B.E. TELECOMMUNICATION - CURRICULUM

TL-MUET BoS TEAM
Effective 24TL onwards

July 2024

Courses, Knowledge Area and Pre-requisites

First Semester

Code	Title	Credit Hours	Knowledge Area	Pre-requisite
CSC110	Introduction to Information and Communication Technologies	(2+1)	Computing (Programming)	
CSC121	Programming Fundamentals	(2+1)	Computing (Programming)	
MTH108	Applied Calculus	(3+0)	Natural Science (Math)	
TL122	Applied Physics	(2+1)	Natural Science (Physics)	
ENG101	Functional English	(3+0)	Humanities (English)	
PS106	Pakistan Studies	(2+0)	Humanities (Culture)	
	TOTAL	(14+3)	= 17	

Second Semester

Code	Title	Credit Hours	Knowledge Area	Pre-requisite
MTH112	Linear Algebra & Analytical Geometry	(3+0)	Natural Science (Math)	
EL102	Circuit Analysis	(3+1)	Engineering Foundation	
EL111	Electrical Workshop Practice	(0+1)	Engineering Foundation	
EL127	Engineering Drawing	(0+1)	Engineering Foundation	
ES113	Electronic Devices & Circuits	(3+1)	Engineering Foundation	
PS107	Ideology & Constitution of Pakistan	(2+0)	Humanities (Culture)	
	TOTAL	(11+4)	= 15	

Introduction to Information & Communication Technologies

Pre-requisites	Nil
Co-requisite	Nil
Course Code	CSC110
Semester	1st
Effective	24TL batch and onwards
Theory Marks	50
Practical Marks	50
Credit Hours	2 + 1
Minimum Contact Hours	32 + 48
Assessment (Theory)	20% sessional work, 30% mid-semester, 50% final examination
Assessment (Practical)	30% lab rubrics, 20% open-ended lab. / mini-project, 50% final lab. examination

Course Objective(s)

To acquaint the students with the history of computing and its fundamentals.

Course Learning Outcomes

Upon completion of this course, students will be able to,

Table 1: TH: CLOs, Mapping of CLOs to PLOs of Introduction to Information & Communication Technologies

CLOs	Description	Taxonomy	PLOs
1.1	*Explain* the basics of computing technology and related terminologies.	C2	1
2.1	*Demonstrate* number system conversion and arithmetic.	C3	1

Table 2: PR: CLOs, Mapping of CLOs to PLOs of Introduction to Information & Communication Technologies

CLOs	Description	Taxonomy	PLOs
1.1p	*Recognize* computing components and their functions.	P1	1

Table 3: Tentative Assessment Methods of CLOs of Introduction to Information & Communication Technologies

CLOs	Quiz / Assignment / Lab Rubrics	Mid Exam	Final Exam	Lab Exam	Project / OEL	Learning Levels	PLOs
1.1	[Quiz-20%]	[Q1-70%]	[Q1-10%]			C2	1
2.1	[Quiz-40%]	[Q2-30%]	[Q2-30%]			C3	1
1.1p	[Lab-30%]			[Test-30%] [ViVa-20%]	[20%]	P1	1

Contents

I. History of Computer and Basics

- Brief history of computer and its importance, definition of computer and its components, software and its types, classification of computers, basics of computer network and Internet.

II. The System Unit, Processing, and Memory

- Digital data representation (binary number system and its conversion to / from decimal number system), machine language and coding systems for text-based / graphics / audio / video data,

the motherboard and its components such as processors / RAM / storage / expansion slots, concept of processing speed / memory / storage / bus and how central processing unit works.

III. Storage

- Storage media and storage devices, types of storage technology such as magnetic hard drives, solid-state drives (SSDs), optical discs and drives, flash memory, concept of network and cloud storage systems.

IV. Input and Output

- Input types and devices such as keyboard / mice / touch pad / stylus / scanners / cameras, barcode and radio frequency identification (RFID) reader, near frequency identification (NFC) reader, optical mark reader (OMR), magnetic ink character recognition (MICR) reader, biometric reader.
- Output devices and their characteristics such as liquid crystal displays (LCDs) and organic light emitting diode (OLED) displays, projectors, printers, speakers.

V. System Software

- Operating system and its functions, graphical user interface (GUI) versus command line interface operating systems, desktop versus mobile versus server operating systems, operating system for personal computers such as disk operating system (DOS) / Windows / OS X / UNIX / Linux, operating system for mobile devices such as Android / iOS.

VI. Networks and Communication Devices

- Definition of computer network and its applications, wired versus wireless networks, concept of network topology and its types (star, bus, mesh), network size and coverage area (LAN, MAN, WAN), concept of intranet and extranet, transmission types and characteristics, types of networking media such as twisted-pair / coaxial / fiber-optic cable.
- Concept of ethernet, power over ethernet (PoE), powerline communication, Wi-Fi, cellular standards, bluetooth, zigbee.
- Concept of network adaptors and modems.

