS26-113)
Effective : 2K26-BE(EE)
Pre-Requisites : Nil
Weeks/Lectures/Labs : 16/32/16
Marks : Theory (50)
 : Practical (50)
Instructor Name : Dr. Asif Jamali

DESCRIPTION

ICT, or Information and Communication Technology, encompasses the use of technology to manage, process, and communicate information, including computers, the internet, and other digital devices, playing a crucial role in various sectors.

Mapping of SDGs

SDG 4: Quality education	4.4: substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
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COURSE LEARNING OUTCOMES (THEORY)

Upon successful completion of the course, the student will be able to:

	CLO	DESCRIPTION	Domain	Taxonomy level	PLO	Marks
Theory	1	Define the fundamental concepts, components, and scope of Information and Communication Technologies (ICT).	Cognitive	C1	1	10
	2	Identify uses of various ICT platforms and tools for different purposes.	Cognitive	C2	1	10
	3	Apply ICT platforms and tools for different purposes to address basic needs in different domains of daily, academic, and professional life. Understand the ethical and legal considerations in use of ICT platforms and tools.	Cognitive	C3	3	30

LABORATORY COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	DESCRIPTION	Domain	Taxonomy level	PLO	Marks
Practical	1	Perform common ICT tasks using office applications, cloud storage, online communication tools, and learning-management platforms under guidance.	Psychomotor	P3	5	50

COURSE OUTLINE (THEORY)

Introduction to Information and Communication Technologies:

Components of Information and Communication Technologies (basics of hardware, software, ICT platforms, networks, local and cloud data storage etc.). Scope of Information and Communication Technologies (use of ICT in education, business, governance, healthcare, digital media and entertainment, etc.). Emerging technologies and future trends.

Basic ICT Productivity Tools: Effective use of popular search engines (e.g., Google, Bing, etc.) to explore World Wide Web. Formal communication tools and etiquettes (Gmail. Microsoft Outlook, etc.). Microsoft Office Suites (Word, Excel, PowerPoint). Google Workspace (Google Docs, Sheets, Slides). Dropbox (Cloud storage and file sharing). Google Drive (Cloud storage with Google Docs integration) and Microsoft OneDrive (Cloud storage with Microsoft Office integration). Evernote (Note-taking and organization applications) and OneNote (Microsoft's digital notebook for capturing and organizing ideas). Video conferencing (Google Meet. Microsoft Teams. Zoom. etc.). Social media applications (LinkedIn. Facebook. Instagram, etc.). ICT in Education: Working with learning management systems (Moodle. Canvas. Google Classrooms, Sources of online education courses (Coursera. edX, Udemy. Khan Academy, etc.). Interactive multimedia and virtual classrooms. ICT in Health and Well-being: Health and fitness tracking devices and applications (Google Fit, Samsung Health, Apple Health, Xiaomi Mi Band, RunKeeper, etc.). Telemedicine and online health consultations (OLADOC. Schact Kahani. Marham. ICT in Personal Finance and Shopping: Online banking and financial management tools (Jazz Cash. Easypaisa, Zong Pay Max. 1LINK and MNET, Keenu Wallet, etc.). E-commerce platforms (Daraz.pk, Telemart. Shophive, etc.) Digital Citizenship and Online Etiquette: Digital identity and online reputation. Netiquette and respectful online communication. Cyberbullying and online harassment. Ethical Considerations in Use of ICT Platforms and Tools: Intellectual property and copyright issues. Ensuring originality in content creation by avoiding plagiarism and unauthorized use of information sources. Content accuracy and integrity (ensuring that the content shared through ICT platforms is free from misinformation, fake news, and manipulation).

COURSE OUTLINE (PRACTICAL)

Guided tutorials and exercises to ensure that students are proficient in commonly used software applications such as word processing software (e.g. Microsoft Word), presentation software (e.g. Microsoft PowerPoint), spreadsheet software (e.g. Microsoft Excel) among such other tools students may be assigned practical tasks that require them to create documents, presentations and spreadsheets etc.

Assigning of tasks that involve creating, managing, and organizing files and folders on both local and cloud storage systems., students will practice file naming conventions, creating directories, and using cloud storage solutions (e.g., Google Drive. OneDrive).

The use of online learning management systems (LMS) where students can access course materials, submit assignments, participate in discussion forums, and take quizzes or tests. This will provide students with the practical experience with online platforms commonly used in education and the workplace.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Misty E. Vermaat, Susan L. Sebok, Steven M. Freund, Jennifer T. Campbell, and Mark Frydenberg, "Discovering Computers," CCengage Learning, latest ed.
- [2] Shelley Gaskin, Alicia Vargas, and Nancy McLellan, "GO! With Microsoft Office," Pearson Education, latest ed.
- [3] Mary Anne Poatsy and June Jamrich Parsons, "Exploring Microsoft Office," Pearson Education, latest ed.



**Department of Electronic Engineering
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Subject Name : **Applied Physics**
Credit Hours : 2+1=3
Course Code : Theory (NS26-114)
 : Practical (NS26-115)
Effective : 2K26-BE(EE)
Pre-Requisites : Nil
Weeks/Lectures/Labs : 16/32/16
Marks : Theory (50)
 : Practical (50)
Instructor Name : Engr. Kundan Kumar

DESCRIPTION

This course includes the basic concepts of electricity, magnetism, electromagnetism, waves and oscillation, electronics and mechanics and their applications.

Mapping of SDGs

SDG 4: Quality education	4.7: ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles.
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COURSE LEARNING OUTCOMES (THEORY):

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Recall theories of mechanics, electricity, magnetism, electromagnetism, waves, oscillations, and electronics	Cognitive	C1	1	15
	2	Define and explain theories of charges, laws of physics, electricity and magnetism, and identify their applications in various engineering fields	Cognitive	C2	1	20
	3	Formulate and solve basic equations and problems of electromagnetism and magnetism	Cognitive	C3	2	15

LABORTORY LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Draw the circuit diagram on the breadboard and practice on the trainer kits under proper guidance.	Psychomotor	P3	2	50

COURSE OUTLINE (THEORY)

Vectors: Review of vectors. Ordinary Differentiation of Vector, Gradient of Scaler field. Divergence and Curl of Vector Field, Line and Surface Integrals with applications. Mechanics: Newton Laws and their Applications (Simple Accelerometer, Banked Curve and Rotor), Frictional Forces and determination of Co-efficient of Friction, Work-Energy Theorem, applications of law of Conservation of Energy. Angular Momentum. Centre of Mass of two-particles. Many-particles and Solid Object, Rotational Inertia of Solid Bodies. Electrostatics And Magnetism: Electric field due to Discrete and Continuous Charge Distribution, Electrostatic Potential of discrete and Continuous charges, Applications of Gauss's Law, Lorentz Force and Hall effect. Ampere's Law, Magnetic Field due to Circular Current Loop and Solenoid. Magnetic dipole. Atomic and Nuclear Magnetism. Magnetization. Magnetic Materials. Semiconductor Physics: Energy levels in a Semiconductor, Hole concept. Intrinsic and Extrinsic regions. Law of Mass Action. P-N junction. Transistors. Waves And Oscillations: Simple Harmonic Oscillator. Damped Harmonic Oscillation. Forced Oscillation and Resonance. Types of Waves and Superposition Principle. Wave Speed on a stretched string. Wave equation. Energy & Power of a Wave. Optics And Lasers: Huygens Principle, Two-slit interference, Single-Slit Diffraction. Resolving power of Optical Instruments. Principles for Laser action. Types of Lasers. Applications of Laser. Modern Physics: Planck's explanations of Black Body Radiation Photoelectric Effect. Compton Effect. de Broglie Hypothesis. Electron Microscope. Atomic structure. X-rays and Moseley's Law. Atomic Nucleus and Properties of Nucleus. Radioactive Decay and Radioactive Dating. Radiation Detection Instruments, Nuclear Reactions

COURSE OUTLINE (PRACTICAL)

Safety Rules, Ohm's law, Resistors in series and parallel capacitance and dielectrics, current and resistance, magnetic fields, sources of magnetic field, Faraday's law, inductance, direct current circuits, alternating current circuits, diode characteristics, Multisim overview, Half wave and full wave rectifier DC power supply.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] David Halliday, Robert Resnick, and Jearl Walker, "Fundamentals of Physics," John Wiley & Sons, latest ed.
- [2] Hugh D. Young and Roger A. Freedman, "University Physics," Pearson Education, latest ed.
- [3] Raymond A. Serway and John W. Jewett Jr., "Physics for Scientists and Engineers," CEngage Learning, latest ed.



**Department of Electronic Engineering
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Subject Name	: Islamic Studies
Credit Hours	: 2+0=2
Course Code	: Theory (HUM26-120)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/32
Marks	: Theory (50)
Instructor Name	: Mr. Sibghatullah

DESCRIPTION

This course provides an introduction to the rich history, culture, and foundational principles of Islam. It explores the life and teachings of Prophet Muhammad (PBUH), the Quran, and the Hadith, alongside key Islamic concepts such as Tawhid (Oneness of God), Ibadah (Worship), and the Five Pillars of Islam. Students will also study Islamic law (Shariah), ethics, and the historical development of Islamic civilization, focusing on its contributions to science, philosophy, and arts. The course aims to foster a deeper understanding of Islamic values and their application in contemporary society, while promoting critical thinking and interfaith dialogue.

SDG 10: Reduced inequalities	10.2: empower and promote the social, economic inclusion of all.....
SDG 16: Peace, Justice and Strong Institutions	16.6: effective, accountable and transparent institutions at all levels.....

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Express the scope and significance of basic beliefs and pillars of Islam and describe their effects on different aspects of individual life and society	Affective	A3	7	25
	2	Apply understanding of Holy Quran (Fehm-e-Quran), Hadith, and the life of Prophet Muhammad (S.A.W) as sources of inspiration and guidance	Cognitive	C3	9	25

COURSE OUTLINE (THEORY)

Introduction to Quranic Studies Basic Concepts of Quran. History of the Holy Quran Uloom-ul-Quran Study of Selected Text of the Holy Quran. Verses of Surah Al-Baqara Related to Faith (Verse No-284-286). Verses of Surah Al-Hujrat Related to Adab Al-Nabi (Verse No-1-18).

Verses of Surah Al-Mumanoon Related to Characteristics of the faithful (Verse No-1-11). Verses of Surah al-Furqan Related to Social Ethics (Verse No.63-77). Verses of Surah Al-Inam Related to Ihkam (Verse No-162-164). Study of Selected Text of the Holy Quran. Verses of Surah Al-Ihzab Related to Adab al-Nabi (Verse No.6, 21, 40, 56, 57, 58.).Verses of Surah Al-Hashar (18,19,20) Related to thinking, Day of Judgment .Verses of Surah Al-Saf Related to Tafakar, Tadabar (Verse No-1,14).Seerat of the Holy Prophet (S.A.W) I. Life of Muhammad Bin Abdullah (Before Prophet Hood).Life of Holy Prophet (S.A.W) in Makkah. Important Lessons Derived from the life of Holy Prophet (S.A.W) in Makkah Seerat of the Holy Prophet (S.A.W) II Life of the Holy Prophet (S.A.W) in Madina. Important Events of Life Holy Prophet (S.A.W) in Madina. Important Lessons Derived from the life of the Holy Prophet (S.A. W) in Madina. Introduction to Sunnah Basic Concepts o-f Hadith History of Hadith Kinds -of Hadith Uloom –ul-Hadith Sunnah & Hadith Legal Position of Sunnah. Selected Study from Text of Hadith. Introduction to Islamic Law & Jurisprudence. Basic Concepts of Islamic Law & Jurisprudence. History & Importance of Islamic Law & Jurisprudence. Sources of Islamic Law & Jurisprudence. Nature of Differences in Islamic Law. Islam and Sectarianism. Islamic Culture & Civilization. Basic Concepts of Islamic Culture & Civilization. Historical Development of Islamic Culture & Civilization. Characteristics of Islamic Culture & Civilization. Islamic Culture & Civilization and Contemporary Issues. Islam & Science. Basic Concepts of Islam & Science. Contributions of Muslims in the Development of Science. Quran & Science. Islamic Economic System. Basic Concepts of Islamic Economic System. Means of Distribution of wealth in Islamic Economics. Islamic Concept of Riba. Islamic Ways of Trade & Commerce. Political System of Islam. Basic Concepts of Islamic Political System. Islamic Concept of Sovereignty. Basic Institutions of Govt. in Islam. Islamic History. Period of Khlaft-E-Rashida. Period of Umayyads. Period of Abbasids. Social System of Islam. Basic Concepts of Social System of Islam. Elements of Family. Ethical Values of Islam

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Muhammad Hamid Ullah, “The Emergence of Islam,” Islamic Research Institute, Islamabad, latest ed.
- [2] Muhammad Hamid Ullah, “Muslim Conduct of State,” Sh. Muhammad Ashraf Publishers, latest ed.
- [3] Muhammad Hamid Ullah, “Introduction to Islam,” Islamic Research Institute, latest ed.
- [4] Maulana Muhammad Yousaf Islahi, “Nizam-e-Hayat,” Markazi Maktaba Islami Publishers, latest ed.
- [5] Hussain Hamid Hassan, “An Introduction to the Study of Islamic Law,” Leaf Publications, Islamabad, Pakistan, latest ed.
- [6] Ahmad Hasan, “Principles of Islamic Jurisprudence,” Islamic Research Institute, International Islamic University, Islamabad, latest ed.
- [7] Mir Waliullah, “Muslim Jurisprudence and the Quranic Law of Crimes,” Islamic Book Service, latest ed.
- [8] H. S. Bhatia, “Studies in Islamic Law, Religion and Society,” Deep & Deep Publications, New Delhi, latest ed.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Ethics
Credit Hours	: 2+0=2
Course Code	: Theory (HUM26-120)
Effective	: 2K26-BE(E)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/32
Marks	: Theory (50)
Instructor Name	: Mr. Muzammil Ahmed Ansari

DESCRIPTION

This course introduces the fundamental concepts of ethics, including the study of moral philosophies, ethical principles, professional and social responsibilities, human values, cultural and civic understanding, and the social, economic, and ethical dimensions of human behavior and society.

Mapping of SDGs

SDG 10: Reduced inequalities	10.2: empower and promote the social, economic inclusion of all.....
SDG 16: Peace, Justice and Strong Institutions	16.6: effective, accountable and transparent institutions at all levels.....

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Explain the scope and significance of ethics, moral values, and their effects on individual life and society.	Cognitive	C2	6	25
	2	Apply ethical principles and moral reasoning to personal, professional, and societal situations.	Cognitive	C3	8	25

COURSE OUTLINE (THEORY)

Introduction to Ethics (basic concepts of ethics, nature and scope of ethics, ethics and morality, ethics and values, importance of ethics in individual and social life), Historical Development of Ethical Thought (ancient ethical traditions, Greek ethics, medieval and modern ethical philosophies, contemporary ethical perspectives), Ethical Theories (utilitarianism, deontology, virtue ethics, egoism, intuitionism, rationalism, moral reasoning and decision making), Ethics

and Religion (relationship between ethics and religion, ethical teachings of major world religions including Christianity, Hinduism, Buddhism, Judaism, Sikhism, Islam, and Zoroastrianism), Professional and Applied Ethics (professional ethics, business ethics, engineering ethics, teacher and student ethics, environmental ethics, media ethics, bioethics), Human Values and Society (justice, tolerance, honesty, integrity, responsibility, human rights, social harmony, peaceful coexistence), Ethics and Contemporary Issues (ethics in science and technology, ethics in economics and politics, globalization and cultural diversity, ethics in social media and communication), Ethical Decision Making (critical thinking, ethical dilemmas, case studies, conflict resolution, moral accountability), Civic and Social Responsibilities (citizenship, community service, leadership, respect for diversity, social welfare and sustainable development).

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] W. Lillie, An Introduction to Ethics. London, U.K.: Methuen & Co. Ltd.
- [2] J. S. Mackenzie, A Manual of Ethics. London, U.K.: University Tutorial Press.
- [3] M. W. Martin and R. Schinzinger, Ethics in Engineering, 4th ed. New York, NY, USA: McGraw-Hill.
- [4] C. E. Harris, M. S. Pritchard, and M. J. Rabins, Engineering Ethics: Concepts and Cases, 4th ed. Boston, MA, USA: Wadsworth Cengage Learning.
- [5] J. Rachels and S. Rachels, The Elements of Moral Philosophy, 9th ed. New York, NY, USA: McGraw-Hill Education.

First Year - Second Semester



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Linear Algebra and Differential Equations
Credit Hours	: 3+0=3
Course Code	: Theory (NS26-124)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48
Marks	: Theory (100)
Instructor Name	: Engr. Kundan Kumar

DESCRIPTION

This course introduces fundamental concepts of linear algebra and differential equations essential for solving engineering and scientific problems. It covers vectors, matrices, systems of linear equations, and linear transformations, along with first- and higher-order differential equations, their solutions, and applications in real-world systems.

Mapping of SDGs

SDG 4: Quality education	4.4: ... substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
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COURSE LEARNING OUTCOMES (THEORY)

Upon successful completion of the course, the student will be able to:

	CLO	DESCRIPTION	Domain	Taxonomy level	PLO	Marks
Theory	1	Describe matrix operations, including inverses, factorizations, and determinants.	Cognitive	C2	1	30
	2	Apply techniques of linear algebra and optimization to solve real-life problems	Cognitive	C3	2	40
	3	Apply different types of analytical methods for solution of different differential equations.	Cognitive	C3	2	30

COURSE OUTLINE (THEORY)

System of Linear equations and Applications with real-world civil engineering case studies. The Eigenvalues and Eigenvectors explore the concepts and applications of linear algebra in constructing curves and surfaces. Linear Programming introduces optimization principles. Basic concepts and Modelling cover linear/ non-linear differential equations and initial/ boundary value

problems. Analytical methods for first-order ODEs, separable variable, homogeneous, exact, and linear equations are discussed, alongside applications such as mixing problems and temperature prediction. The subsequent section investigates the analytical methods for second order ODEs covering homogeneous and non-homogeneous, Cauchy-Euler equations, with practical applications in earthquake modeling and bridge collapse scenarios.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Bernard Kolman and David R. Hill, Introductory Linear Algebra, Pearson Education, ISBN: 9780131437401.
- [2] Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, ISBN: 9780470458365.
- [3] John Polking, Al Boggess, and David Arnold, Differential Equations, Prentice Hall, ISBN: 9780131437388.
- [4] Dennis G. Zill and Michael R. Cullen, Differential Equations with Boundary Value Problems, Brooks/Cole Publishers, ISBN: 9789360532291.
- [5] Dennis G. Zill, A First Course in Differential Equations with Modeling Applications, CCengage Learning, ISBN: 9780357760192.
- [6] E. A. Bender, An Introduction to Mathematical Modelling, Wiley, latest ed.



Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro



Subject Name	: Discrete Mathematics
Credit Hours	: 3+0=3
Course Code	: Theory (NS26-126)
Effective	: 2K26-BE(E)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48
Marks	: Theory (100)
Instructor Name	: Engr. Umair Ali Abro

DESCRIPTION

Discrete Mathematics deals with mathematical structures that are fundamentally discrete rather than continuous. It includes topics such as logic, set theory, combinatorics, graph theory, and algorithms, providing essential tools for computer science, data structures, and digital system design.

Mapping of SDGs

SDG 4: Quality education	4.4: substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
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COURSE LEARNING OUTCOMES (THEORY)

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Understand the mathematical reasoning to comprehend and construct mathematical argument	Cognitive	C2	1	50
	2	Solve counting problems with combinatorial analysis	Cognitive	C3	2	50

COURSE OUTLINE (THEORY)

Number theory; sets, set operations, and Venn diagrams; sequences and strings; relations and functions; propositional logic, conditional propositions, and logical equivalence; methods of proof; rules of inference; mathematical induction and recursion; matrices; Boolean algebra; algorithms and integers; counting techniques; graphs and trees; algebraic structures; formal languages and grammars; and finite-state machines.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] K. H. Rosen, Discrete Mathematics and Its Applications, latest ed., McGraw-Hill.
- [2] R. Johnsonbaugh, Discrete Mathematics, latest ed., Pearson.
- [3] S. S. Epp, Discrete Mathematics with Applications, latest ed., Cengage Learning.
- [4] R. P. Grimaldi, Discrete and Combinatorial Mathematics: An Applied Introduction, latest ed., Pearson.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Communication and Presentation Skills
Credit Hours	: 2+0=2
Course Code	: Theory (HUM26-128)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/32
Marks	: Theory (50)
Instructor Name	: Mr. Israr Ahmed Khoso

DESCRIPTION

This course focuses on developing effective verbal, non-verbal, and written communication skills essential for academic and professional success. It emphasizes clarity, confidence, and organization in delivering presentations, participating in discussions, and preparing professional documents.

Mapping of SDGs

SDG 8: Decent work and economic growth	8.3: decent job creation, entrepreneurship.....
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Clarify effective use of intermediate to advanced level English	Affective	A3	9	20
	2	Cooperate in group discussions by attentive listening, questioning to clarify ideas, eliciting responses, and disagreeing in a constructive way	Affective	A3	9	10
	3	Acknowledge the impact of different communication styles and presentation skills on interpersonal relationships	Affective	A2	11	20

COURSE OUTLINE (THEORY)

Writing Skills: Vocabulary Building, Writing Skills: Essays and Letters, Common Writing Errors, Purposeful Writing. Reading Skills: Skimming and Scanning, Critical Reading, Reading

for Understanding, Techniques and strategies to develop sound vocabulary. Listening Skills, Introduction to Communication, Process, Seven Cs of Communication.

Types of Listening: Listening for Comprehension, Speaking Skills, Verbal and Non-Verbal Communication, Basics of Presentation Skills. Presentation Strategies and public speaking skills. Use of Audio-Visual Aids, Basics of Group Communication, Listening Skills Communicate effectively in job interviews

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Anchor in English-II (Lessons I–V), A SPELT Publication, latest ed.
- [2] Christopher Fry, Summary Writing (Book-I), Oxford University Press, latest ed.
- [3] John Langlan, College Essays, latest ed.
- [4] Barron's TOEFL iBT, Barron's Educational Series, latest ed.
- [5] Sunita Marshal and C. Muralikrishna, Communication Skills for Engineers, McGraw-Hill Education, latest ed.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Pakistan Studies
Credit Hours	: 2+0=2
Course Code	: Theory (HUM26-130)
Effective	: 2K26-BE(E)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/32
Marks	: Theory (50)
Instructor Name	: Bisharat Lanjwani

DESCRIPTION

Pakistan Studies explores the historical, cultural, political, and social development of Pakistan. It covers the country's creation, key historical events, and the challenges faced in its nation-building process, along with an understanding of its geography, economy, and national identity.

Mapping of SDGs

SDG 5: Gender equality	5.5: Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic, and public life.
SDG 16: Peace, Justice and Strong Institutions	16.3: rule of law at the national and international levels.....

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	DESCRIPTION	Domain	Taxonomy level	PLO	Marks
Theory	1	Recall the knowledge of the basis of the ideology of Pakistan with special reference to the contributions of the founding fathers of Pakistan.	Cognitive	C1	6	25
	2	Justify the guiding principles on rights and responsibilities of Pakistani citizens as enshrined in the Constitution of Pakistan 1973.	Cognitive	C5	7	25

COURSE OUTLINE (THEORY)

Introduction to the Ideology of Pakistan: Definition and significance of ideology, Historical context of the creation of Pakistan (with emphasis on sociopolitical, religious, and cultural dynamics of British India between 1857 till 1947), Contributions of founding fathers of Pakistan in the freedom movement including but not limited to Allama Muhammad Iqbal, Muhammad Ali

Jinnah, among others, Contributions of women and students in the freedom movement for separate homeland for Muslims of British India. Two-Nation Theory: Evolution of the Two-Nation Theory (Urdu-Hindi controversy. Partition of Bengal. Simla Deputation 1906. Allama Iqbal's Presidential Address 1930. Congress Ministries 1937. Lahore Resolution 1940), Role of communalism and religious differences. Introduction to the Constitution of Pakistan: Definition and importance of a constitution, Ideological factors that shaped the Constitution(s) of Pakistan (Objectives Resolution 1949), Overview of constitutional developments in Pakistan. Constitution and State Structure: Structure of Government (executive, legislature, and judiciary), Distribution of powers between federal and provincial governments, 18th Amendment and its impact on federalism. Fundamental Rights, Principles of Policy and Responsibilities: Overview of fundamental rights guaranteed to citizens by the Constitution of Pakistan 1973 (Articles 8-28), Overview of Principles of Policy (Articles 29-40), Responsibilities of the Pakistani citizens (Article 5). Constitutional Amendments: Procedures for amending the Constitution, Notable constitutional amendments and their implications

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Shahid Javed Burki, State & Society in Pakistan, The Macmillan Press Ltd, latest ed.
- [2] S. Akbar Zaidi, Issues in Pakistan's Economy, Oxford University Press, Karachi, latest ed.
- [3] S. M. Burke and Lawrence Ziring, Pakistan's Foreign Policy: An Historical Analysis, Oxford University Press, Karachi, latest ed.
- [4] Safdar Mehmood, Pakistan: Political Roots & Development, Lahore, latest ed.
- [5] Stephen P. Cohen, The Idea of Pakistan, latest ed.
- [6] Javed Iqbal, Ideology of Pakistan, latest ed.
- [7] I. H. Qureshi, The Struggle for Pakistan, latest ed.
- [8] Khalid Bin Sayeed, Pakistan: The Formative Phase, latest ed.
- [9] Safdar Mehmood, Pakistan: Political Roots and Development, latest ed.
- [10] Sharif-ul-Mujahid, Ideology of Pakistan, latest ed.



Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro



Subject Name	: Computer Programming
Credit Hours	: 3+1=4
Course Code	: Theory (CS26-120)
	: Practical (CS26-121)
Effective	: 2K26-BE(E)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100)
	: Practical (50)
Instructor Name	: Engr. Safiullah

DESCRIPTION

Computer Programming introduces students to the fundamentals of writing code to solve problems using programming languages. The course covers key concepts such as algorithms, data structures, control structures, and debugging, focusing on building problem-solving skills through practical coding exercises.

Mapping of SDGs

SDG 4: Quality education	4.4: ... substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Explain fundamental programming concepts, algorithms, data types, control structures, functions, arrays, file handling, and basic object-oriented concepts.	Cognitive	C2	1	40
	2	Apply structured and object-oriented programming techniques to design, implement, test, and debug solutions to engineering problems.	Cognitive	C3	3	60

LABORTORY LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Develop and debug programs under guidance using control structures, functions, arrays, files, classes, and objects.	Psychomotor	P3	5	50

COURSE OUTLINE (THEORY)

Introduction to problem solving and the Von Neumann architecture; algorithms and flowcharts; compilers and linkers; variables, data types, operators, and input/output; selection and repetition structures; functions and modular programming; arrays and strings; pointers/references and memory management; structures, classes, and objects; inheritance and polymorphism; exception handling; file input/output; recursion; basic searching and sorting; software testing and debugging.

COURSE OUTLINE (PRACTICAL)

Programming exercises covering input/output, selection, loops, functions, arrays, strings, pointers/references, classes and objects, inheritance, exception handling, file handling, searching and sorting, debugging, and a small semester project.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Tony Gaddis, Starting Out with Python, Pearson Education, latest ed.
- [2] Tony Gaddis, Starting Out with Programming Logic & Design, Pearson Education, latest ed.
- [3] Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall, latest ed.
- [4] Robert Lafore, Object-Oriented Programming in C++, Sams Publishing, latest ed.
- [5] John Guttag, Introduction to Computation and Programming Using Python: With Application to Understanding Data, MIT Press, latest ed.
- [6] William Punch and Richard Enbody, The Practice of Computing Using Python, McGraw-Hill Education, latest ed.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Electronic Devices and Circuits
Credit Hours	: 3+1=4
Course Code	: Theory (EE26-122) Practical (EE26-123)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100) Practical (50)
Instructor Name	: Engr. Dr. Mudasir Ahmed Memon

DESCRIPTION

This course introduces the fundamental principles of electronic devices such as diodes, transistors, and operational amplifiers. It focuses on the analysis and design of basic analog circuits, laying the foundation for advanced studies in electronics and circuit design.

Mapping of SDGs

SDG 9: Industry, Innovation and Infrastructure	9.4: greater adoption of clean and environmentally sound technologies and industrial processes.....
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Explain the basic construction, operation and characteristics of semiconductor devices.	Cognitive	C2	1	40
	2	Apply the acquired knowledge to illustrate the dc and ac response of semiconductor devices-based small-scale circuits.	Cognitive	C3	4	60

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Assemble and test semiconductor-device circuits under guidance, record measurements, and compare the results with theoretical behavior.	Psychomotor	P3	8	50

COURSE OUTLINE (THEORY)

Semiconductor Theory: Introduction to Semiconductors. Intrinsic and Extrinsic Semiconductors. Doping and energy levels. Diodes' junction/ Biased PN junction, V-I Characteristics, Load Line and dynamic resistance. Diode models. Reverse recovery time and temperature effects. Diode Equivalent Circuits Transitions, Recovery, Specification, Notations Testing of Diode Zener Diode, Light Emitting Diodes. Diode Applications, Load Line Analysis, Parallel and Series Configurations, Zener Diodes. Voltage-Multiplier Circuits, Half wave and Full wave rectifiers. Clippers and Clampers. Logic gates. Bipolar Junction Transistors: Construction. Limits of Operation. Specification and characteristics. Testing, Casing and Terminal Identification of BJTs, Amplifying action and variation in current gain. Common Emitter. Common Collector and Common Base Configurations. Power Ratings' Biasing Circuits, Fixed Bias. Voltage Divider Bias and Emitter feedback Bias Circuits, DC load line and operating point, Biasing circuit design and stabilization, Miscellaneous Configurations, Transistor as a switch Small Signal Analysis Domain and BJT Modeling, Common Emitter Amplifier, Common Base Amplifier, Common Collector Amplifier, Amplifier Design and Loading effects, Two Port Systems and Cascaded Systems, Darlington and feedback Pair, Hybrid Equivalent Model and Hybrid π Model Field Effect Transistors' Construction and Operation, Transfer characteristics and parameters Biasing Circuits, Fixed Bias, Self-Bias and Voltage divider Bias Design of a bias circuit FET Small Signal Analysis JFET Depletion MOSFET small-signal model Common source, common drain and common gate amplifiers, Loading effects and design of amplifier circuits.

COURSE OUTLINE (PRACTICAL)

The emphasis is first on understanding the characteristics of basic circuits that use resistors, capacitors, diodes, bipolar junction transistors and field-effect transistors. The students then use this understanding to design and construct more complex circuits such as rectifiers, amplifiers and power supplies.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Theodore F. Bogart Jr., Electronic Devices and Circuits, Pearson Education, latest ed.
- [2] Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, Pearson Education, ISBN: 0135026490.
- [3] Thomas L. Floyd, Electronic Devices, Pearson Education, latest ed.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Understanding of Holy Quran-I (Lab)
Credit Hours	: 0+1
Course Code	: Lab (HUM26-131)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/16
Marks	: Lab (50)
Instructor Name	: Mr. Muzammil Ahmed Ansari

DESCRIPTION

Fehm-e-Quran-I introduces students to understanding the Qur'an by learning its basic vocabulary, themes, and messages, enabling them to comprehend selected Qur'anic verses meaningfully.

Mapping of SDGs

SDG 10: Reduced inequalities	10.2: empower and promote the social, economic inclusion of all.....
SDG 16: Peace, Justice and Strong Institutions	16.3: rule of law at the national and international levels.....