Lab Outline

The laboratory experiments will make students recognize different components of computer as well as be able to assemble and disassemble it. Following are the list of topics to cover hands-on demonstration,

I. Recognize different components of computer as well as be able to assemble and disassemble it.

- System Unit, Processing, Memory, Storage, Input and Output

II. Recognize and be able to use System as well as Application Software.

- Operating System (Installation and Basic Usage / Demonstration of Windows / Linux)
- System Tools: Windows Defender Firewall, Disk Cleanup, Disk Management, OS Recovery etc.
- Basic Windows command line tools such as `copy`, `move`, `dir`, `del`, `cd`, `format`, `ping`, `tracert`, `ipconfig`, `getmac`, `arp`, `netstat`, `netsh`, `scp`, `ssh`, `telnet`, `cipher`, `attrib` etc.
- Basic Linux command line tools such as `ls`, `cd`, `cp`, `mv`, `rm`, `mkdir`, `rmdir`, `grep`, `pwd`, `cat`, `nano`, `gpart`, `find`, `which`, `chown`, `chmod` etc.
- ISO Image Making and Deployment on Removable Media
- Desktop Application Software such as Microsoft (Word, Excel, PowerPoint, Access) / LibreOffice (Writer, Calc, Math, Impress, Draw), Compression Tools, Web Browsers, Image/Audio/Video Editing Tools etc.
- Web Server Installation / Deployment (XAMP, WAMP, Apache, PHP)
- Development of Simple Website using HTML and CSS basics.
- Mobile Application Software (Android OS Usage)

III. Recognize different transmission media and connectors used in computer networks.

- UTP/STP cable and RJ45 connectors, Straight-through / Crossover Ethernet cable, Crimping tool, Fiber optic cable and LC/ST/SC/FC connectors, Coaxial cable and BNC connectors.

IV. Recognize and be able to use different electronic devices.

- Hub, Switch, Router, Servers, WiFi Access Point and USB WiFi Adaptors, PCI Express Gigabit Ethernet adaptor, Ethernet Cable Modem, USB 4G Modem, USB flash drives, Smart Phones and Tablets, Fitness Band and Smart Watches, CCTV System, Biometric Devices, LAN cable testers.

V. Be able to Recognize and Deploy Ad-hoc as well as Infrastructure Network between PCs

Recommended Textbooks

1. Understanding Computers: Today and Tomorrow: Comprehensive - Deborah Morley and Charles S. Parker
(Latest Edition "16th", ISBN-10: 1305656318 or ISBN-13: 978-1305656314)
2. Using Information Technology: A Practical Introduction to Computers and Communications - Brian Williams and Stacey Sawyer
(Latest Edition "7th", ISBN-10: 0072260718 or ISBN-13: 978-0072260717)

Reference Material

1. Computer Organization and Architecture: Designing for Performance - William Stallings
(Latest Edition "7th", ISBN-10: 0131856448 or ISBN-13: 978-0131856448)

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	Academic Council	Res. No. 104.6(i)	Dated: 29-07-2022

Programming Fundamentals

Pre-requisites	Nil
Co-requisite	Nil
Course Code	CSC121
Semester	1st
Effective	24TL batch and onwards
Theory Marks	50
Practical Marks	50
Credit Hours	2 + 1
Minimum Contact Hours	32 + 48
Assessment (Theory)	20% sessional work, 30% mid-semester, 50% final examination
Assessment (Practical)	30% lab rubrics, 20% open-ended lab. / mini-project, 50% final lab. examination

Course Objective(s)

The objective of this course is to assist students in creating computer programs and designing algorithms using contemporary high-level language, which enables them to achieve practical objectives.

Course Learning Outcomes

Upon completion of this course, students will be able to,

Table 4: TH: CLOs, Mapping of CLOs to PLOs of Programming Fundamentals

CLOs	Description	Taxonomy	PLOs
1.1	*Explain* the basic problem solving steps and logic constructs.	C2	1
2.1	*Apply* basic programming concepts.	C3	3

Table 5: PR: CLOs, Mapping of CLOs to PLOs of Programming Fundamentals

CLOs	Description	Taxonomy	PLOs
1.1p	Design and *implement* algorithms to solve real-world problems.	C3	3

Table 6: Tentative Assessment Methods of CLOs of Programming Fundamentals

CLOs	Quiz / Assignment / Lab Rubrics	Mid Exam	Final Exam	Lab Exam	Project / OEL	Learning Levels	PLOs
1.1	[Quiz-50%]	[Q1-30%]	[Q1-20%]			C2	1
2.1	[Quiz-40%]	[Q2-30%]	[Q2-30%]			C3	3
1.1p	[Lab-30%]			[Test-30%] [ViVa-20%]	[20%]	C3	3

Contents

I. Background

- Basics of computer hardware and software
- How computers store data and manipulate
- How a computer program works
- Why programs are written in high-level languages
- Concept of compiler and interpreter
- Building and running computer program, python through interactive / script mode

II. Fundamentals

- Program development cycle, pseudocode and flow chart
- Design / write / compile simple programs (input, processing, output)
- Variables, comments, reading input from keyboard
- Data types and assignment statements, mathematical operation and performing calculation, named constants
- Introduction to Turtle Graphics, basic programs through turtle graphics library

III. Decision Structures

- `if` and `if-else` structures
- Comparing strings
- `if-elif-else` nested structures
- Logical operators (`AND`, `OR`, and `NOT`), boolean variables
- Apply decision structures using Turtle Graphics

IV. Repetition Structures

- `While` loops
- `For` loops
- Counters, accumulators, running totals
- Sentinels, techniques for writing input validation loops
- Nested loops
- Utilize loops to draw designs with Turtle Graphics

V. Functions

- Function definition, benefits of using functions, identify situations where functions can be used effectively
- Defining and calling a Void function, designing a program to use functions, local variables and scope, passing arguments to functions
- Global variables and global constants
- Value-returning functions, examples of value-returning functions
- Standard library functions and modules, importing modules (`math`, `random`)
- Writing your own value-returning functions
- Modularize the code with functions using Turtle Graphics

VI. Files and Exceptions

- Basic File Input and Output
- Type of files, file access methods, filenames and file objects
- File processing (opening a file, specifying the location of a file, writing data to a file, reading data from a file, appending data to an existing file, writing and reading numeric data)
- Using loops to process files and records
- Handling exceptions

VII. Lists and Tuples

- Python sequences
- Basics of lists (repetition operator, iterating over a list with the `for` loop, indexing, concatenating lists)
- List slicing and List processing
- Two-dimensional lists
- Tuples
- Plotting list data with the `matplotlib` package as well as learn how to interpret and analyze it

VIII. Dictionaries and Sets

Lab Outline

I. Python Environment

- Python and its features
- Installation and setting up Python environment
- Python in Interactive / Script mode
- Python IDEs (Visual Studio Code / PyCharm Community Edition / Spyder)
- Package management and virtual environment setup

II. Fundamentals

- Demonstration of data types, variables, operators, assignment statements, mathematical operation and performing calculation, named constants, comments

III. Decision Structures

- Apply `if`, `if-else`, `if-elif-else` structures to code efficient and concise programs
- Apply decision structures to handle errors and unexpected inputs
- Apply logical operators and boolean variables to demonstrate wide range of scenarios and conditions
- Develop a project that uses decision structures to make decisions based on user input

IV. Repetition Structures

- Demonstration of definite and indefinite loops
- Demonstration of loop control statements and nested loops
- Demonstration of how to raise exceptions in loops to handle unexpected situations
- Develop a project that uses repetition structures to iterate over data and perform operations, as well as apply error handling techniques to handle unexpected situations

V. Functions

- Demonstration of how to use built-in functions in python
- Demonstration of how to write reusable code by defining and calling custom functions as well as learn to pass arguments in python
- Demonstration of how to import and use built-in as well as external modules in python
- Develop a project that uses functions and modules to organize and reuse code, as well as apply good coding practices such as code readability and documentation

VI. Files and Exceptions

- Demonstration of file input and output operations in Python
- Demonstration of different file types and access methods
- Demonstration of creating, opening, and closing file objects in Python
- Demonstration of reading from and writing data to files using Python's file I/O functions
- Demonstration of appending data to existing files in Python
- Demonstration of writing and reading numeric data to/from files using Python's file I/O
- Demonstration of processing files and records using loops in Python
- Demonstration of handling exceptions in Python's file I/O operations
- Develop a finance management program that uses files and exceptions to read/write financial data and handle errors caused by incorrect user input or file access issues

VII. Lists and Tuples

- Demonstration of how to create, modify, and access elements of lists in Python
- Demonstration of the repetition operator and concatenation to manipulate lists
- Demonstrate of how to iterate over a list with a for loop and the use of indexing to access list elements

- Demonstration of how to slice a list and perform various operations on the sliced elements
- Demonstration of creating and manipulating two-dimensional lists
- Demonstration of how to create, modify, and access elements of tuples in Python
- Demonstration of using the `matplotlib` package to plot list data
- Develop a project to analyze sales data using lists and tuples in Python, including reading and parsing data from CSV files, organizing data, performing data analysis, visualizing data using `matplotlib` package, and writing the analyzed data to a new CSV file

VIII. Dictionaries and Sets

- Demonstration of creating, modifying, and accessing dictionary and set data structures
- Demonstration of the ability to use dictionary and set methods to perform common operations such as adding, removing, and updating elements
- Demonstration of the ability to manipulate dictionary and set data structures using iteration and conditional statements
- Demonstration of the ability to apply dictionary and set data structures to real-world problem-solving scenarios
- Develop a project that utilizes dictionaries and sets in Python to efficiently store and retrieve data about a fictional bookstore's inventory, including features such as adding new books, updating information, searching by title or author, tracking sales and generating reports.

Recommended Textbooks

1. Starting Out with Python - Tony Gaddis
   (Latest Edition "4th", ISBN-10: 0134444329 or ISBN-13: 978-0134444321)
2. Starting Out with Programming Logic and Design - Tony Gaddis
   (Latest Edition "4th", ISBN-10: 0133985075 or ISBN-13: 978-0133985078)
3. Introduction to Computation and Programming using Python: With Application to Understanding Data - John V. Guttag
   (Latest Edition "2nd", ISBN-10: 0262529629 or ISBN-13: 978-0262529624)

Reference Material

1. Python Programming: An Introduction to Computer Science - John Zelle
   (Latest Edition "2nd", ISBN-10: 1590282418 or ISBN-13: 978-1590282410)
2. The C Programming Language - Brian W. Kernighan, Dennis M. Ritchie
   (Latest Edition "2nd", ISBN-10: 0131103628 or ISBN-13: 978-0131103627)
3. Object-Oriented Programming in C++ - Robert Lafore
   (Latest Edition "4th", ISBN-10: 0672323087 or ISBN-13: 978-0672323089)
4. Understanding Pointers in C - Yashavant Kanetkar
   (Latest Edition "3rd", ISBN-10: 8176563587 or ISBN-13: 978-8176563581)

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	Board of Faculty of EEC Engineering	Res. No. 19.9	Dated: 15-06-2022
	Academic Council	Res. No. 104.6(i)	Dated: 29-07-2022

Applied Calculus

Pre-requisites	Nil
Co-requisite	Nil
Course Code	MTH108
Semester	1st
Effective	22TL batch and onwards
Theory Marks	100
Practical Marks	0
Credit Hours	3 + 0
Minimum Contact Hours	48 + 0
Assessment (Theory)	20% sessional work, 30% mid-semester, 50% final examination

Course Objectives

To acquaint the students with the idea of calculus and its applications in the engineering field.