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Practice the correct pronunciation and articulation of Arabic letters under the guidance of the instructor.	Psychomotor	P2	10	15
	2	Recite selected Quranic verses and short Surahs with correct pronunciation and basic Tajweed rules	Psychomotor	P3	10	25
	3	Demonstrate the correct application of Noon Sakinah, Tanween, Meem Sakeenah, Madd, and Qalqalah during Quranic recitation.	Psychomotor	P3	10	10

COURSE OUTLINE (PRACTICAL)

Orientation to laboratory recitation practice and identification of Arabic letters; guided practice of Makharij al-Huruf and essential pronunciation characteristics; recognition and application of basic Tajweed rules; Noon Sakinah and Tanween rules; Meem Sakinah rules; Madd and its basic types; Qalqalah; guided recitation of selected short Surahs and Qur'anic verses; correction of common pronunciation errors; individual and group recitation practice; instructor-observed performance and formative recitation assessment.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Ubaid ur Rahman, Muallim-ul-Qurān (Volumes 1–3), latest ed.
- [2] Muhammad Asad, The Message of the Qur'ān, Dar al-Andalus, ISBN: 9781873478000.
- [3] M. A. Draz, The Qur'anic Phenomenon – Exegesis of The Qur'an in the Modern Age, ISBN: 9789953513662.
- [4] Fazlur Rahman, Major Themes of the Qur'ān, University of Chicago Press, ISBN: 9780226776286.
- [5] Sayyid Qutb, In the Shade of the Qur'ān, ISBN: 9781870838180.
- [6] Muhammad Tahir-ul-Qadri, Tafhīm al-Qur'ān, Minhaj ul Qur'ān International, latest ed.
- [7] Abdullah Yusuf Ali, The Holy Qur'ān: Text, Translation and Commentary, ISBN: 9788184951012.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: History-I (Alternative)
Credit Hours	: 1+0=1
Course Code	: Theory (HUMH26-131)
Effective	: 2K26-BE(E)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/16
Marks	: Theory (50)
Instructor Name	: Mr. Waheed Chandio

DESCRIPTION

This course introduces students to the nature, scope, sources, and methods of historical study. It examines the emergence and development of early human societies and major ancient civilizations. Emphasis is placed on their political institutions, social structures, cultural traditions, scientific developments, technological achievements, and contributions to contemporary civilization.

Mapping of SDGs

SDG 4: Quality education	4.7:, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including global citizenship and appreciation of cultural diversity. The course develops historical understanding, critical thinking, and awareness of human civilization.
SDG 11: Sustainable Cities and Communities	11.4: Strengthen efforts to protect and safeguard the world's cultural and natural heritage. The course promotes appreciation and preservation of ancient civilizations, historical monuments, and cultural heritage.

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Describe the nature, scope, sources, and methods of historical study and identify the emergence of early human societies and ancient civilizations.	Cognitive	C2	10	15

	2	Explain the political institutions, social structures, cultural traditions, scientific developments, and technological achievements of major ancient civilizations.	Cognitive	C2	10	25
	3	Demonstrate an understanding of the contributions of ancient civilizations to contemporary society through historical analysis and interpretation.	Cognitive	C3	10	10

COURSE OUTLINE (THEORY)

Nature and scope of history; meaning and importance of historical knowledge; primary and secondary historical sources; chronology and periodization; archaeological and documentary evidence; development of early human societies; transition from hunting and gathering to settled agricultural communities; Mesopotamian civilization; ancient Egyptian civilization; Indus Valley civilization; ancient Chinese civilization; Persian civilization; Greek civilization; Roman civilization; Gandhara civilization; political and administrative systems of ancient societies; development of law, writing, education, architecture, art, science, engineering, agriculture, and trade; major religious and philosophical traditions; decline and transformation of ancient civilizations; preservation of historical monuments and cultural heritage; relevance of ancient civilizations to contemporary society.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] B. G. Trigger, Understanding Early Civilizations: A Comparative Study. Cambridge, U.K.: Cambridge University Press, 2003.
- [2] I. Shaw, Ed., The Oxford History of Ancient Egypt. Oxford, U.K.: Oxford University Press, 2000.
- [3] J. M. Kenoyer, Ancient Cities of the Indus Valley Civilization, 1st ed. Karachi, Pakistan: Oxford University Press, and Islamabad, Pakistan: American Institute of Pakistan Studies, 1998.
- [4] M. Van De Mieroop, A History of the Ancient Near East, ca. 3000–323 BC, 4th ed. Hoboken, NJ, USA: Wiley-Blackwell, 2024.
- [5] J. M. Roberts and O. A. Westad, The Penguin History of the World, 6th ed. London, U.K.: Penguin Books, 2013.

Second Year - Third Semester



Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro



Subject Name	: Complex Variables and Transforms
Credit Hours	: 3+0=3
Course Code	: Theory (NS26-216)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48
Marks	: Theory (100)
Instructor Name	: Dr. Shahnawaz Shah

DESCRIPTION

This subject explores the properties and behavior of complex numbers and functions of a complex variable, extending concepts from real analysis to the complex plane.

SDG 4: Quality education	4.4: substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Identify the complex number, complex functions, and fundamental theorems of complex valued functions	Cognitive	C1	1	30
	2	Understand the concept of the calculus for the complex valued functions and the properties of various transforms.	Cognitive	C2	1	30
	3	Apply the computational and conceptual principles of various transforms for solving problems in engineering and sciences.	Cognitive	C3	2	40

COURSE OUTLINE (THEORY)

Introduction to complex number systems, Arganda's diagram, modulus and argument of a complex number, polar form of a complex number, De Moivre's theorem and its applications, complex functions, analytical functions, harmonic and conjugate, harmonic functions, Cauchy-Riemann equations, line integrals, Green's theorem, Cauchy's theorem, Cauchy's integral formula, singularities, poles, residues, contour integration and applications; Laplace transform definition, Laplace transforms of elementary functions, properties of Laplace transform, periodic functions and their Laplace transforms, inverse Laplace transform and its properties, convolution theorem, inverse Laplace transform by integral and partial fraction methods, Heaviside expansion formula, solutions of ordinary differential equations by Laplace transform, applications of Laplace transforms; series solution of differential equations, validity of series solution, ordinary point, singular point, Forbenius method, indicial equation, Bessel's differential equation, its solution of first kind and recurrence formulae, Legendre differential equation and its solution, Rodrigues formula; Fourier transform definition, Fourier transforms of simple functions, magnitude and phase spectra, Fourier transform theorems, inverse Fourier transform, solutions of differential equations using Fourier transform.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, ISBN: 0470458364.
- [2] G. Stephenson and R. K. Nagle, Advanced Engineering Mathematics, Prentice Hall, ISBN: 9780130473940.
- [3] Dennis G. Zill and Michael R. Cullen, Advanced Engineering Mathematics with Modeling Applications, CCengage Learning, ISBN: 9780357760192.
- [4] H. K. Dass, Advanced Engineering Mathematics, S. Chand Publishing, ISBN: 9788121926291.
- [5] K. A. Stroud and Dexter J. Booth, Engineering Mathematics, Palgrave Macmillan, ISBN: 9780230275489.
- [6] B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Education, ISBN: 9780070589468.
- [7] Peter V. O'Neil, Advanced Engineering Mathematics, CCengage Learning, ISBN: 9781285463247.



Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro



Subject Name	: Occupational Health and Safety
Credit Hours	: 1+0=1
Course Code	: Theory (MDE26-220)
Effective	: 2K26-BE(E)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/16
Marks	: Theory (50)
Instructor Name	: Engr. Umair Ali Abro

DESCRIPTION

Occupational Health and Safety (OHS) is a crucial discipline focused on ensuring the safety, health, and welfare of people engaged in work or employment. This course introduces students to workplace hazards, safety regulations, risk management strategies, and health promotion in various industrial and engineering settings. Students will learn to identify potential risks, implement preventative strategies, and comply with safety standards. The course empowers future engineers to design safer systems and promote a culture of safety within organizations.

SDG 3: Good Health and Well-being	3.9: substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.
SDG13. Climate Action	13.1: Strengthen resilience and adaptive capacity to climate related hazards and natural disasters.....

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Explain the principles, importance, and legal requirements of occupational health and safety in engineering environments.	Cognitive	C2	2	30
	2	Discover and assess workplace hazards and recommend appropriate risk control measures.	Cognitive	C4	4	20

COURSE OUTLINE (THEORY)

Introduction to Occupational Health and Safety, Health and Safety Legislation, Hazard Identification and Risk Assessment, Safety Management Systems (SMS), Occupational Health,

Fire and Electrical Safety, Construction and Industrial Safety, Safety Culture and Human Behavior, Environmental and Psychological Aspects, Case Studies and Practical Applications. Hazards and Risk and types of hazards: Physical (mechanical and non-mechanical), Chemical (Toxic and biological agents), electrical, fire, construction, heat and temperature, noise and vibration, falling and lifting etc.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Jeremy Stranks, The A-Z of Health and Safety, Routledge, latest ed.
- [2] Jeremy Stranks, The Manager's Guide to Health & Safety at Work, Routledge, latest ed.
- [3] Ogletree, Deakins, Nash, Smoak, and Stewarts, Occupational Safety and Health Law Handbook, latest ed.



Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro



Subject Name	: Digital Logic Design
Credit Hours	: 3+1=4
Course Code	: Theory (EE26-210)
	: Practical (EE26-211)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100)
	: Practical (50)
Instructor Name	: Mr. Waseem Javed Soomro

DESCRIPTION

Digital Logic Design is the study of how electronic systems process binary information (0s and 1s) using logic gates and circuits. It forms the foundation of digital electronics, including computers and communication systems. Binary number systems, Logic gates (AND, OR, NOT, etc.), Boolean algebra, Combinational and sequential circuits

Mapping of SDGs

SDG 9: Industry, Innovation, and Infrastructure:	9.c: significantly increase access to information and communications technology.....
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	DESCRIPTION	Domain	Taxonomy level	PLO	Marks
Theory	1	Define fundamentals and underlying principles of digital design	Cognitive	C1	1	10
	2	Solve the number systems and logic conversion and gate level minimization using K-map and combinational logic by employing analysis and design procedure.	Cognitive	C3	2	60
	3	Differentiate between various combinational and sequential logic circuits based on their functionality and applications in digital systems	Cognitive	C3	3	30

LABORTORY LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	DESCRIPTION	Domain	Taxonomy level	PLO	Marks
Practical	1	Demonstrate small-scale logic circuits (basic, combinational, Sequential, Digital circuit) for desired output.	Psychomotor	P4	4	50

COURSE OUTLINE (THEORY)

Binary Systems, Boolean Algebra & Logic Gates, Combinational Logic, Sequential Circuits, Registers & Counters, Introduction to Arithmetic Logic Units.

COURSE OUTLINE (PRACTICAL)

Basic logic gates; Verilog simulation and hardware implementation of combinational circuits such as MUX/DEMUX, encoder/decoder, arithmetic logic unit (ALU); Verilog simulation and hardware implementation of sequential circuits such as flip-flops, registers, shift registers, counters; implementation of logic circuits using SPLDs; project solving a real-life problem.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] M. Morris Mano and Charles Kime, Logic and Computer Design Fundamentals, Prentice Hall, ISBN: 013198926X.
- [2] Thomas L. Floyd, Digital Fundamentals, Prentice Hall, ISBN: 0132359235.
- [3] Roger Tokheim, Digital Electronics: Principles and Applications, Student Text with MultiSIM CD-ROM, Career Education, ISBN: 0078309816.
- [4] William Kleitz, Digital Electronics: A Practical Approach with VHDL, Pearson, ISBN: 0132543036.
- [5] M. Morris Mano and Michael D. Ciletti, Digital Design with an Introduction to the Verilog HDL, Prentice Hall, latest ed.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Data Structures and Algorithms
Credit Hours	: 3+1=4
Course Code	: Theory (CS26-212) Practical (CS26-213)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100) Practical (50)
Instructor Name	: Engr. Mirza Altamash Baig

DESCRIPTION

Data Structures and Algorithms (DSA) are essential for writing efficient programs.

1. Data Structures organize data (e.g., arrays, stacks, trees).
2. Algorithms are step-by-step methods to solve problems (e.g., sorting, searching).
3. Mastering DSA improves performance and problem-solving in computing.

Mapping of SDGs

SDG 8: Decent Work and Economic Growth	8.3: decent job creation, entrepreneurship.....
SDG 9: Industry, Innovation, and Infrastructure:	9.b: Support domestic technology development, research and innovation in developing countries.....

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Explain fundamental data structures and algorithm design principles.	Cognitive	C2	1	50
	2	Analyze various data structures such as arrays, stacks, queues, linked lists, trees, and graphs.	Cognitive	C4	3	30

	3	Apply algorithmic strategies like recursion, divide-and-conquer, dynamic programming, and greedy methods to solve computational problems.	Cognitive	C3	2	20
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LABORTORY LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Practice the implementation of fundamental data structures and algorithms under guidance and manipulating them to solve computational problems and testing their efficiency through hands-on exercises and experiments.	Psychomotor	P3	4	50

COURSE OUTLINE (THEORY)

Overview of data structures and algorithms, Basic concepts of complexity analysis, Recursion and divide-and-conquer strategies, sorting algorithms including merge sort, quick sort, heap sort, and radix sort, Search techniques including linear and binary search. Hashing (open addressing, chaining), Tree structures (binary trees, heaps, M-way and balanced trees), Graph algorithms for traversal, shortest path, and topological sorting using adjacency structures. Dynamic Programming (tabulation and memorization), Greedy algorithms for optimization problems, Memory management and garbage collection concepts

COURSE OUTLINE (PRACTICAL)

Introduction to Programming Environment, Arrays and Strings, Linked Lists, Stacks, Queues, Recursion, Searching Algorithms, Sorting Algorithms, Hashing, Trees, Heaps and Priority Queues, Graphs, Dynamic Programming & Greedy Algorithms

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Adam Drozdek, Data Structures and Algorithms in C++, Cengage Learning, latest ed.
- [2] Mark A. Weiss, Data Structures and Algorithm Analysis in Java, Pearson Education, latest ed.
- [3] Frank M. Carrano and Timothy M. Henry, Data Structures and Abstractions with Java, Pearson Education, latest ed.
- [4] Mark Allen Weiss, Data Structures and Algorithm Analysis in C, Pearson Education, latest ed.



Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro



Subject Name	: Electrical Network Analysis
Credit Hours	: 3+1=4
Course Code	: Theory (EE26-214)
	: Practical (EE26-215)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100)
	: Practical (50)
Instructor Name	: Mr. Waseem Javed Soomro

DESCRIPTION

Electrical Network Analysis involves the study of electric circuits using mathematical tools and techniques. It covers circuit laws, network theorems, AC/DC analysis, and transient behavior, helping engineers design and analyze real-world electrical systems.

Mapping of SDGs

SDG 9: Industry, Innovation, and Infrastructure	9.4: greater adoption of clean and environmentally sound technologies and industrial processes.....
SDG 4: Quality education	4.4: substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Analyze the effect of power transfer, power dissipation and power factor on power transmission	Cognitive	C4	1	50
	2	Apply transform techniques to analyze circuits in time domain and S-domain, and analyze RLC circuits while differentiating between transient and steady-state responses	Cognitive	C3	2	50

LABORTORY LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Achieve Time domain, Phasor and Frequency domain response of second order circuits	Psychomotor	P2	3	50

COURSE OUTLINE (THEORY)

Integra-differential equations of circuits; transient analysis; source-free series and parallel RLC circuits; complete response of RLC circuit; resonance; lossless LC circuit; complex forcing functions; phase relationships for R, L and C; impedance and admittance; sinusoidal steady-state response; quality factor; power factor and power factor improvement; complex frequency; three-phase balanced and unbalanced circuits; three-phase source-load connections; power relationships; magnetically-coupled circuits (mutual inductance, energy considerations, ideal transformers); variable frequency network performance; variable frequency response analysis; sinusoidal frequency analysis; Analysis of Circuits using Laplace Transform and Bode Plot; Analysis of Circuits using Fourier Series; resonant circuits and filter circuits; general two-port networks; impedance and admittance parameters; transmission parameters; hybrid parameters; and interconnection of two port networks.

COURSE OUTLINE (PRACTICAL)

Basic RL and RC circuits, RLC circuit, sinusoidal steady-state analysis, AC power circuit analysis, poly phase circuits, frequency-domain analysis and Bode plots, network analysis in the s-domain, mutual inductance and transformers, two-port networks, circuit analysis techniques using software packages such as PSPICE, Electronic Workbench, Multi-Sim, and Lab View.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] W. H. Hayt and J. E. Kemmerly, Engineering Circuit Analysis, McGraw-Hill Education, latest ed.
- [2] Robert L. Boylestad, Introductory Circuit Analysis, Pearson Education, latest ed.
- [3] S. Franco, Electric Circuits Fundamentals, Oxford University Press, latest ed.
- [4] V. V. Burg, Network Analysis, latest ed.
- [5] J. D. Irwin and R. M. Nelms, Basic Engineering Circuit Analysis, Wiley, latest ed.



Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro



Subject Name	: Civics and Community Engagement
Credit Hours	: 2+0
Course Code	: Theory (HUM26-218)
Effective	: 2K26-BE(E)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/32
Marks	: Theory (50)
Instructor Name	: Dr. Niaz Bhutto

DESCRIPTION

This course is designed to provide students with a deep understanding of Civics and community engagement. The course will explore the foundations of civic life, including the principles of democracy, the role of the government, and the responsibilities of citizenship. Additionally, the course will provide students with an opportunity to develop skills in community engagement, including community organizing, advocacy, and social justice.

Mapping of SDGs

SDG 3: Good health and well-being	3.d: Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks.
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Apply skills in community engagement, including community organizing, advocacy, and social justice, with an emphasis on gender sensitivity, inclusivity, and equitable participation of all genders in community processes.	Cognitive	C3	8	10
	2	Analyze the role of community organizations and civic institutions in promoting civic responsibility, including their approaches to gender equity, women's empowerment, and gender-responsive governance.	Cognitive	C4	7	25

	3	Analyze non-profit and community-based organizations and evaluate their role in community engagement, focusing on gender-sensitive policies, inclusive program design, and the promotion of social justice across diverse gender groups.	Cognitive	C5	11	15
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COURSE OUTLINE (THEORY)

Introduction to Civics and Citizenship, definition of civics, citizenship, and civic engagement, Historical evolution of civic participation, Types of citizenship: active, participatory, digital, etc., The relationship between democracy and citizenship, Civics and Citizenship, Concepts of civics, citizenship, and civic engagement, Foundations of modern society and citizenship, Types of citizenship: active, participatory, digital, etc, State, government and Civil Society, Structure and functions of government in Pakistan, The relationship between democracy and civil society, Right to vote and importance of political participation and representation, Right and Responsibilities, Overview of fundamental rights and liberties of citizens under Constitution of Pakistan 1973, Civic responsibilities and duties, Ethical considerations in civic engagement (accountability, non-violence, peaceful dialogue, civility, etc.), Community Engagement, Concept, nature and characteristics of community, Community development and social cohesion, Approaches to effective community engagement, Case studies of successful community driven initiatives, Advocacy and Activism, Public discourse and public opinion, Role of advocacy in addressing social issues, Social action movements, Digital Citizenship and Technology, The use of digital platforms for civic engagement, Cyber ethics and responsible use of social media, Digital divides and responsible (access, usage, socioeconomic, geographic, etc.) and their impacts on citizenship, Diversity, Inclusion and Social Justice, Understanding diversity in society (ethnic, cultural, economic, political etc.), Youth, women and minorities' engagement in social development., Addressing social inequalities and injustices in Pakistan, Promoting inclusive citizenship and equal rights for societal harmony and peaceful coexistence.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] McGraw-Hill Education, Civics Today: Citizenship, Economics & You, latest ed.
- [2] Joan Kloppenburg, Community Organizing: Theory and Practice, latest ed.
- [3] James Q. Wilson and John J. DiIulio Jr., American Government: Institutions and Policies, CCengage Learning, ISBN: 9780357136246.
- [4] Robert A. Dahl, Democracy and Its Critics, Yale University Press, ISBN: 9780300053997.
- [5] Alexis de Tocqueville, Democracy in America, University of Chicago Press, ISBN: 9780226100446.
- [6] David Easton, A Systems Analysis of Political Life, Wiley, ISBN: 9780471538648.
- [7] Sidney Verba, Voice and Equality: Civic Voluntarism in American Politics, Harvard University Press, ISBN: 9780674078420.
- [8] John J. Macionis and Linda Marie Gerber, Sociology, Pearson Education, ISBN: 9780134444616.



Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro



Subject Name : Understanding of Holy Quran-II (Lab)
Credit Hours : 0+1=1
Course Code : Lab (HUM26-221)
Effective : 2K26-BE(EE)
Pre-Requisites : Nil
Weeks/Lectures/Labs : 16/16
Marks : Lab (50)
Instructor Name : Mr. Muzammil Ahmed Ansari

DESCRIPTION

This course focuses on deeper understanding of selected Qur'anic passages through advanced vocabulary, themes, and practical application of Qur'anic guidance in contemporary life.

Mapping of SDGs

SDG 10: Reduced inequalities	10.2: ... empower and promote the social, economic inclusion of all....."
SDG 16: Peace, Justice and Strong Institutions	16.3: ... rule of law at the national and international levels....."

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Recite selected Quranic passages fluently by applying appropriate pronunciation and Tajweed rules.	Psychomotor	P3	10	25
	2	Coordinate Tajweed, Makharij, Wakf, and ibtida rules while reciting selected Quranic passages.	Psychomotor	P4	10	15
	3	Perform independent Quranic recitation with fluency, correct pauses, continuity and minimal instructor assistance	Psychomotor	P4	10	10

COURSE OUTLINE (PRACTICAL)

Review and consolidation of Makharij and essential Tajweed rules; coordinated application of Noon Sakinah, Tanween, Meem Sakinah, Madd, Qalqalah, and relevant pronunciation characteristics; rules of Waqf and Ibtida; maintaining continuity, rhythm, and fluency during recitation; guided recitation of selected Qur'anic passages; independent recitation practice with progressively reduced instructor assistance; identification and correction of recitation errors; individual performance, peer-supported practice, and final practical recitation assessment.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Ubaid-ur-Rahman, Mu'allim-ul-Qur'ān (Volumes II & III), latest ed.
- [2] The Holy Qur'an (Arabic Text), latest ed.
- [3] Abdul Kareem Parekh, Qur'ānic Arabic: A Reader, latest ed.
- [4] V. Abdur Rahim, Easy Qur'ānic Arabic Grammar, latest ed.



Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro



Subject Name : **History-II (Alternative)**
Credit Hours : 1+0=1
Course Code : Theory (HUMH26-221)
Effective : 2K26-BE(E)
Pre-Requisites : Nil
Weeks/Lectures/Labs : 16/16
Marks : Theory (50)
Instructor Name : Mr. Waheed Chandio

DESCRIPTION

This course examines major historical developments from the medieval period to the modern era. It explores the development of Muslim civilization, European intellectual and industrial transformations, colonial expansion, political and social reform movements, nationalism in South Asia, the Pakistan Movement, decolonization, and major developments that shaped the contemporary world.

Mapping of SDGs

SDG 4: Quality education	4.7: Promotes historical knowledge, critical thinking, global citizenship, and appreciation of cultural diversity through the study of modern historical developments.
SDG 16: Peace, Justice and Strong Institutions	16.7: Enhances understanding of governance, democratic institutions, justice, political reforms, nationalism, and responsible citizenship through historical analysis.
SDG 10: Reduced Inequalities	10.2: Empower and promote the social, economic, and political inclusion of all. The course examines colonialism, decolonization, reform movements, and struggles for equality and national self-determination.

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Explain the major historical developments from the medieval period to the modern era, including the emergence of Muslim civilization and significant global transformations.	Cognitive	C2	10	25

	2	Analyze the causes and impacts of colonial expansion, political and social reform movements, nationalism in South Asia, and the Pakistan Movement.	Cognitive	C4	10	15
	3	Evaluate the significance of decolonization and major historical events in shaping the contemporary world using historical evidence and critical reasoning.	Cognitive	C5	10	10

COURSE OUTLINE (THEORY)

Major medieval civilizations; development and expansion of Muslim civilization; administrative, educational, cultural, scientific, medical, mathematical, architectural, and technological contributions of Muslim scholars; interaction among civilizations; Renaissance and humanism; Reformation; Scientific Revolution; Enlightenment; political revolutions in Europe and America; Industrial Revolution and its social, economic, environmental, and technological effects; rise of imperialism and colonialism; British expansion in South Asia; political, educational, religious, and social reform movements in the subcontinent; War of Independence 1857; development of Muslim political consciousness; Sir Syed Ahmad Khan and the Aligarh Movement; Allama Muhammad Iqbal; Quaid-e-Azam Muhammad Ali Jinnah; Two-Nation Theory; major events of the Pakistan Movement; creation of Pakistan; decolonization; Cold War; globalization; technological change; human rights movements; historical roots of contemporary political, cultural, and social challenges.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] C. A. Bayly, The Birth of the Modern World, 1780–1914: Global Connections and Comparisons. Malden, MA, USA: Blackwell Publishing, 2003.
- [2] B. G. Smith, M. Van De Mierop, R. von Glahn, and K. E. Lane, World in the Making: A Global History, Volume Two: Since 1300, 2nd ed. New York, NY, USA: Oxford University Press, 2022.
- [3] A. Jalal, The Sole Spokesman: Jinnah, the Muslim League and the Demand for Pakistan. Cambridge, U.K.: Cambridge University Press, 1985.
- [4] S. A. Wolpert, Jinnah of Pakistan. New York, NY, USA: Oxford University Press, 1984.
- [5] I. Talbot, Pakistan: A Modern History. London, U.K.: C. Hurst & Co., 1998

Second Year - Fourth Semester



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Probability and Statistics for Engineers
Credit Hours	: 2+0=2
Course Code	: Theory (EE26-226)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/32
Marks	: Theory (50)
Instructor Name	: Engr. Fozia Hajano

DESCRIPTION

This course provides an introduction to probability theory and statistical methods, with a focus on applications in engineering. Students will learn the fundamental concepts of probability, random variables, probability distributions, and statistical inference. The course emphasizes the practical application of statistical techniques to solve engineering problems, including the analysis of data, estimation of parameters, hypothesis testing, and regression analysis. Students will also gain experience with statistical software to analyze and interpret data from real-world engineering contexts. By the end of the course, students will be equipped with the tools necessary to make informed decisions based on uncertainty and variability in engineering systems.

Mapping of SDGs

SDG 4: Quality education	4.4: substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
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COURSE LEARNING OUTCOMES (THEORY)

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Define basic probability concepts and their use in different problems.	Cognitive	C1	1	20
	2	Apply basic statistical techniques such as regression and curve. fitting to engineering data.	Cognitive	C3	2	10
	3	Analyze different types of random variables to solve problems in science and engineering	Cognitive	C4	4	20

COURSE OUTLINE (THEORY)

Basic Statistical Parameters and Data Representation, Set theory, basic concepts of probability, conditional probability, independent events, Bayes' formula, discrete and continuous random variables, distributions and density functions, probability distributions (binomial, Poisson, Hypergeometric, Gaussian, uniform and exponential) functions, mean, variance, standard deviations, moments and moment generating functions, linear regression and curve fitting, limits theorems, stochastic processes, first and second order characteristics, applications. Measure of Central Pendency and Dispersion, • Error Functions and Q-Functions, finding probabilities of a normally distributed random variable by using Standard Normal Curve.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Alberto Leon-Garcia, Probability, Statistics and Random Processes for Electrical Engineering, Pearson Education, latest ed.
- [2] Roy D. Yates and David J. Goodman, Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers, John Wiley & Sons, latest ed.
- [3] Athanasios Papoulis and S. Unnikrishna Pillai, Probability, Random Variables and Stochastic Processes, McGraw-Hill Education, latest ed.
- [4] M. Anwar Solangi, Statistical Methods and Estimations, latest ed.
- [5] Douglas C. Montgomery, Applied Statistics and Probability for Engineering, Wiley, latest ed.
- [6] Sheldon Ross, A First Course in Probability, Prentice Hall, latest ed.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Engineering Mechanics
Credit Hours	: 2+0=2
Course Code	: Theory (MDE26-228)
Effective	: 2K26-BE(E)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/32
Marks	: Theory (50)
Instructor Name	: Engr. Dr Aamir Hussain Memon

DESCRIPTION:

This course introduces the fundamental principles of mechanics as they apply to the analysis of static and dynamic systems in engineering. Topics include the study of forces, moments, equilibrium, and motion of rigid bodies. Students will explore key concepts such as Newton's Laws of Motion, work and energy, and the principles of rigid body dynamics. The course also covers topics such as trusses, beams, friction, and kinematics of particles. Through problem-solving and real-world applications, students will develop the ability to model and analyze the mechanical behavior of structures and systems, preparing them for advanced studies in various engineering disciplines.

Mapping of SDGs

SDG 9: Industry innovation	9.5: encouraging innovation and substantially increasing the number of research and development workers.....
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Describe the principles of statics and dynamics to solve engineering problems involving forces, moments, and motion of rigid bodies.	Cognitive	C2	1	25
	2	Demonstrate an understanding of the forces, equilibrium, and motion in mechanical systems, allowing them to explain the underlying concepts and mechanisms.	Cognitive	C2	2	25

COURSE OUTLINE (THEORY)

Introduction: Definitions and scope of Applied Mechanics, Concept of Rigid and Deformed

Bodies Fundamental concepts and principles of mechanics: Newtonian Mechanics Basic Concept in Statics and Static Equilibrium. Concept of Particles and Free Body Diagram Physical meaning of Equilibrium and its essence in structural application, Equation of Equilibrium in Two Dimension, Forces acting on particle and rigid body. Different types of Forces: Point. Surface Traction and Body Forces - Translational Force and Rotational Force: Relevant Examples, Resolution and Composition of Forces: Relevant Examples, Principle of Transmissibility and Equivalent Forces: Relevant Examples, Moments and couples: Relevant Examples, Resolution of a Force into Forces and a Couple: Relevant Example, Resultant of Force and Moment for a System of Force: Example, Center of Gravity, Centroid and .Moment of Inertia, Concepts and Calculation of Centre of Gravity and Centroid: Examples, Calculation of Second Moment of Area / Moment of Inertia and Radius of Gyration and Relevant usages, Use of Parallel axis Theorem: Relevant Examples. Friction Laws of Friction. Static and Dynamic Coefficient of Friction. Angle of Friction: Engineering Examples of usage of friction, Calculations involving friction in structures: Example as High-Tension Friction Grip bolts and its free body diagram, Analysis of Beams and Frames, Introduction to Structures: Discrete and Continuum, Concept of Load Estimating and Support Idealizations: Examples and Standard symbols, Use of beams¹ frames in engineering: Concept of rigid joints 'distribute loads in beams, frames. Concept of Statically/Cinematically Determinate and Indeterminate Beams and Frames: Relevant Examples, Calculation of Axial Force, Shear Force and Bending Moment for Determinate Beams and Frames, Axial Force. Shear Force and Bending Moment Diagrams and Examples for drawing it Analysis of Plane Trusses. Use of trusses in engineering: Concept of pin joints joint loads in trusses. Calculation of Member Forces of Truss by method of joints: Simple Examples. Calculation of Member Forces of Truss by method of sections: Simple Examples. Kinematics of Particles and Rigid Body. Rectilinear Kinematics: Continuous Motion. Position. Velocity and Acceleration of a Particle and Rigid Body. Determination of Motion of Particle and Rigid Body. Uniform Rectilinear Motion of Particles. Uniformly Accelerated Rectilinear Motion of Particles. Curvilinear Motion: Rectangular Components with Examples of Particles. Kinetics of Particles and Rigid Body! Force and Acceleration. Newton's Second Law of Motion and momentum. Equation of Motion and Dynamic Equilibrium: Relevant Examples. Angular Momentum and Rate of Change. Equation of Motion-Rectilinear and Curvilinear. Rectangular: Tangential and Normal Components and Polar Coordinates: Radial and Transverse Components

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] E. R. Beer and E. R. Johnston Jr., Mechanics of Engineers: Statics and Dynamics, McGraw-Hill Education, latest ed.
- [2] R. C. Hibbeler and Ashok Gupta, Engineering Mechanics: Statics and Dynamics, Pearson Education, latest ed.
- [3] L. C. Jong and B. G. Rogers, Engineering Mechanics: Statics and Dynamics, latest ed.
- [4] D. K. Anand and P. F. Cunniff, Engineering Mechanics: Statics and Dynamics, latest ed.
- [5] R. S. Khurmi, A Textbook of Engineering Mechanics, latest ed.
- [6] R. S. Khurmi, Applied Mechanics and Strength of Materials, latest ed.
- [7] I. B. Prasad, A Textbook of Applied Mechanics, latest ed.



Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro



Subject Name	: Electromagnetic Field Theory
Credit Hours	: 2+0=2
Course Code	: Theory (EE26-230)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/32
Marks	: Theory (50)
Instructor Name	: Dr. Shahnawaz Shah

DESCRIPTION

This course provides a comprehensive introduction to the fundamental principles of electromagnetic field theory, focusing on the behavior of electric and magnetic fields in static and dynamic conditions. Topics include electrostatics, magnetostatics, Maxwell's equations, electromagnetic waves, and the behavior of fields in various materials. Students will also study the concepts of electric and magnetic potentials, boundary conditions, and the propagation of electromagnetic waves in free space and dielectric media. The course emphasizes both theoretical concepts and practical applications of electromagnetic fields in engineering, including waveguides, transmission lines, and antennas. Through problem-solving and simulations, students will develop the ability to analyze and design systems influenced by electromagnetic fields.

Mapping of SDGs

SDG 4: Quality education	4.4:... substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Describe vector algebra and vector calculus in commonly used orthogonal coordinate systems and introduce the concept of operations frequently used throughout the course	Cognitive	C2	1	20
	2	Analyze generally the charge at stationary position or in motion to produce steady currents and apply them in various situations	Cognitive	C4	2	10

	3	Formulate and analyze time-dependent electromagnetic fields and related problems	Cognitive	C4	3	20
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COURSE OUTLINE (THEORY)

Vector analysis, Coulombs law and electric field intensity, Gauss's law, flux density and divergence, energy and potential, conductor dielectric and capacitance, Poisson's and Laplace's equations, steady-state magnetic field, magnetic forces, materials and inductance, time-varying fields and Maxwell's equations, uniform plane waves.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] J. D. Kraus and D. A. Carver, Electromagnetics, McGraw-Hill Education, latest ed.
- [2] David K. Cheng, Fundamentals of Engineering Electromagnetics, Addison-Wesley, latest ed.
- [3] William Hayt and John A. Buck, Engineering Electromagnetics, McGraw-Hill Education, ISBN: 0073104639.
- [4] Matthew N. Sadiku, Elements of Electromagnetics, Oxford University Press, ISBN: 0195103688.
- [5] J. D. Kraus, Electromagnetics, John Wiley & Sons, latest ed.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Signals and Systems
Credit Hours	: 3+1=4
Course Code	: Theory (EE26-222) Practical (EE26-223)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100) Practical (50)
Instructor Name	: Engr. Dr. Beenish Ansari

DESCRIPTION

This course introduces the fundamental concepts of signals and systems, which are essential in the analysis and processing of signals in various engineering applications. Topics include classification of signals, time-domain and frequency-domain analysis, linear time-invariant (LTI) systems, and system properties such as stability, causality, and impulse response. The course covers both continuous-time and discrete-time signals and systems, with an emphasis on Fourier series, Fourier transform, and Laplace transform techniques for analyzing signals in the frequency domain. Students will also explore system representation, convolution, and the sampling theorem. The course aims to provide students with the tools to analyze and design systems for signal processing, communication, and control applications.

Mapping of SDGs

SDG 8: Decent Work and Economic Growth	8.6: reduce the proportion of youth not in employment, education or training....
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Explain the fundamental concepts, properties of continuous-time signal and systems in time-domain, and perform various signal operations.	Cognitive	C2	1	40

	2	Apply and Solve signals and systems problems in time, frequency, and complex frequency domain.	Cognitive	C3	2	50
	3	Evaluate continuous-time systems, including filters design with appropriate properties and windowing methods	Cognitive	C5	3	10

LABORTORY LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Practice signals using MATLAB simulations under guidance and analyze systems in time and frequency domain.	Psychomotor	P3	5	50

COURSE OUTLINE (THEORY)

Introduction to signals and systems, classification of signals, classification of systems, complex number applications, time-domain analysis of LTI systems, BIBO stability, Laplace transform and its applications, continuous time Fourier series, Fourier transform, frequency domain, Z-transform and its applications, introduction to analog filter design

COURSE OUTLINE (PRACTICAL)

Introduction to signals and systems, classification of signals, classification of systems, complex number applications, time-domain analysis of LTI systems, BIBO stability, Laplace transform and its applications, continuous time Fourier series, Fourier transform, frequency domain, Z-transform and its applications, introduction to analog filter design.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Alan V. Oppenheim, A. S. Willsky, and S. H. Nawab, Signals & Systems, Prentice Hall, latest ed.
- [2] B. P. Lathi, Linear Systems and Signals, Oxford University Press, latest ed.
- [3] M. J. Roberts, Fundamentals of Signals and Systems, McGraw-Hill Education, latest ed.
- [4] S. Haykin and B. Van Veen, Signals and Systems, Wiley, latest ed.
- [5] C. L. Phillips, J. M. Parr, and E. A. Riskin, Signals, Systems, and Transforms, Prentice Hall, latest ed.



Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro



Subject Name	: Electronic Circuit Design
Credit Hours	: 3+1=4
Course Code	: Theory (EE26-224)
	: Practical (EE26-225)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100)
	: Practical (50)
Instructor Name	: Engr. Fozia Hajano

DESCRIPTION

This course focuses on the analysis, design, and implementation of analog and digital electronic circuits. Students will study the characteristics and applications of key electronic components such as diodes, transistors (BJT and MOSFET), and operational amplifiers. The course emphasizes the design of amplifiers, oscillators, filters, and voltage regulators, along with practical considerations like biasing, stability, and frequency response. Simulation tools and circuit design software will be used to model and test electronic circuits. By the end of the course, students will be able to design functional electronic circuits for real-world applications in communication, control, and embedded systems.

Mapping of SDGs

SDG 9: Industry innovation	9.4: greater adoption of clean and environmentally sound technologies and industrial processes.....
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Define the basic concepts of amplifiers and its behavioral analysis with the help of hybrid parameters, AC & DC load lines	Cognitive	C1	1	30
	2	Distinguish the frequency characteristics and stability analysis of different electronic devices including filters, amplifiers, and oscillators.	Cognitive	C2	2	52

	3	Apply Kirchhoff laws (current/voltage) in electronic circuits.	Cognitive	C3	3	18
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LABORATORY LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Practice the amplifier circuits based on semiconductor devices under guidance in the laboratory.	Psychomotor	P3	4	50

COURSE OUTLINE (THEORY)

Amplifier analysis: Transistor as an amplifier, hybrid model of a transistor, small-signal analysis, large-signal analysis, gain calculation of single-stage amplifier, cascading, multistage gain calculations. Classification of amplifiers on the basis of biasing: Class A amplifier, class B amplifier, class AB amplifier, class C amplifier, push-pull amplifier, and complementary symmetry amplifier. Classification of amplifiers on the basis of coupling: RC-coupled amplifier, transformer-coupled amplifier, direct-coupled amplifier. Classification of amplifiers on the basis of frequency: Audio-frequency amplifier, radio-frequency amplifier, tuned amplifiers. Feedback: Feedback concept, feedback amplifiers, voltage feedback amplifier, current feedback amplifier. Effect of feedback on frequency response. Practical amplifier considerations: Input and output impedance, amplifier loading, impedance matching. Oscillators: Basic theory, tank circuit, damped and undamped oscillations, phase-shift oscillator, Colpitts oscillator, Hartley oscillator, Wein Bridge oscillator, Clapp oscillator.

COURSE OUTLINE (PRACTICAL)

Transistor curve tracer, introduction to PSPICE and AC voltage dividers, characterization and design of emitter and source followers, characterization and design of AC variable-gain amplifier, design of test circuits for BJTs and FETs, design of FET ring oscillators, design and characterization of emitter-coupled transistor pairs, tuned amplifier and oscillator, design of oscillators.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Adel S. Sedra and Kenneth C. Smith, Microelectronic Circuits, Oxford University Press, ISBN: 0199339139.
- [2] Behzad Razavi, Fundamentals of Microelectronics, Wiley, ISBN: 1118166323.
- [3] Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, Prentice Hall, ISBN: 0132622262.
- [4] Thomas L. Floyd, Electronic Devices (Conventional Current Version), Prentice Hall, ISBN: 0132549867.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Ideology and Constitution of Pakistan
Credit Hours	: 2+0=2
Course Code	: Theory (HUM26-232)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/32
Marks	: Theory (50)
Instructor Name	: Mr. Sibghatullah

DESCRIPTION

This course examines the ideological foundations, constitutional development, and state structure of Pakistan. It covers the Two-Nation Theory, the Pakistan Movement, the Constitutions of 1956, 1962, and 1973, fundamental rights, federalism, state institutions, constitutional amendments, and the civic responsibilities of citizens.

SDG 4: Quality education	4.7: ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles...
SDG 5: Gender equality	5.5: Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life.

COURSE LEARNING OUTCOME

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Analyze the structure, roles, and functions of state institutions under the Constitution of Pakistan.	Cognitive	C4	7	25
	2	Evaluate contemporary constitutional issues, fundamental rights, and civic responsibilities of citizens.	Cognitive	C5	11	25

COURSE OUTLINE (THEORY)

Ideological Foundations of Pakistan: Meaning and significance of ideology, Ideology of Pakistan and the Two-Nation Theory, Role of Islam in shaping Muslim identity, Vision of Allama

Muhammad Iqbal, Political struggle of Muslims in the Subcontinent. Pakistan Movement: Sir Syed Ahmad Khan and Aligarh Movement. Role of All-India Muslim League Key events: Lahore Resolution (1940), Elections of 1945–46, Leadership of Quaid-e-Azam Muhammad Ali Jinnah. Constitutional Development (1947–1973). Government of India Act 1935 (as interim constitution), Objectives Resolution (1949), Constitution of 1956, Constitution of 1962, Salient features of the Constitution of 1973, Salient Features of the Constitution of 1973, Islamic provisions, Fundamental rights and duties, Federal system, Parliamentary form of government, Independence of judiciary: State Institutions and Governance, Legislature, Executive, and Judiciary, Role of President and Prime Minister, Federal and Provincial governments, Election system and accountability institutions. Constitutional Amendments and Contemporary Issues, Important constitutional amendments, 18th Amendment and provincial autonomy, Challenges to democracy and constitutional rule, Role of citizens in strengthening the constitution.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] The Constitution of the Islamic Republic of Pakistan, 1973, official text.
- [2] K. B. Sayeed, Pakistan: The Formative Phase, latest ed.
- [3] I. H. Qureshi, The Struggle for Pakistan, latest ed.
- [4] S. M. Burke and L. Ziring, Pakistan's Foreign Policy: An Historical Analysis, latest ed.
- [5] S. P. Cohen, The Idea of Pakistan, latest ed.



Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro



Subject Name	: Introduction to Cooperative Housing Societies
Credit Hours	: 1+0=1
Course Code	: Theory (HUM26-320)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/16
Marks	: Theory (50)
Instructor Name	: Engr. Umair Abro

DESCRIPTION

This course provides an understanding of the concept, structure, and functioning of cooperative housing societies, with emphasis on legal frameworks, management principles, community participation, and social responsibility. The course aims to develop awareness of collective housing solutions, governance mechanisms, and the role of cooperatives in sustainable urban development.

Mapping of SDGs

SDG 8: Decent work and economic growth	8.3: decent job creation, entrepreneurship.....
SDG 11: Sustainable cities and communities	11.a: positive economic, social and environmental links between urban, peri-urban and rural areas.....

COURSE LEARNING OUTCOMES (THEORY)

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Describe the concept, principles, and importance of cooperative housing societies.	Cognitive	C2	6	15
	2	Explain the legal and administrative framework governing cooperative housing societies in Pakistan.	Cognitive	C2	7	15
	3	Apply basic management and financial principles in the operation of cooperative housing societies.	Cognitive	C3	11	20

COURSE OUTLINE (THEORY)

Introduction to Cooperative Housing: Concept and philosophy of cooperation, History and evolution of cooperative movements. Principles of cooperative societies. Importance of cooperative housing in urban development. Cooperative Housing System in Pakistan. Cooperative housing societies in Pakistan. Role of government and regulatory authorities. Registration process and legal status. Comparison with private housing schemes, Legal and Administrative Framework. Cooperative Societies Acts and Rules. Bye-laws of cooperative housing societies, Rights and responsibilities of members, Role of managing committee and general body, Management and Finance of Cooperative Housing. Organizational structure. Financial management and budgeting. Maintenance, service charges, and audits. Transparency and accountability. Community Development and Social Responsibility. Community participation and engagement. Conflict resolution within housing societies, Gender inclusion and social equity, Ethical issues and civic responsibility, Sustainable and Modern Housing Practice. Sustainable housing concepts Environmental considerations in housing societies Smart and green housing initiatives. Future challenges of cooperative housing

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Cooperative Housing Societies: Law and Practice in Pakistan, latest ed.
- [2] Introduction to Cooperative Management, latest ed.
- [3] Housing Policy and Urban Development in Pakistan, latest ed.
- [4] N. R. Banerjee, Urban Development and Housing Policy, latest ed.
- [5] K. T. Arif, Cooperative Management Principles and Practices, latest ed.
- [6] John F. Kennedy, Housing and Urban Policy: A Global Perspective, latest ed.

Third Year - Fifth Semester



Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro



Subject Name	: Instrumentation and Measurements
Credit Hours	: 3+1=4
Course Code	: Theory (EE26-310)
	: Practical (EE26-311)
Effective	: 2K26-BE(E)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100)
	: Practical (50)
Instructor Name	: Engr. Dr. Aamir Hussain Memon

DESCRIPTION

Concepts of accuracy, precision, sensitivity, resolution, repeatability, and calibration. Types of measurement errors and methods to minimize them Working principles, classification, and applications of sensors for measuring physical, chemical, and biological variables Selection criteria of sensors for different engineering applications.

Mapping of SDGs

SDG 4: Quality education	4.4: substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Explain the fundamentals and elementary concepts of measurement and instrumentation systems	Cognitive	C2	1	35
	2	Illustrate the mechanism of different kinds of instruments based on electrical and electronic	Cognitive	C2	1	35
	3	Apply signal conditioning principles based on transducers and sensors related to instrumentation systems	Cognitive	C3	3	30

LABORTORY LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Operate measurement instruments, sensors, and signal-conditioning circuits under guidance; record data and compare measured values with expected results.	Psychomotor	P3	5	50

COURSE OUTLINE (THEORY)

Measurements: Precision measurements terminologies principles of different measurement techniques; Types of Errors: Instruments, Measurement of electrical and non-electrical quantities including voltmeters, ammeters, function generators, oscilloscopes; Systems for signal processing and signal transmission; modern Instrumentation techniques; Static and dynamic responses of instrumentation and signal conditioning; Data acquisition systems, Principles of operation, construction and working of different analogue and Digital meters, Advanced Testing & Measuring instruments recording instruments, signal generators. Transducers: Sensors, input and output transducers; Types of bridges for measurement of resistance, inductance, and capacitance, Power and energy meters; high-voltage measurements, PLC systems.

COURSE OUTLINE (PRACTICAL)

Design, construction, and analysis of measurement circuits, data acquisition circuits, instrumentation devices, and automatic testing; measurement of electrical parameters using different lab instruments; calibration of measurement instruments; use of data acquisition systems for presentation and interpretation of data; use of microcomputers to acquire and process data; use of simulation and instrumentation languages (LabVIEW).

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] A. D. Helfrick and W. D. Cooper, Modern Electronic Instrumentation and Measurement Techniques, Pearson Education, latest ed.
- [2] Klaas B. Klaassen and Steve Gee, Electronic Measurement and Instrumentation, Cambridge University Press, ISBN: 0521477298.
- [3] H. Kevin James, PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control, Newnes, ISBN: 075064624X.



Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro



Subject Name	: Microprocessors and Interfacing
Credit Hours	: 3+1=4
Course Code	: Theory (EE26-312)
	: Practical (EE26-313)
Effective	: 2K26-BE(E)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100)
	: Practical (50)
Instructor Name	: Engr. Abdul Manan Memon

DESCRIPTION

The main objective of this course is to develop understanding of microprocessor and microcontroller-based systems and their applications. This includes enabling a student to design and use microprocessor-based systems for variety of purposes such as control, telemetry, digital systems etc. Course focuses on study of microprocessor and its basic support components including CPU architecture, memory interfaces, processor bus concepts, serial I/O devices, and interrupt control devices. Laboratories directly related to microprocessor functions and its interfaces

SDG 4: Quality education	4.4: substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Understand various Micro-processor or Microcontroller features, describe their operations and use relevant development tools.	Cognitive	C2	2	50

	2	Apply the concept of C/Assembly language to perform basic tasks with Microprocessors or Microcontrollers and interface digital devices	Cognitive	C3	3	50
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LABORTORY LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Practice the practical applications using 8086 microprocessors under guidance and demonstrate debugging and troubleshooting skills.	Psychomotor	P3	5	50

COURSE OUTLINE (THEORY)

Introduction to Embedded Systems: What is an Embedded System, Embedded Systems design constraints Microcontroller Architecture and Programming Model

Microcontrollers vs Microprocessors, Overview of PIC Microcontroller Family and Architecture Programming Model, PIC Instruction Set, Examples, Interfacing PIC Microcontroller to the outside world: I/O Interfacing basics, PIC GPIO Model, PIC micros and Counters Module, Watchdog Timer Serial Communications basicopic Serial Ports Module, Interrupt Management, PIC Interrupts Module, PIC Capture-Compare Module, Analog-To-Digital Conversion basic, PIC Analog-To-Digital (A/D) Conversion Module, PIC. I2C Communications Basics, PIC SPI, I2C Module. Examples Model Based Design of Embedded Systems Embedded Systems Design Process, Introduction to model-based design, Context and Use Case diagram, Sequence and Collaboration diagrams, Class and Object Diagrams

COURSE OUTLINE (PRACTICAL)

To acquaint the students with the organization, programming and applications of microprocessor-based systems

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Muhammad Ali Mazidi, AVR Microcontroller and Embedded Systems: Using Assembly and C, Pearson Education, latest ed.
- [2] Jonathan W. Valvano, Embedded Systems: Introduction to ARM® Cortex™-M Microcontrollers (Volume 1), CreateSpace Independent Publishing Platform, latest ed.
- [3] Jonathan W. Valvano, Embedded Systems: Real-Time Interfacing to ARM® Cortex™-M Microcontrollers, CreateSpace Independent Publishing Platform, latest ed.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Communication Systems
Credit Hours	: 3+1=4
Course Code	: Theory (EE26-314) : Practical (EE26-315)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100) : Practical (50)
Instructor Name	: Engr. Abdul Wahab Khokar

DESCRIPTION

This course includes the fundamental concepts of analog and digital communication systems and Provide knowledge of various modulation and demodulation techniques. Develop an understanding of signal transmission, noise analysis, and bandwidth considerations. Explain the functioning and design of transmitters and receivers. Familiarize students with modern communication technologies such as wireless communication, satellite systems, and fiber optics. waves, oscillations, electronics and mechanics.

Mapping of SDGs

SDG 4: Quality education	4.4: substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Use theorems such as Parseval's theorem and tools such as Fourier transform to represent and quantify signals in time and frequency domain as well as understand the characteristics of distortion-less communication channel	Cognitive	C3	6	50

	2	Describe and apply the basic theory, compare advantages and disadvantages, identify and compute parameters, the performance metrics, and explain the working of the different types of analog transceiver designs using time and frequency domain analysis	Cognitive	C4	9	50
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LABORTORY LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Practice various electronic circuits for analog modulation under guidance and demodulation and understand their working in order to apply theory into practice.	Psychomotor	P3	5	50

COURSE OUTLINE (THEORY)

Amplitude Modulation: Baseband and carrier communications, Double Sideband (DSB), Single Sideband (SSB), Vestigial Sideband (VSB), Superheterodyne AM Receiver, Carrier Acquisition, Television, Angle Modulation: Instantaneous frequency, Bandwidth of FM/PM, Generation of FM/PM, Demodulation of FM/PM. Noise: Mathematical representation, Signal to Noise Ratio, Noise in AM, FM, and PM systems Pulse Modulation: Sampling and Quantization, Pulse Amplitude Modulation, Pulse Position and Pulse Width Modulation, Quantization Noise, Signal to Quantization Noise Ratio, Pulse code Modulation, Delta Modulation, Frequency Shift Keying, Phase Shift Keying.

COURSE OUTLINE (PRACTICAL):

Developing and understanding signal systems and transforms using MATLAB

RECOMMENDED TEXT AND REFERENCE BOOKS

1. B. P. Lathi and Zhi Ding, Modern Digital and Analog Communication Systems, Oxford University Press, latest ed.
2. John G. Proakis and Masoud Salehi, Fundamentals of Communication Systems, Prentice Hall, latest ed.
3. John G. Proakis and Masoud Salehi, Digital Communications, McGraw-Hill Education, latest ed.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Control Systems
Credit Hours	: 3+1=4
Course Code	: Theory (EE26-316) Practical (EE26-317)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100) Practical (50)
Instructor Name	: Mr. Ghulam Mustafa Shoro

DESCRIPTION

Provide fundamental knowledge of control system concepts and its applications. Provide fundamental knowledge of control system concepts and their mathematical modeling. Teach students how to analyze the dynamic behavior of control systems using time-domain and frequency-domain techniques. Introduce stability analysis and methods to determine the performance of control systems. Develop understanding of feedback principles and their role in improving system performance. Equip students with tools to design basic controllers (e.g., PID) and analyze control system responses. Familiarize students with the application of control systems in electrical, mechanical, and industrial systems.

Mapping of SDGs

SDG 4: Quality education	4.4: substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
SDG 4: Quality education	4.4: substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Understand the fundamental concepts of control systems and their applications	Cognitive	C2	1	10
	2	Analyze system behavior using time response and transient response techniques.	Cognitive	C4	2	54

	3	Design and simulate control systems to improve the energy efficiency and reduce environmental impact in industrial applications.	Cognitive	C6	6	12
	4	Evaluate control system performance and propose improvements, also evaluate the intellectual property and ethical design issues	Cognitive	C5	7	24

LABORATORY LEARNING OUTCOMES

Upon successful completion of the lab experiments, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Demonstrate Proficiency in Laboratory Techniques and Equipment	Psychomotor	P4	1	15
	2	Perform Experiments and Analyze Data	Psychomotor	P5	2	15
	3	Integrate, test, and troubleshoot a control-system setup to achieve specified performance under laboratory conditions.	Psychomotor	P6	3	20

COURSE OUTLINE (PRACTICAL)

Familiarization with MATLAB Control System toolbox and MATLAB/SIMULINK tool box; Modeling and simulation of armature-controlled and field-controlled DC motors, simulation of step response and impulse response with unity feedback using MATLAB; system analysis using root locus, bode plot, and Nyquist plot using MATLAB; PI, PD and PID controller design, analysis of servo system and higher order systems

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Norman S. Nise, Control Systems Engineering, Wiley, latest ed.
- [2] Richard C. Dorf and Robert H. Bishop, Modern Control Systems, Pearson Education, latest ed.



Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro



Subject Name	: Engineering Management
Credit Hours	: 2+0=2
Course Code	: Theory (SS26-318)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/32
Marks	: Theory (50)
Instructor Name	: Engr. Dr. Beenish Ansari

DESCRIPTION

Engineering Management is an interdisciplinary field that combines technical engineering knowledge with business and leadership principles to optimize processes, projects, and organizations. This subject bridges the gap between engineering and management, preparing professionals to lead teams, manage resources, and drive innovation in technology-driven industries.

Mapping of SDGs

SDG 8: Decent work and economic growth	8.3: decent job creation, entrepreneurship.....
SDG 12: Responsible consumption and production	12.2: achieve the sustainable management and efficient use of natural resources.

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Describe the fundamentals of industrial networks, product and process development, and modern business management practices.	Cognitive	C2	8	20
	2	Analyze the role of multidisciplinary and science-based knowledge in solving engineering-management problems and fostering innovation.	Cognitive	C4	9	10
	3	Evaluate and defend a comprehensive business plan that includes market identification, technology marketing, financing, and distribution strategies.	Cognitive	C5	10	20

COURSE OUTLINE (THEORY)

Industrial networks, Fundamentals of Product and Process development, Business Community and New Generations of Managers, Practical Skills Knowledge and Experience in Commercialization of New- Technological Inventions, Use of Multidisciplinary' Science Based Knowledge, Problem Solving. Teamwork and Outreach Activity. Major steps in proof of concept to intellectual property protection. Prototype development, Fabrication and assembly routes Materials procurement, Identification and creation of new markets, Development of business plan, Appropriate technology and marketing, Distribution and financing, Routes and strategies for specific technology under development

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] R. A. Burgelman, Strategic Management of Technology and Innovation, McGraw-Hill Education, latest ed.
- [2] Michael A. Hitt, R. Duane Ireland, and Robert E. Hoskisson, Strategic Management: Competitiveness and Globalization, CCengage Learning, latest ed.
- [3] Fred R. David and Forest R. David, Strategic Management: Concepts and Cases, Pearson Education, latest ed.
- [4] Jeffrey A. Thompson and Frank Martin, Strategic Management: Awareness and Change, CCengage Learning, latest ed.
- [5] Charles W. L. Hill and Gareth R. Jones, Strategic Management Theory: An Integrated Approach, CCengage Learning, latest ed.

Third Year - Sixth Semester



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Expository Writing
Credit Hours	: 2+0=2
Course Code	: Theory (HUM26-330)
Effective	: 2K26-BE(E)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/32
Marks	: Theory (50)
Instructor Name	: Mr. Israr Ahmed Khoso

DESCRIPTION

This course includes the basic concepts of effective expository writing (clarity, coherence and organization) and paragraph writing. Understanding Expository Writing (definition, types, purpose, and applications) and Characteristics of effective expository writing (clarity, coherence and organization)

Mapping of SDGs

SDG 4: Quality education	4.7: ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles...
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Apply the essentials of writing process integrating pre-writing, drafting, editing and proof reading to produce well-structured essays.	Cognitive	C3	9	20
	2	Demonstrate mastery of diverse expository type to address different purposes and audiences.	Cognitive	C3	10	20
	3	Evaluate ethical practices to maintain originality in expository writing.	Cognitive	C5	11	10

COURSE OUTLINE (THEORY)

Expository Writing is a sequential undergraduate course aimed at refining writing skills in various contexts. Building upon the foundation of pre-requisite course, Functional English, this course will enhance students' abilities of producing clear, concise, and coherent written texts in English. This course will also enable students to dissect intricate ideas to amalgamate information and to express their views and opinion through well-organized essays. The students will further be able to refine their analytical skills to substantiate their viewpoints using credible sources while adhering to established ethical writing norms. Additionally, the course will highlight the significance of critical thinking enabling students to produce original and engaging written texts.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Rise B. Axelrod and Charles R. Cooper, *The St. Martin's Guide to Writing*, Bedford/St. Martin's, latest ed.
- [2] Gerald Graff and Cathy Birkenstein, *They Say / I Say: The Moves That Matter in Academic Writing*, W. W. Norton & Company, latest ed.
- [3] David Rosenwasser and Jill Stephen, *Writing Analytically*, CCengage Learning, latest ed.
- [4] Joseph M. Williams and Joseph Bizup, *Style: Lessons in Clarity and Grace*, Pearson Education, latest ed.
- [5] William Strunk Jr. and E. B. White, *The Elements of Style*, Pearson Education, latest ed.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Computer Communication and Networks
Credit Hours	: 3+1=4
Course Code	: Theory (MDE26-328) Practical (MDE26-329)
Effective	: 2K26-BE(E)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100) Practical (50)
Instructor Name	: Engr. Saeed Rattar

DESCRIPTION

Computer Communication and Networks involve the exchange of data between devices using communication protocols. A computer network connects devices (like computers, routers, and servers) to share resources and information efficiently. Networks are classified by size and scope—such as LAN, WAN, and MAN—and are structured using topologies like star, ring, or mesh. Communication is governed by protocols like TCP/IP, which ensure reliable data transfer. These networks enable internet access, cloud computing, remote work, and modern applications like IoT and video streaming, making them essential to today's digital world.

Mapping of SDGs

SDG 4: Quality education	4.4: substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Understand and explain the fundamentals of computer communication networks, including the OSI and TCP/IP models, protocols, and network topologies.	Cognitive	C2	3	40
	2	Analyze the performance of communication networks by applying concepts of bandwidth, latency, throughput, and packet	Cognitive	C4	4	40

		loss in different network environments				
	3	Evaluate and troubleshoot common network issues, such as congestion, routing problems, and data packet transmission errors, using appropriate tools and techniques.	Cognitive	C5	8	20

LABORATORY LEARNING OUTCOMES

Upon successful completion of the lab experiments, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Configure , implement, and test basic communication networks using appropriate devices, addressing schemes, and protocols.	Psychomotor	P4	5	50

COURSE OUTLINE (THEORY)

Overview of Communication System, Communication Model, Nodes. Links. Protocol. Network Edge (Client, Server). Network Fundamentals, Types of Networks (LAN, MAN, WAN), Network Topologies. (Bus. Star, Tree, Ring, Mesh), Logical versus Physical Topology. Network Interface Controller, Repeaters, Hubs, Bridges, Switches. Routers, Gateway. Access Networks, Core Networks, Internet. Intranet. Concept of Packet, Packet Forwarding/Switching, Store-and-Forward, Transmission. Transmission Delay, Propagation Delay, Queueing Delay. Physical Media. Coaxial (10Base-2, 10Base-5). Coaxial Cable Connectors. Ethernet (10Base-T, 100Base-TX, 1000Base-T), Twisted-Pair Connectors, Fiber Optic (10Base-F, 100Base-FX, 1000Base-LX, 1000Base-SX), Fiber- Optic Connectors. Serial (RS-232 and RS-422). Architecture and Protocols, Layered Models (TCP/IP, OSI), Encapsulation/Decapsulation; Link Layer, Services Provided by the Link Layer. Error-Detection and -Correction Techniques (Parity Checks. Check summing Methods). Multiple Access Links and Protocols. Channel Partitioning Protocols (FDM. TDM). Random Access Protocols (Slotted ALOHA. Pure ALOHA. CSMA/CD. CSMA/CA). Taking-Turns Protocols (Polling Protocol. Token-Passing Protocol). Switched Local Area Networks (Collision Domain. ICMP, and ARP). Self-learning of Switch Table Properties of Link-Layer Switching Spanning Tree Protocol (STP) Virtual Local Area Networks (VLANs), Ethernet Framing, Frame Formats (Ethernet II versus IEEE 802.3), Media Access Control (MAC) Addressing, Frame Forwarding and Filtering (Unicast. Broadcast, Multicast), Frame Processing (Source MAC. Destination MAC, Type Field. Data. FCS), IP Addressing, IP Packet Header and IP Addressing (Network Part. Host Part). Network Address. Broadcast Address. IP Address Classes (A. B. C. D. E). Subnet Mask. VLSM. IP Addressing Limitations. Dynamic Host Configuration Protocol (DHCP). Network Layer, Forwarding and Routing. Virtual Circuit and Datagram Networks. IP routing tasks. Routing Decision (Preference. Metric). Static Routing (Application, Behavior, Limitations). Routing Algorithms (Distance-Vector Routing Algorithm. Link-State Routing Algorithm). Dijkstra's Algorithm. Transport Layer Protocols, Transmission Control Protocol (TCP), TCP Ports, TCP Header, TCP Connection Establishment Termination. Go-Back-N (GBN), Selective Repeat (SR), User Datagram Protocol (UDP), UDP Datagram Format. UDP Forwarding Behavior, Principles of Congestion Control, TCP Congestion Control

(Slow Start, Congestion Avoidance, Fast Recovery), Application Layer Protocols. The Web and HTTP, HTTP Message Format, Cookies, File Transfer: FTP, Overview of How DNS Works

COURSE OUTLINE (PRACTICAL)

Introduction to Networking, Networking Media, Topology Orientation and Building a Small Network Introduction to Switch & Its Basic Configurations Basic VLAN Configuration, Introduction to Router & Its Basic Configurations Static Routing Using Wireshark to view Protocol Data Units Dynamic Routing using RIP and EIGRP, Dynamic Routing using OSPF Basic DHCP and NAT Configuration Basic Inter-VLAN Routing IPv6 Configurations

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] William Stallings, Data and Computer Communications, Pearson Education, ISBN: 0131006819.
- [2] James F. Kurose and Keith W. Ross, Computer Networking: A Top-Down Approach, Pearson Education, ISBN: 0132856204.
- [3] Andrew S. Tanenbaum and David J. Wetherall, Computer Networks, Pearson Education, latest ed.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Power Electronics
Credit Hours	: 3+1=4
Course Code	: Theory (EE26-322) : Practical (EE26-323)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100) : Practical (50)
Instructor Name	: Mr. Ghulam Mustafa Shoro

DESCRIPTION

This course includes the basic concepts of power electronic devices and their applications. To teach students the fundamental concepts of power electronics. To teach students about switching and power losses and converters.