Course Learning Outcomes

Upon completion of this course, students will be able to achieve:

Table 7: TH: CLOs, Mapping of CLOs to PLOs of Applied Calculus

CLOs	Description	Taxonomy	PLOs
1.1	Determine the functions and their derivatives.	C3	1
2.1	Compute the integral calculus with applications.	C3	1
3.1	Apply the vector calculus in the field of engineering.	C3	1

Table 8: Tentative Assessment Methods of CLOs of Applied Calculus

CLOs	Quiz / Assignment / Lab Rubrics	Mid Exam	Final Exam	Lab Exam	Project / OEL/CEP	Learning Levels	PLOs
1.1	[Quiz-20%]	[Q1-70%]	[Q1-10%]			C3	1
2.1	[Quiz-40%]	[Q2-30%]	[Q2-30%]			C3	1
3.1	[Quiz-40%]		[Q3-60%]			C3	1

Contents

I. Introduction to Functions

- Mathematical and physical meaning of functions, graphs of various functions, types of functions.

II. Introduction to Limits

- Theorems of limits and their applications to functions, right hand and left hand limits, continuous and discontinuous functions and their applications

III. Derivatives

- Introduction to derivatives, geometrical and physical meaning of derivatives, partial derivatives and their geometric significance, application problems (rate of change, marginal analysis)

IV. Higher Derivatives

- Leibnitz theorem, Rolle's theorem, mean value theorem, taylors and maclaurins series.

V. Evaluation of limits using L'Hospital's rule

- Indeterminate forms $(0/0), (\infty/\infty), (0 \times \infty), (\infty - \infty), 1^{\infty}, \infty^{0}, 0^{0}$

VI. Application of Derivatives

- Asymptotes, tangents and normal, curvature and radius of curvature, differentials with application.

VII. Application of Partial Derivatives

- Euler's theorem, total differentials, maxima and minima of function of two variables

VIII. Integral Calculus

- Methods of integration by substitution and by parts, integration of rational and irrational algebraic functions, definite integrals, improper integrals, gamma and beta functions, reduction formulae

IX. Application of Integral Calculus

- Cost function from marginal cost, rocket flights, area under curve

X. Vector Calculus

- Vector differentiation and vector integration with their physical interpretation and applications, ∇ operator, gradient, divergence and curl with their application

Recommended Books

1. Brief Calculus and its Applications - Daniel Dale Benice
(Latest Edition "2nd", ISBN-10: 0395824648 or ISBN-13: 978-0395824641)
2. Applied Calculus - Raymond F. Coughlin
(Latest Edition "2nd", ISBN-10: 020506910X or ISBN-13: 978-0205069101)
3. Calculus with Analytical Geometry - S. M. Yousuf, Muhammad Amin
(Latest Edition "7th")

Approval:	Board of Studies of BSRS	Res. No. 01	Dated: 26-03-2018
	Board of FOST&H	Res. No. 3.1	Dated: 11-04-2018
	Academic Council	Res. No. 17(ii)	Dated: 23-04-2018

Applied Physics

Pre-requisites	Nil
Co-requisite	Nil
Course Code	TL122
Semester	1st
Effective	22TL batch and onwards
Theory Marks	50
Practical Marks	50
Credit Hours	2 + 1
Minimum Contact Hours	32 + 48
Assessment (Theory)	20% sessional work, 30% mid-semester, 50% final examination
Assessment (Practical)	30% lab rubrics, 20% open-ended lab. / mini-project, 50% final lab. examination

Course Objectives

To acquaint the students with the physics of semiconductors, electrostatics, and electrical circuits.

Course Learning Outcomes

Upon completion of this course, students will be able to achieve:

Table 9: TH: CLOs, Mapping of CLOs to PLOs of Applied Physics

CLOs	Description	Taxonomy	PLOs
1.1	Describe with the physics of semiconductors, electrostatics, magnetism and electrical circuits.	C2	1
2.1	Analyze the problem of AC/DC based electrical circuits.	C4	2

Table 10: PR: CLOs, Mapping of CLOs to PLOs of Applied Physics

CLOs	Description	Taxonomy	PLOs
1.1p	Explain the practical knowledge of different devices and components used in applied physics.	C2	1
2.1p	Perform experiments in laboratory to validate the laws and theories of physics.	P4	9
3.1p	Respond to the questions related to applied physics.	A2	8

Table 11: Tentative Assessment Methods of CLOs of Applied Physics

CLOs	Quiz / Assignment / Lab Rubrics	Mid Exam	Final Exam	Lab Exam	Project / OEL/CEP	Learning Levels	PLOs
1.1	[Quiz-40%]	[Q1-30%]	[Q1-30%]			C2	1
2.1	[Quiz-40%]	[Q2-30%]	[Q2-30%]			C4	2
1.1p	[Lab-100%]					C2	1
2.1p	[Lab-40%]			[Test-30%]	[30%]	P4	9
3.1p				[ViVa-100%]		A2	8

Contents

I. Semiconductor Physics

- insulators, conductors, superconductors, semiconductors, energy levels in a semiconductor, hole concept, intrinsic and extrinsic regions, electron hole pair, distribution of electrons and holes in conduction and valence band, recombination and life time, doped semiconductors, law of mass action, PN junction, forward and reverse characteristics, diodes and transistors.

II. Electrostatics

- electric current, electric charge, coulomb's law, electric field intensity and electric potential, capacitors and charge storage concepts

III. Electric Circuits

- electric quantities, simple resistive circuits (series and parallel), kirchhoff law (KVL, KCL), voltage-divider rule, current-divider rule.

IV. Magnetism

- magnetism, magnetic fields, magnetic effects of electric current, faraday's and lenz's laws, ampere's law and its applications, eddy currents, inductors and inductance, induced current, Transformers, DC motors, stepper motors, and servo motors.

V. AC fundamentals

- AC waveform, period and frequency, radians and angular frequency, peak, instantaneous and rms values, average and effective values, AC voltage and current in capacitors and inductors, average power.

Lab Outline

The laboratory experiments will make students understand the phenomena of electromagnetic induction, heating effect of electric current, and the tools to analyze electric circuits and PN junction devices. For example, evaluation of series/parallel resistive circuits, charging/discharging mechanism of RC and RL circuits as well as non-linear characteristics of diode are investigated through hardware/simulations tools.

Recommended Books

1. University Physics - Hugh D. Young, Roger A. Freedman
   (Latest Edition "13th" Edition, ISBN-10: 0321696891 or ISBN-13: 978-0321696892)
2. Physics - David Halliday, Robert Resnick, Kenneth S. Krane
   (Latest Edition "4th" Edition, ISBN-10: 0471804584 or ISBN-13: 978-0471804581)

Reference Material

1. Basic Engineering Circuit Analysis - J. David Irwin, Robert M. Nelms
   (Latest Edition "11th" Edition, ISBN-10: 111853929X or ISBN-13: 978-1118539293)
2. Hughes Electrical and Electronic Technology - Edward Hughes
   (Latest Edition "11th" Edition, ISBN-10: 0273755102 or ISBN-13: 978-0273755104)

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	Board of Faculty of EEC Engineering	Res. No. 19.7	Dated: 15-06-2022
	Academic Council	Res. No. 6(iii)	Dated: 29-07-2022

Functional English

Pre-requisites	Nil
Co-requisite	Nil
Course Code	ENG101
Semester	1st
Effective	22TL batch and onwards
Theory Marks	100
Practical Marks	0
Credit Hours	3 + 0
Minimum Contact Hours	48 + 0
Assessment (Theory)	20% sessional work, 30% mid-semester, 50% final examination

Course Objectives

The aim of this course is to enable students to use four skills of language with confidence and use different components of grammar.

Course Learning Outcomes

Upon completion of this course, students will be able to achieve:

Table 12: TH: CLOs, Mapping of CLOs to PLOs of Functional English

CLOs	Description	Taxonomy	PLOs
1.1	Write varied contents including official letters, e-mails, and applications and summarize the texts using appropriate grammatical mechanisms and cohesive devices.	C3	12
2.1	Apply skimming, scanning and detailed reading and listening strategies to understand gist of the text/conversation.	C3	2
3.1	Demonstrate their skills using english language to express their point of view, show arguments and deliver a presentation in a real life situations.	C3	10

Table 13: Tentative Assessment Methods of CLOs of Functional English

CLOs	Sessional Quizzes and Assignments	Mid Exam	Final Exam	Learning Levels	PLOs
1.1	[Quiz-20%]	[Q1-60%]	[Q1-20%]	C2	12
2.1	[Quiz-20%]	[Q2-40%]	[Q2-40%]	C3	2
3.1	[Quiz-20%]		[Q3-80%]	C3	10

Contents

I. Reading

- Interactive reading, apply the skills of surveying skimming, scanning and detailed reading and identify topic sentence.

II. Writing

- Audience related writing, composition of sentences, paragraph, short descriptive writing, precis and letter and application, identify contextual clues with the help of cohesive devices.

III. Listening

- Collect gist and important points from a listening text or any other oral source viz. Lecture, speech or conversation.

IV. Speaking

- Taking part in different real life situations, answer question, argue and explain one's point of view, ask for information-turn taking techniques and presentation skills.

V. Grammar

- Mechanics of english language, punctuation, vocabulary, conversion of words, tenses and sentence structure.

Recommended Books

1. A Practical English Grammar: Exercises 1 (Bk. 1) - Audrey Thomson, Agnes Martinet
(Latest Edition "3rd", ISBN-10: 0194313433 or ISBN-13: 978-0194313438)
2. Academic Writing Course (Collins study skills in English) - R.R. Jordan
(Latest Edition "1st", ISBN-10: 0003700046 or ISBN-13: 978-0003700046)
3. Listening Comprehension and Note Taking Course (Collins study skills in English) - K. James, R. R. Jordan, A. J. Matthews
(Latest Edition "1st", ISBN-10: 0003700011 or ISBN-13: 978-0003700015)
4. A New English Course: An Approach to GCSE English Language for Individual Study of Class Use - Rhodri Jones
(Latest Edition "3rd", ISBN-10: 0435105019)
5. Axelrod and Cooper's Concise Guide to Writing - Rise B. Axelrod, Charles R. Cooper
(Latest Edition "6th", ISBN-10: 0312668902 or ISBN-13: 978-0312668907)
6. English for Undergraduates - T. A. Kirkpatrick, D. L. Kirkpatric, D. H. Howe
(Latest Edition "1st", ISBN-10: 0195472195 or ISBN-13: 978-0195472196)
7. Essential Grammar in Use: A Self-Study Reference and Practice Book for Elementary Learners of English - Raymond Murphy
(Latest Edition "4th", ISBN-10: 1107480558 or ISBN-13: 978-1107480551)
8. How To Write Better English (Penguin Writers' Guides) - Robert Allen
(Latest Edition "1st", ISBN-10: 0141016760 or ISBN-13: 978-0141016764)
9. Oxford Practice Grammar: With Answers - John Eastwood
(Latest Edition "2nd", ISBN-10: 0194313697 or ISBN-13: 978-0194313698)
10. Selected text from DAWN newspaper, readers digest, new scientist and other relevant material of teacher's choice.

Approval:	Board of Studies of ELDC	Res. No. 01	Dated: 07-12-2012
	Board of Studies of Telecom. Engg:	Res. No. 20.3	Dated: 03-10-2017
	Board of Faculty of EEC Engineering	Res. No. 12.4	Dated: 16-10-2017
	Academic Council	Res. No. 12	Dated: 17-10-2017

Pakistan Studies

Pre-requisites	Nil
Co-requisite	Nil
Course Code	PS106
Semester	1st
Effective	22TL batch and onwards
Theory Marks	50
Practical Marks	0
Credit Hours	2 + 0
Minimum Contact Hours	32 + 0
Assessment (Theory)	20% sessional work, 30% mid-semester, 50% final examination

Course Objectives

The course is designed to acquaint the students with the rationale of the creation of Pakistan. It deals in detail with the salient aspects of Pakistan movement, focusing on the main objectives of national life. The course moves further to give a broader perspective of the social, political, constitutional, economic and geographical aspect of Pakistan's endeavours to develop and progress in the contemporary world. For this purpose, the main strands of Pakistan's foreign policy are also included.