Mapping of SDGs

SDG 4: Quality education	4.4: substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
SDG 7: Affordable and clean energy	7.b: expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries...

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Understanding of Power Semiconductor Devices and Circuits	Cognitive	C2	1	10
	2	Analyze Power Conversion System and Circuits	Cognitive	C4	2	30
	3	Design Power Electronics Systems and Circuits	Cognitive	C6	3	30
	4	Evaluate the performance and efficiency of Power Electronics System	Cognitive	C5	4	30

LABORATORY LEARNING OUTCOMES

Upon successful completion of the lab experiments, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Demonstrate Proficiency in Laboratory Techniques and Equipment	Psychomotor	P4	1	15
	2	Perform Experiments and Analyze Data	Psychomotor	P5	2	15
	3	Integrate, test, and troubleshoot a power-electronic converter to meet specified operating conditions.	Psychomotor	P6	3	20

COURSE OUTLINE (THEORY)

Introduction to power electronics; solid-state devices used in power electronics: power diode, power BJT, power MOSFET, SCR, GTO, IGBT, TRIAC, DIAC; on-state and switching power losses; semi-controlled, fully-controlled and uncontrolled rectifiers: single-phase and three-phase, six-pulse, twelve-pulse and twenty-four pulse rectifiers; DC-DC converters; Buck, Boost and Buck-Boost converters, single-phase and three-phase inverters; pulse-width-modulated (PWM) inverters, AC controllers, switched mode power supplies, Fundamentals of AC and DC motor drives.

COURSE OUTLINE (PRACTICAL)

Design of converters; single-phase and three-phase uncontrolled, half-controlled and fully controlled rectifiers; buck, boost and polarity inverting converters; flyback converter; PWM Inverters.

RECOMMENDED TEXT AND REFERENCE BOOKS:

- [1] Robert W. Erickson and Dragan Maksimovic, Fundamentals of Power Electronics, Springer, ISBN: 0792372700.
- [2] Muhammad H. Rashid, Power Electronics: Circuits, Devices & Applications, Prentice Hall, ISBN: 0133125904.
- [3] Ned Mohan, William P. Robbins, and Tore M. Undeland, Power Electronics: Converters, Applications and Design, John Wiley & Sons, ISBN: 0471429082.
- [4] Daniel Hart, Power Electronics, McGraw-Hill Science/Engineering/Math, ISBN: 0073380679.
- [5] L. Umanand, Power Electronics: Essentials and Applications, Wiley, latest ed.
- [6] M. S. Jamil Asghar, Power Electronics: Devices, Circuits, and Applications, Springer, latest ed.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Electrical Machines
Credit Hours	: 3+1=4
Course Code	: Theory (EE26-324) Practical (EE26-325)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100) Practical (50)
Instructor Name	: Engr. Dr. Aamir Hussain Memon

DESCRIPTION:

The **subject** Electrical Machines is fundamental in electrical and electronics engineering. It covers the principles, design, operation, and applications of machines that convert electrical energy to mechanical energy and vice versa.

Mapping of SDGs

SDG 4: Quality education	4.4: substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Understand the electromechanical energy conversion concepts, working and construction of AC and DC electrical machines.	Cognitive	C2	1	40
	2	Explain AC and DC generators and motors with their types and performance.	Cognitive	C2	2	40
	3	Analyse the working principle, performance and construction of transformers.	Cognitive	C4	4	20

LABORATORY LEARNING OUTCOMES

Upon successful completion of the lab experiments, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Perform laboratory experiments on AC and DC machines and transformers under guidance, and evaluate their operating characteristics.	Psychomotor	P3	5	50

COURSE OUTLINE (THEORY)

Magnetic circuits and calculations: Single-phase and polyphase circuits. Transformers: Principle of operation, construction, types, EMF equation and transformation ratio, equivalent values and equivalent power circuit diagram, impedance matching, operation and phasor diagram with and without load, measurement of losses and efficiency, parallel operation, cooling, three-phase connections, instrumentation transformers; DC machines: Construction, types, armature reaction, no load and on voltage characteristics of series, shunt generators, division of loads in parallel operation, torque speed characteristics, measurement of losses and efficiency. AC machines: AC machine armature winding, three-phase windings, MMF of distributed windings, speed and direction of rotating magnetic field. Induction motor: Types, construction, principle of operation, induced EMF, relation between stator and rotor quantities, phasor diagram, equivalent circuit diagram, torque slip power relations. Synchronous generator. Brushless DC motor. Switched-reluctance motor. Stepper motor.

COURSE OUTLINE (PRACTICAL)

Characteristics of DC series and shunt motors, DC series and shunt generators, AC induction motor, synchronous generator, induction generator, universal motor, brushless DC motor and switched reluctance motor; transformer theory and testing.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Stephen J. Chapman, Electric Machinery Fundamentals, McGraw-Hill International, latest ed.
- [2] Fitzgerald, Kingsley, and Umans, Electric Machinery, McGraw-Hill Education, latest ed.
- [3] Hindmarsh, Electrical Machines, McGraw-Hill Education, latest ed.
- [4] Theodore Wildi, Electrical Machines, Drives, and Power Systems, Pearson Education, latest ed.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Digital Signal Processing
Credit Hours	: 3+1=4
Course Code	: Theory (EE26-326)
	: Practical (EE26-327)
Effective	: 2K26-BE(E)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100)
	: Practical (50)
Instructor Name	: Engr. Dr. Beenish Ansari

DESCRIPTION

This course includes the basic concepts physical and mathematical significance of digital signal processing from theoretical and application perspective and their applications.

Mapping of SDGs

SDG 4: Quality education	4.4: substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Explain the fundamental concepts, properties of discrete-time signals and systems in time-domain, and perform various signal operations	Cognitive	C2	6	30
	2	Apply and Solve signals and systems problems in time, frequency, and complex frequency domain.	Cognitive	C3	9	50
	3	Analyze and develop discrete-time systems, including filters design, with appropriate properties and windowing methods	Cognitive	C4	11	20

LABORATORY LEARNING OUTCOMES

Upon successful completion of the lab experiments, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Practice the design of FIR and IIR filters in MATLAB under guidance.	Psychomotor	P3	5	50

COURSE OUTLINE (THEORY)

The purpose of this course is to develop physical and mathematical significance of Digital Signal Processing from theoretical, application and implementation perspectives. The topics include a quick review of Discrete-Time signals and systems, z-transform and Discrete-Time Fourier transform (DTFT) and bandlimited sampling. An introduction to multirate systems will then be covered with some applications. Discrete Fourier Transform (DFT) is then introduced as a practical spectral analysis tool followed by algorithms for efficient computation of DFT (such as FFT and Goertzel Algorithm). A good portion of the course focuses on the frequency domain analysis of systems and the structures for system implementation. Different techniques for filter design against given specifications are then introduced with their practical significance.

COURSE OUTLINE (PRACTICAL)

Understanding the concept of designing of the filters in MATLAB, different transformation techniques of discrete signals.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] John G. Proakis and Dimitris G. Manolakis, Digital Signal Processing: Principles, Algorithms, and Applications, Pearson Education, latest ed.
- [2] Emmanuel C. Ifeachor and Barrie W. Jervis, Digital Signal Processing: A Practical Approach, Pearson Education, latest ed.
- [3] K. Deergha Rao, Digital Signal Processing: Theory and Practice, Pearson Education, latest ed.
- [4] Alan V. Oppenheim and Ronald W. Schaffer, Discrete-Time Signal Processing, Pearson Education, latest ed.

Fourth Year - Seventh Semester



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Renewable Energy Systems
Credit Hours	: 2+0=2
Course Code	: Theory (EE26-414)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/32
Marks	: Theory (50)
Instructor Name	: Mr. Ghulam Mustafa Shoro

DESCRIPTION

By studying Renewable Energy Systems, students can gain a deep understanding of the complex relationships between energy, environment, and society, and develop the skills and knowledge needed to design, implement, and manage sustainable energy systems that meet the needs of present and future generations.

Mapping of SDGs

SDG 7: Affordable and clean energy	7.b: ... expand infrastructure...
SDG 11: Sustainable cities and communities	11.5: ... reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses by disasters, including water-related disasters...
SDG 13: Climate action	13.1: Strengthen resilience and adaptive capacity to climate related hazards and natural disasters...

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Compute the effects of renewable energy systems on local communities, including their social, economic, and environmental impacts	Cognitive	C3	6	20
	2	Analyze a renewable energy system for a specific community or industry, taking into account technical, economic, and social factors.	Cognitive	C4	9	20
	3	Evaluate a comprehensive plan for integrating renewable energy	Cognitive	C5	11	10

		systems into existing energy infrastructure, including strategies for overcoming technical, economic, and social barriers.				
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COURSE OUTLINE (THEORY)

Present day fuel use, Energy Problems of modern societies, Renewable Energy Sources as a solution, Solar Thermal Energy, Nature and availability of solar radiation. Low temperature solar energy applications, Solar thermal engines and electricity generation, Economics Potential and environmental impact, Solar Photovoltaic, Historical Background. PV in Silicon. Reducing the cost of crystalline PV cells, Thin film PV. Other innovative PV technologies, Electrical characteristics of Silicon PV cells and modules, PV systems for remote power, Grid-connected PV systems. Economics of PV Energy Systems, Environmental Impact and Safe Fuel Cells, Thermodynamic principles, Efficiency of fuel cell factors limiting the performance, Design, new development in fuel cells, Possibility of future use in Electric vehicles., Bio Mas Introduction, Past and present. Bio Mass as a fuel, Extracting the energy. Agricultural residues, Energy crops. Environmental benefits and impacts. Economics, New Technologies, Future Prospects. Wind Energy, wind turbine types and terms, Aerodynamics of wind turbines. Mechanical power, Wind turbine generators, power and energy from wind turbines, Wind speed characteristics of a site, Economics of wind turbine, Commercial development and wind energy potential. Tidal Power, Tidal energy harnessing schemes, Tidal barrages, Geothermal Energy, Scope, advantages and issues.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Godfrey Boyle, Renewable Energy and Power for a Sustainable Future, Oxford University Press, latest ed.
- [2] John Twidell and Tony Weir, Renewable Energy Resources, Taylor and Francis, latest ed.
- [3] Aldo V. da Rosa, Fundamentals of Renewable Energy Processes, Academic Press, latest ed.



Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro



Subject Name : Artificial Intelligence
Credit Hours : 2+0=2
Course Code : Theory (EE26-416)
Effective : 2K26-BE(EE)
Pre-Requisites : Nil
Weeks/Lectures/Labs : 16/32
Marks : Theory (50)
Instructor Name : Dr. Shahnawaz Shah

DESCRIPTION

This course will introduce to the students the application areas of artificial intelligence (AI), the techniques and tools used in writing AI applications. In particular, the students will learn to structure a real-world problem as an AI problem, apply the appropriate techniques and tools to solve the problem. The students will be taught Prolog language and its use in representing and solving a logical system. Application of AI techniques such as state space search, heuristic search, optimization techniques, game programming, expert system development, natural language processing, and machine learning will be covered in detail. The students will be given extensive programming exercises to provide them opportunity to practice their classroom skills.

Mapping of SDGs

SDG 9: Industry innovation	9.5: encouraging innovation and substantially increasing the number of research and development workers.....
SDG 17: Partnerships for the goals	17.17: effective public, public private and civil society partnerships.....

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Explain artificial intelligence, its characteristics and its application areas.	Cognitive	C2	2	15
	2	Select and apply appropriate algorithms and AI techniques to solve complex problems	Cognitive	C3	3	15
	3	Analyze real-world problems as state space problems, optimization	Cognitive	C4	4	20

		problems or constraint satisfaction problem				
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COURSE OUTLINE (THEORY)

Introduction to AI and Machine learning, Linear regression, Logistic regression, Gradient Descent Method, Polynomial Regression Regularization, Classification Evaluation, Naïve Bayes, Decision Tree, Neural Networks, Clustering, Debugging the ML models, Search-algorithms, informed search, Game playing, propositional Logic, First Order Predicate Logic, Constraint satisfaction, conclusion & Future of AI.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Stuart J. Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson/Prentice Hall, latest ed.
- [2] George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Addison-Wesley, ISBN: 978-0321545893.
- [3] Stuart J. Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson/Prentice Hall, ISBN: 978-0136042594.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Robotic Engineering
Credit Hours	: 3+1=4
Course Code	: Theory (EE26-410) Practical (EE26-411)
Effective	: 2K26-BE(E)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100) Practical (50)
Instructor Name	: Engr. Dr. Zain Anwar Memon

DESCRIPTION

This course provides an overview of robot mechanisms, dynamics, and intelligent controls. Topics include planar and spatial kinematics, and motion planning; mechanism design for manipulators and mobile robots, multi-rigid-body dynamics, 3D graphic simulation; control design, actuators, and sensors; wireless networking

Mapping of SDGs

SDG 8: Decent work and economic growth	8.3: decent job creation, entrepreneurship.....
SDG 9: Industry innovation	9.4: greater adoption of clean and environmentally sound technologies and industrial processes.....

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Explain the necessary ingredients of robotic systems ranging from basic to the state of the art	Cognitive	C2	6	50
	2	Analyze the forward and inverse kinematics of robotic manipulators.	Cognitive	C4	9	50

LABORATORY LEARNING OUTCOMES

Upon successful completion of the lab experiments, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Demonstrate the kinematics and dynamics of a multi-degree-of-freedom manipulator and implement position controllers in MATLAB/Simulink.	Psychomotor	P4	5	50

COURSE OUTLINE (THEORY)

Introduction to Robotics: Fundamentals, Classification of Robots, Advantages vs Disadvantages of Robots, Components of a robot, Robots degrees of freedom, Robot Joints, Robot Coordinates, Robot Reference Frames, Robot Languages. Robot Kinematics: Position Analysis, Forward Kinematics, Inverse Kinematics, Robots As Mechanism, Matrix Representation, Homogeneous Transformation Matrices, Representation of Transformations, Inverse of Transformation Matrices, Forward And Inverse Kinematics of Robots, Denavit-Hartenberg Representation of Forward Kinematic Equations of Robot, Inverse Kinematic Program of Robots, Degeneracy And Dexterity. Dynamic Analysis and Forces: Lagrangian Mechanics. Trajectory Planning: Path vs. Trajectory, Joint-Space vs. Cartesian-Space DESCRIPTIONs, Basics of Trajectory Planning, Joint-Space Trajectory Planning. Sensors and Actuators in Robotic.

COURSE OUTLINE (PRACTICAL)

Experiments to introduce the students to basic robotics and programming of programmable devices used in the robotics field.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] John J. Craig, Introduction to Robotics: Mechanics and Control, Prentice Hall, ISBN: 0201643613.
- [2] Saeed B. Niku, Introduction to Robotics: Analysis, Control, Applications, Wiley, ISBN: 0470604468.
- [3] J. L. Fuller, Robotics: Introduction, Programming, and Projects, Prentice Hall, ISBN: 0130955434.
- [4] M. W. Spong and M. Vidyasagar, Robot Dynamics and Control, John Wiley & Sons, latest ed.
- [5] M. W. Spong and S. Hutchinson, Robot Modeling and Control, John Wiley & Sons, latest ed.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Embedded Systems
Credit Hours	: 3+1=4
Course Code	: Theory (EE26-412) Practical (EE26-413)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Office Hours	: 3-hours/ week
Marks	: Theory (100) Practical (50)
Instructor Name	: Engr. Abdul Manan

DESCRIPTION

In today's world, embedded systems are everywhere homes, offices, cars, factories, hospitals, planes and consumer electronics. Their huge numbers and new complexity call for a new design approach, one that emphasizes high-level tools and hardware/software tradeoffs, rather than low-level assembly-language programming and logic design. This course presents the traditionally distinct fields of software and hardware design in a new unified approach. It covers trends and challenges, introduces the design and use of single-purpose processors ("hardware") and general-purpose processors ("software"), describes memories and buses, and illustrates hardware/software tradeoffs, chip technologies, and modern design tools.

Mapping of SDGs

SDG 9: Industry innovation	9.4: greater adoption of clean and environmentally sound technologies and industrial processes.....
SDG 11: Sustainable cities and communities	11.6: special attention to air quality and municipal and other waste management.....