Course Learning Outcomes

Upon completion of this course, students will be able to achieve:

Table 14: TH: CLOs, Mapping of CLOs to PLOs of Pakistan Studies

CLOs	Description	Taxonomy	PLOs
1.1	Trace the Muslim nationalism in South Asia and the creation of Pakistan.	C2	6
2.1	Discuss the constitutional and political history of Pakistan and to analyse contemporary challenges of Pakistan.	C2	6

Table 15: Tentative Assessment Methods of CLOs of Pakistan Studies

CLOs	Sessional Quizzes and Assignments	Mid Exam	Final Exam	Learning Levels	PLOs
1.1	[Quiz-30%]	[Q1-40%]	[Q1-30%]	C2	6
2.1	[Quiz-20%]	[Q2-10%]	[Q2-70%]	C2	6

Contents

I. The Historical Background of Pakistan

- Evolution and growth of Muslim society in Subcontinent
- Muslim Revivalist and Reformist Movements
- The Factors that shaped the Muslim Nationalism in the Subcontinent
- The Factors that led birth to Pakistan
- Ideology of Pakistan with special reference to Allama Muhammad Iqbal and Quaid-e-Azam Muhammad Ali Jinnah
- Role of Sindh in Making of Pakistan

II. History of Internal and External Affairs of Pakistan

- The Constitutional and Political Developments in Pakistan (1947-1973)
- The Constitution of 1973; Salient Features and Amendments
- Political Development in Pakistan (1973 to date)

- Determinants of Foreign Policy of Pakistan
- Pakistan's Relations with Big Powers

III. Contemporary Pakistan (Issues and Challenges)

- Geo-Strategic Significance of Pakistan
- Economic Potential and its Utilization
- Challenges to National Security of Pakistan
- Internal Political, Economic and Legal Problems
- Futuristic Outlook of Pakistan

Recommended Books

1. Pakistan's Foreign Policy 1947-2016: A Concise History - Abdul Sattar
(Latest Edition "4th", ISBN-10: 0199407126 or ISBN-13: 978-0199407125)
2. The Future of Pakistan - Stephen P. Cohen
(Latest Edition "1st" , ISBN-10: 0815721803 or ISBN-13: 978-0815721802)
3. Frontline Pakistan: The Struggle with Militant Islam - Zahid Hussain
(Latest Edition "1st", ISBN-10: 0067008127 or ISBN-13: 978-0067008126)
4. The Struggle for Pakistan: A Muslim Homeland and Global Politics - Ayesha Jalal
(Latest Edition "1st", ISBN-10: 0674052897 or ISBN-13: 978-0674052895)
5. A Concise History of Pakistan - Muhammad Reza Kazimi
(Latest Edition "1st", ISBN-10: 0199065128 or ISBN-13: 978-0199065127)
6. Constitutional and Political History of Pakistan - Hamid Khan
(Latest Edition "2nd", ISBN-10: 0195477871 or ISBN-13: 978-0195477870)
7. A History of Pakistan - Roger D. Long
(Latest Edition "1st", ISBN-10: 0199400245 or ISBN-13: 978-0199400249)
8. Islam, Ethnicity and Power Politics: Constructing Pakistan's National Identity - Rasul Bakhsh Rais
(Latest Edition "1st", ISBN-10: 0199407592 or ISBN-13: 978-0199407590)
9. Deadly Embrace: Pakistan, America, and the Future of the Global Jihad - Bruce Riedel
(Latest Edition "2nd", ISBN-10: 0815722745 or ISBN-13: 978-0815722748)
10. Pakistan: The Formative Phase 1857-1948 - Khalid Bin Sayeed, George Cunningham
(Latest Edition "2nd", ISBN-10: 0195771141 or ISBN-13: 978-0195771145)
11. Pakistan: A New History - Ian Talbot
(Latest Edition "1st", ISBN-10: 0199391084 or ISBN-13: 978-0199391080)
12. Jinnah of Pakistan - Stanley Wolpert
(Latest Edition "1st", ISBN-10: 0195678591 or ISBN-13: 978-0195678598)

Reference Material

1. A Short History of Pakistan - Ishtiaq Husain Qureshi
(Latest Edition "1st", ISBN-10: 9694040086)
2. History of Pakistan - Rafiullah Shehab
(Latest Edition "1st", 1989)
3. Our Freedom Fighters, 1562-1947: Twenty-one Great Lives - G. Allana
(Latest Edition "1st", 1976)
4. The Making of Pakistan: A Study in Nationalism - K. K. Aziz
(Latest Edition "1st", ISBN-10: 969350870X or ISBN-13: 978-9693508703)
5. The Emergence of Pakistan - Chaudhri Muhammad Ali
(Latest Edition "1st", 1983)
6. Pakistan's Foreign Policy: Indian Perspectives - K. Arif
(Latest Edition "1st", 1984)

7. The Economy of Pakistan - Khawaja Amjad Saeed
   (Latest Edition "1st", ISBN-10: 0199060800 or ISBN-13: 978-9693508703)
8. International Affairs - Safdar Mahmood
   (Latest Edition "2nd", 1967)
9. Political System of Pakistan - Khalid Bin Sayeed
   (Latest Edition "1st", 1987)

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	Academic Council	Res. No. 17(ii)	Dated: 23-04-2018

Linear Algebra and Analytical Geometry

Pre-requisites	Applied Calculus
Co-requisite	Nil
Course Code	MTH112
Semester	2nd
Effective	22TL batch and onwards
Theory Marks	100
Practical Marks	0
Credit Hours	3 + 0
Minimum Contact Hours	48 + 0
Assessment (Theory)	20% sessional work, 30% mid-semester, 50% final examination

Course Objectives

To develop the knowledge of matrix algebra, the system of linear equations, analytic geometry of three dimension and multiple integrals.

Course Learning Outcomes

Upon completion of this course, students will be able to achieve:

Table 16: TH: CLOs, Mapping of CLOs to PLOs of Linear Algebra and Analytical Geometry

CLOs	Description	Taxonomy	PLOs
1.1	Determine the basic operation of matrix algebra and solution of system of linear equations.	C3	1
2.1	Analyze the concepts of two and three dimensional geometry.	C4	1
3.1	Determine the area and volume of bounded regions using multiple integrals.	C3	1

Table 17: Tentative Assessment Methods of CLOs of Linear Algebra and Analytical Geometry

CLOs	Sessional Quizzes and Assignments	Mid Exam	Final Exam	Learning Levels	PLOs
1.1	[Quiz-20%]	[Q1-70%]	[Q1-10%]	C3	1
2.1	[Quiz-40%]	[Q2-30%]	[Q2-30%]	C4	1
3.1	[Quiz-40%]		[Q3-60%]	C3	1

Contents

I. Introductions to Matrices and Elementary Row Operations

- Brief introduction of matrices, types of matrices, introduction to elementary row operations, echelon and reduced echelon forms, rank of a matrix, inverse of a matrix using elementary row operations.

II. System of Linear Equations

- System of non-homogeneous and homogeneous linear equations, gaussian elimination method, gauss jordan method, consistence criterion for solution of homogeneous and non-homogeneous system of linear equations, application of system of linear equations.

III. Determinants

- Introduction to determinants, properties of determinants of order n, rank of a matrix by using determinants.

IV. Analytic Geometry of 3-Dimensions

- Introduction, coordinates in R^3

V. Line

- Coordination of a point dividing a line segment in a given ratio, straight line, in R^3, vector form of a straight line, parametric equations of a straight line, equation of a straight line in symmetric form, direction ratios and direction cosines, angle between two straight lines, distance of a point from a line.

VI. Plane

- Equation of a plane, angle between two planes, intersection of two planes, a plane and a straight line, skew lines, cylindrical and spherical coordinates.

VII. Sphere

- General equation of sphere, latitude and longitude directions, direction of Qibla.

VIII. Multiple Integrals

- Evaluation of double and triple integrals in cartesian and polar coordinates.

Recommended Books

1. Brief Calculus and its Applications - Daniel Dale Benice
   (Latest Edition "2nd", ISBN-10: 0395824648 or ISBN-13: 978-0395824641)
2. Applied Calculus with Linear Programming for Business, Economics, Life Sciences and Social Sciences - Raymond A. Barnett
   (Latest Edition "5th", ISBN-10: 0536024499 or ISBN-13: 978-0536024497)
3. Calculus with Analytical Geometry - S. M. Yousuf, Muhammad Amin
   (Latest Edition "7th")
4. Mathematical Methods - S. M. Yousuf, Abdul Majeed, Muhammad Amin
   (Latest Edition "2nd")

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Electrical Workshop Practice

Pre-requisites	Nil
Co-requisite	Nil
Course Code	EL111
Semester	2nd
Effective	24TL batch and onwards
Theory Marks	0
Practical Marks	50
Credit Hours	0 + 1
Minimum Contact Hours	0 + 48
Assessment (Practical)	30% lab rubrics, 20% open-ended lab. / mini-project, 50% final lab. examination

Upon completion of this course, students will be able to achieve:

Table 18: PR: CLOs, Mapping of CLOs to PLOs of Electrical Workshop Practice

CLOs	Description	Taxonomy	PLOs
1.1p	Describe fundamentals of electrical safety and components of electrical wiring.	C1	1
2.1p	Show the functioning of electrical tools and equipment used in workshop.	P2	5
3.1p	Fabricate electrical circuits on printed circuit board.	P4	5

Table 19: Tentative Assessment Methods of CLOs of Electrical Workshop Practice

CLOs	Quiz / Assignment / Lab Rubrics	Mid Exam	Final Exam	Lab Exam	Project / OEL/CEP	Learning Levels	PLOs
1.1p	[Lab-40%]			[Test-30%]	[30%]	C1	1
2.1p				[ViVa-100%]		P2	5
3.1p				[ViVa-100%]		P4	5

Lab Outline

I. Workshop Safety

- Demonstration of safety equipment
- Tools and safety gear in accordance with safety regulations
- Electric shock treatment

II. Measurements

- Measurement of bolt using Vernier calipers, micrometer, and thread pitch gauge
- Familiarization with different bench fitting tools and equipments

III. Preparation of Work Piece

- Preparation of work pieces of required dimensions and joining of metal work pieces in lap, butt and T-joints using electric arc welding

IV. Familiarization with Lathe Machine

- Introduction to Lathe machine, its parts, accessories, and operations

V. Familiarization with Electric Cables and Switching Devices

- Familiarization with the types of of cables and electric accessories including switches, plugs, circuit breakers, fuses etc., comprehending their symbols for electrical wiring schematics.

VI. Wiring circuits & Earthing Concepts

- Assembling a parallel electric wiring circuit for a hotel and its testing in accordance with wiring regulations.
- Demonstration of earthing concepts and installation of an earthing cable.