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Describe the basic concepts of the Embedded System Design and shall be able to differentiate between the hardware and software viewpoints.	Cognitive	C2	3	50
	2	Analyze the various design techniques for single-purpose, general purpose and standard single purpose processors	Cognitive	C4	4	50

LABORATORY LEARNING OUTCOMES

Upon successful completion of the lab experiments, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Troubleshoot and debug embedded systems to identify and resolve issues.	Psychomotor	P4	4	50

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COURSE OUTLINE (THEORY)

Introduction to Embedded Systems, what is an Embedded System. Embedded Systems design constraints Microcontroller Architecture and Programming Model, Microcontrollers vs Microprocessors, Overview of PIC Microcontroller Family and Architecture Programming Model, PIC Instruction Set, Examples, Interfacing PIC Microcontroller to the outside world. I/O Interfacing Basics, PIC GPIO Module, PIC Timers and Counters Module, Watchdog Timer • Serial Communications Basics, PIC Serial Ports Module, Interrupt Management Interrupts Module, PIC Capture-Compare Module, Analog-To-Digital Conversion Basics, PIC Analog-To-Digital (A/D) Conversion Module, SPI, I2C Communications Basics, PIC SPI, I2C Module, Examples, Model Based Design of Embedded Systems, Embedded Systems Design Process, Introduction to model-based design, Context and Use Case diagrams, Sequence and Collaboration diagrams, Class and Object Diagrams, State charts.

COURSE OUTLINE (PRACTICAL)

8051 Microcontroller, PWM generation using AVR Microcontroller, Implementation of a Calculator with PIC Microcontroller, Keypad and Alphanumeric LCD, Serial Communication with PIC Controller, Analog to Digital Conversion using PIC Controller, Graphics on Microblaze, Analysis and Verification project.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Frank Vahid and Tony Givargis, Embedded System Design: A Unified Hardware/Software Introduction, Wiley, latest ed.
- [2] E. A. Lee and S. A. Seshia, Introduction to Embedded Systems: A Cyber-Physical Systems Approach, MIT Press, latest ed.
- [3] Pong P. Chu, RTL Hardware Design Using VHDL: Coding for Efficiency, Portability, and Scalability, Wiley-IEEE Press, latest ed.



**Department of Electronic Engineering
Faculty of Engineering and Technology
University of Sindh, Jamshoro**



Subject Name	: Project Management
Credit Hours	: 2+0=2
Course Code	: Theory (MS26-418)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/32
Marks	: Theory (50)
Instructor Name	: Engr. Umair Ali Abro

DESCRIPTION

The primary objective of this course is to get the fair understanding of core issues pertaining to Engineering Project Management. This course is aimed at providing both basic and some advanced exposure to emerging trends in the field of Project Management, so as to enable the engineering professionals of tomorrow to successfully complete sophisticated projects within the constraints of capital, time, and other resources with due regards to stakeholders set of expectations. Engineering students will learn key Project Management skills and strategies and will be able to face emerging challenges.

Mapping of SDGs

SDG 4: Quality education	4.4: substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
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COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Understand the concept of a sustainable lifestyle and explain why a sustainable society is important for the environment.	Cognitive	C2	6	10
	2	Analyze project-management knowledge areas, including risk, quality, stakeholder, schedule, and cost management.	Cognitive	C4	10	20
	3	Justify time and cost estimates for complex tasks using project scheduling and control techniques, including CPM and EVM.	Cognitive	C5	11	20

COURSE OUTLINE (THEORY)

Project Management Concepts: History of Project Management. Introduction to Project Management, Project, Program & Portfolio Management, Project characteristics, Objectives & Requirements. Project Phases and Stages, Project Life Cycle, Project Environment, Project Scope & Project Charter, Project Manager, Project Stakeholder Analysis. Project Proposal Development. Project Proposal. Characteristics of good proposal. Types of Proposals. Request for Proposal. Request for Quotation etc). Proposal Templates etc. Project Feasibility. Brief review of various aspects of Project Feasibility like Technical. Social. Managerial. Economic. Financial & Marketing, Administrative etc. Project Selection Criteria (Economic Analysis of Engineering Projects) Using Break Even Analysis, Cost Benefit Ratio, Internal Rate of Return, Net Present Value etc. Project Contract & Procurement Management. Engineering contracts. Type of contracts, understanding of procurement Process & Cycle, PPRA Rules. Project Planning and Scheduling. Project Planning (Resource & HR Planning). Work Breakdown Structure. Project Network & Scheduling. Manning Schedule and Activity Charts, Critical Path Method (CPM)/Project Evaluation & Review Techniques. Project Costing & Estimation. Cost Estimation in Projects. Cost components in projects and methods for cost estimation in projects. Cost Control in Projects. Estimation of Outstanding Work. Earned Value Management. Schedule & cost variance analysis. Project HRM & Communication Management. Effective organization and communication for Successful Projects, Project Organizational Structures (Project matrix and project-based organizations). Project HR Plan preparation. HR Need Assessment and HR Matrix. Building and managing effective project team. Selection & control mechanism of HRM in Projects, Effective Communication Plan. Project Risk Management. Definitions Project Risk, Project Risk Management Tools. Types of Project Risk, Project Risk Assessment. Risk Identification and Mitigation, Monitoring & Controlling Risk, Generic Risk Management Strategies & Technique. Computer Application in Project Management. Basic: Elementary introduction and hands on basic exposure of use of MS Project & Primavera P6 Software in Project Management. Project Quality Management. Defining Quality, Quality Assurance, Quality Management, Quality Improvement Tools as applied to Project Management, Project Quality Management Plan, Quality Management Processes and Strategies. Project Closure & Termination. Project Evaluation, defining project success. Project Completion Criteria, Project Audit. Project Termination & When to close a project, the termination process. Project Close Up & lesson learnt. & Project Archive

RECOMMENDED TEXT AND REFERENCE BOOKS

1. Harold Kerzner, Project Management: A System Approach to Planning, Scheduling, and Controlling, Wiley, latest ed.
2. F. Lawrence Bennett, The Management of Engineering, Wiley, latest ed.
3. David Cleland, Field Guide to Project Management, Wiley, latest ed.
4. H. Eisner, Essentials of Project Management and Systems Engineering Management, Wiley, latest ed.
5. J. D. Frame, Managing Projects in Organizations, Jossey-Bass, latest ed.
6. Eliyahu Goldratt, Critical Chain, North River Press, latest ed.
7. M. E. Haynes, Project Management: From Idea to Implementation, Crisp Publications, latest ed.
8. James Lewis, Project Planning, Scheduling & Control, McGraw-Hill, latest ed.
9. James P. Lewis, Mastering Project Management, McGraw-Hill, latest ed.

Fourth Year - Eighth Semester



Department of Electronic Engineering
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Subject Name : Entrepreneurship
Credit Hours : 3+0=3
Course Code : Theory (MS26-424)
Effective : 2K26-BE(EE)
Pre-Requisites : Nil
Weeks/Lectures/Labs : 16/48
Marks : Theory (100)
Instructor Name : Engr. Aunsa Shah

DESCRIPTION

This course is designed to promote entrepreneurial spirit and outlook among students, encouraging them to think critically, identify opportunities, and transform their ideas into successful ventures. It aims at imparting them with the requisite knowledge; skills and abilities, enabling them to seize the identified opportunities for initiating ventures and successfully navigating the challenges that come with starting a business and managing it. The course covers topics relevant to entrepreneurship including setting up and initiation of business (including requirements for registration and incorporation with regulators such as SECP and others), market research, opportunity identification, business planning, financial literacy for managing finances and securing funding, marketing and sales, team building and innovation. Overall, the course is geared towards personal growth and professional development for pursuing innovative- ideas, availing opportunities and initiating start-ups.

Mapping of SDGs

SDG 1: No Poverty	1.4: ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance.
SDG 2: Zero hunger	2.3: double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment.

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Defend a business plan with an appropriate business model	Cognitive	C5	11	40
	2	Formulate the ability to provide self-analysis in the context of an entrepreneurial career, incorporating project management and financial decision-making skills	Affective	A4	10	44
	3	Express the ability to find an attractive market that can be reached economically.	Affective	A3	6	16

COURSE OUTLINE (THEORY)

Introduction to Entrepreneurship, Definition and concept of entrepreneurship, why to become an entrepreneur? Entrepreneurial process, Role of entrepreneurship in economic development, Entrepreneurial Skills, Characteristics and qualities of successful entrepreneurs (including stories of successes and failures), Areas of essential entrepreneurial skills and ability areas such as creative and critical thinking, innovation and Risk taking. Opportunity Recognition and Idea generation, Marketing and Sales, Financial Literacy, Basic concepts of income, savings, investments, Basic concepts of assets, liabilities and equity, Basic concepts of revenue and expenses, overview of cash flows, Overview of banking products including Islamic modes of financing, Sources of funding for startups (angel financing, debt financing, equity financing etc.) Team building for startups, characteristics and features of effective Teams, Regulatory requirements to Establish Enterprises in Pakistan, Types of enterprises (e.g.. sole proprietorship; partnership; private limited companies etc), Intellectual property rights and protection, Regulatory requirements to register an enterprise in Pakistan, with special emphasis on export firms, Taxation and financial reporting obligation

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Paul Burns and Jim Dewhurst, Small Business and Entrepreneurship, Palgrave Macmillan, latest ed.
- [2] P. N. Singh, Entrepreneurship for Economic Growth, latest ed.
- [3] Peter F. Drucker, Innovation and Entrepreneurship, Harper & Row, latest ed.



Department of Electronic Engineering
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Subject Name	: FPGA-Based System Design
Credit Hours	: 3+1=4
Course Code	: Theory (EE26-420)
	: Practical (EE26-421)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100)
	: Practical (50)
Instructor Name	: Engr. Dr. Zain Anwar Memon

DESCRIPTION

FPGA involves designing and developing digital systems using FPGAs. FPGAs are integrated circuits that can be programmed and reprogrammed to perform a wide range of digital functions. They are widely used in various industries, including telecommunications, aerospace, automotive, and consumer electronics. Students will learn the fundamentals of digital design, including Boolean algebra, combinational logic, and sequential logic.

Mapping of SDGs

SDG 8: Decent work and economic growth	8.3: decent job creation, entrepreneurship.....
SDG 9: Industry innovation	9.5: encouraging innovation and substantially increasing the number of research and development workers.....

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Understand the fundamentals of digital system design.	Cognitive	C2	3	35
	2	Evaluate complex FPGA systems with logic blocks, LUTs and memory.	Cognitive	C5	3	40
	3	Apply the Hardware Description Language (HDL) to design hardware components and systems using software tools.	Cognitive	C3	2	25

LABORATORY LEARNING OUTCOMES

Upon successful completion of the lab experiments, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Implement and verify digital-logic circuits on an FPGA using HDL-based design software under guidance.	Psychomotor	P3	8	50

COURSE OUTLINE (THEORY)

Introduction to FPGA-Based Digital Design, Overview of digital design and FPGA technology, Applications of FPGA-Based Digital Design, Introduction to hardware DESCRIPTION languages Combinational Logic Design, Boolean algebra and logic gates, Karnaugh maps and simplification, Implementation of combinational logic using FPGAs Sequential Logic Design, Flip-Flops and latches, State machines and state diagrams, Implementation of sequential logic using FPGAs, Hardware Description Languages, VHDL and Verilog, Design and simulation of digital systems using HDLs, Introduction to synthesis and optimization, FPGA Implementation and Verification, FPGA architecture and configuration, Synthesis and place-and-route, Verification and testing of digital systems using FPGAs Advanced Topics in FPGA-Based Digital Design, High-level synthesis and design automation, Reconfigurable computing and dynamic reconfiguration, Emerging trends in FPGA-Based Digital Design

COURSE OUTLINE (PRACTICAL)

Introduction to Verilog HDL, gate-level modeling, data flow modeling, behavioral modeling, design, simulation, synthesis and fitting of combinational circuits, design and implementation of an FSM and memory.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] Steve Kilts, Advanced FPGA Design: Architecture, Implementation, and Optimization, Wiley-IEEE Press, ISBN: 0470054379.
- [2] Samir Palnitkar, Verilog HDL, Prentice Hall, ISBN: 0130449113.
- [3] Pong P. Chu, FPGA Prototyping by VHDL Examples: Xilinx Spartan-3, Wiley-Interscience, ISBN: 0470185317.
- [4] Wayne Wolf, FPGA-Based System Design, Wiley, latest ed.
- [5] Simon Monk, Programming FPGAs: Getting Started with Verilog, McGraw-Hill Education, latest ed.
- [6] Douglas L. Perry, VHDL Programming by Example, McGraw-Hill Education, latest ed.
- [7] Michael D. Ciletti, Advanced Digital Design with the Verilog HDL, Prentice Hall, ISBN: 0136019285.



Department of Electronic Engineering
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University of Sindh, Jamshoro



Subject Name	: Industrial Electronics
Credit Hours	: 3+1=4
Course Code	: Theory (EE26-422)
	: Practical (EE26-423)
Effective	: 2K26-BE(EE)
Pre-Requisites	: Nil
Weeks/Lectures/Labs	: 16/48/16
Marks	: Theory (100)
	: Practical (50)
Instructor Name	: Mr. Ghulam Mustafa Shoro

DESCRIPTION

Introduction to Industrial Electronics, Applications of industrial electronics and Overview of power electronics, motor control, sensors, and instrumentation. Industrial Electronics deals with the application of electronic principles and technologies to control and automate industrial processes. It involves the use of electronic devices, circuits, and systems to monitor, control, and optimize industrial processes, such as manufacturing, power generation, and transmission.

Mapping of SDGs

SDG 8: Decent work and economic growth	8.8: promote safe and secure working environments for all workers.....
SDG 9: Industry innovation	9.4: greater adoption of clean and environmentally sound technologies and industrial processes.....

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Theory	1	Design using building block of industrial heating system	Cognitive	C6	1	10
	2	Analyze the various control mechanism related to industrial drives	Cognitive	C4	2	30
	3	Design and Implementation of Industrial Electronic Systems and assess the impact of industrial electronic solution on energy	Cognitive	C6	6	30

		consumption and environmental sustainability.				
	4	Evaluate the integration of advance integrating system technology	Cognitive	C5	4	30

LABORATORY LEARNING OUTCOMES

Upon successful completion of the lab experiments, the student will be able to:

	CLO	Description	Domain	Taxonomy level	PLO	Marks
Practical	1	Demonstrate Proficiency in Laboratory Techniques and Equipment	Psychomotor	P4	1	10
	2	Perform Experiments and Analyze Data	Psychomotor	P5	2	20
	3	Integrate and troubleshoot PLC-based industrial-control hardware to achieve specified system operation.	Psychomotor	P6	3	20

COURSE OUTLINE (THEORY)

Introduction to Industrial Electronics, Applications of industrial electronics, Overview of power electronics, motor control, sensors, and instrumentation Power Electronics, Power semiconductor devices, Rectifiers and filters, DC-DC converters, Inverters, AC voltage controllers, Motor Control, DC motor control, AC motor control, Motor starting and braking Sensors and Instrumentation, Principles of sensing, Sensors for temperature, pressure, flow, and level, Signal conditioning circuits, Industrial Communication, Overview of industrial communication systems, Modulation techniques, Transmission lines and waveguides, Antennas and radiation, Industrial Automation, Programmable Logic Controllers (PLCs), Supervisory Control and Data Acquisition (SCADA) systems, Human Machine Interfaces (HMIs), Case Studies, Real-world examples of industrial electronics applications, Analysis and design of electronic circuits and systems in industrial settings.

COURSE OUTLINE (PRACTICAL)

Experiments related to the principles of PLCs; speed control of DC, AC, and servo motors.

RECOMMENDED TEXT AND REFERENCE BOOKS

- [1] James A. Rehg and Glenn J. Sartori, Industrial Electronics, Pearson, latest ed.
- [2] Ned Mohan, Tore M. Undeland, and William P. Robbins, Power Electronics: Converters, Applications, and Design, Wiley, latest ed.
- [3] Ramon Pallas-Areny and John G. Webster, Sensors and Signal Conditioning, Wiley, latest ed.
- [4] Thomas E. Kissell, Industrial Electronics Applications for Programmable Controllers, Instrumentation and Process Control, and Electrical Machines and Motor Controls, Prentice Hall, latest ed.

- [5] Biswanath Paul, Industrial Electronics and Control, PHI Learning, latest ed.
- [6] J. David Irwin and C. H. Chen, Industrial Electronics Handbook, CRC Press, latest ed.