VII. Assembling and disassembling of computer system

- Assembling and disassembling of a modern computer system along with its accessories.

VIII. Introduction to Circuit designing and PCB Printing

- Introduction to circuit designing and simulation using Proteus.
- Introduction to PCB printing (Fabrication of a PCB) and etching in PCB design.
- Demonstration and evaluation of a complete PCB design and fabrication.

IX. Open Ended Lab or Semester Project

- Students will do a project in the last three weeks to summarize the technical knowledge and skills learnt in Electrical Workshop Practice and prepare a report.

Suggested Teaching and Assessment Methods

Lectures (audio / video aids), Lab demontration / experimentation, Written Assignments / Quizzes, Tutorials, Case Studies relevant to engineering disciplines, Semester Project, Guest Speaker, Industrial / Field Visits, Group discussion, Report Writing.

Assessment:

Mid term, Project Report writing / Presentation, Lab experiment evaluation, Assignments, Quizzes, Final Term.

1. Umesh Rathore and Naresh Kumar Sharma, "A Text book of Electrical Workshop Practices" (Latest Edition "1st", ISBN-10: 9350146959 or ISBN-13: 978-9350146958)
2. S.K. Choudhury, "Elements of Workshop Technology", Vol.1 Media Promoters & Publishers. ISBN-10: 8185099146 or ISBN-13: 978-8185099149)
3. Chapman, "Workshop Technology", Part-I, II, III CBS

Recommended Textbooks

1. Umesh Rathore and Naresh Kumar Sharma, "A Text book of Electrical Workshop Practices" (Latest Edition "1st", ISBN-10: 9350146959 or ISBN-13: 978-9350146958)
2. S.K. Choudhury, "Elements of Workshop Technology", Vol.1 Media Promoters & Publishers. ISBN-10: 8185099146 or ISBN-13: 978-8185099149)
3. Chapman, "Workshop Technology", Part-I, II, III CBS

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	Academic Council	Res. No. x	Dated: xx

Circuit Analysis

Pre-requisites	Nil
Co-requisite	Nil
Course Code	EL102
Semester	2nd
Effective	22TL batch and onwards
Theory Marks	100
Practical Marks	50
Credit Hours	3 + 1
Minimum Contact Hours	48 + 48
Assessment (Theory)	20% sessional work, 30% mid-semester, 50% final examination
Assessment (Practical)	30% lab rubrics, 20% open-ended lab. / mini-project, 50% final lab. examination

Course Objectives

The subject aims to give adequate knowledge and clear understanding about the concepts of basic electrical engineering and tools to analyze electric circuits.

Course Learning Outcomes

Upon completion of this course, students will be able to achieve:

Table 20: TH: CLOs, Mapping of CLOs to PLOs of Circuit Analysis

CLOs	Description	Taxonomy	PLOs
1.1	Explain AC/DC based electrical circuits as well as the related theorems to help solve and draw the equivalent circuits.	C2	2
2.1	Differentiate between steady state/transient analysis of circuits along with different forms of sinusoidal / exponential excitations and their responses.	C2	3

Table 21: PR: CLOs, Mapping of CLOs to PLOs of Circuit Analysis

CLOs	Description	Taxonomy	PLOs
1.1p	Perform experiments in laboratory to validate the laws and theories of circuit analysis.	P4	9

Table 22: Tentative Assessment Methods of CLOs of Circuit Analysis

CLOs	Sessional Quizzes and Assignments	Mid Exam	Final Exam	Lab Exam	Project/ OEL/CEP	Learning Levels	PLOs
1.1	[Quiz-40%]	[Q1-40%]	[Q1-20%]			C2	2
2.1	[Quiz-40%]	[Q2-20%]	[Q1-40%]			C2	3
1.1p	[Quiz-40%]			[ViVa-30%] [Test-30%]		P4	9

Contents

I. Introduction

- Review of KVL, KCL, nodal and loop analysis, serial/parallel connections of two terminal circuit elements

II. Elementary Transient Analysis

- Differential and Integral forms of circuit equations, initial voltage on a capacitor, initial current in an inductor, first-order circuits, solution of single first order differential equations, homogeneous, particular and total solutions, exponential responses, second-order circuits.

III. Sinusoidal Steady-State Analysis

- Network response to sinusoidal driving functions, complex impedance and admittance functions, development of concept of phasor, power consideration, complex power, maximum power transfer, circuits, series and parallel RLC circuits, quality factor.

IV. Network Theorems

- Linear and non-linear networks, superposition theorem, reciprocity theorem, maximum power transfer theorem, equivalent networks, thevenin's theorem, thevenin's equivalent network, norton's theorem, norton's equivalent networks, T-equivalent networks.

Lab Outline

Learn the use of basic instruments in electrical engineering such as function generators, power supplies, oscilloscopes. Design and implement circuits using R, RL, RC, RLC combination and observe resonance and impedance characteristics. Verify node voltage and current in RLC circuits as well as circuit theorems using laboratory instruments. Circuit transformation should also be verified using laboratory instruments. Related concepts are established through simulation tools such as PSPICE, Multisim etc.

Recommended Books

1. Basic Circuit Theory - Charles A. Desoer, Ernest S. Kuh
(Latest Edition "1st", ISBN-10: 0070851832 or ISBN-13: 978-0070851832)
2. Basic Electrical Engineering - Arthur Eugene Fitzgerald, David E. Higginbotham, Arvin Grabel
(Latest Edition "5th", ISBN-10: 007021154X or ISBN-13: 978-0070211544)
3. Schaum's Outline of Electric Circuits - Mahmood Nahvi, Joseph Edminister
(Latest Edition "6th", ISBN-10: 0071830456 or ISBN-13: 978-0071830454)
4. Fundamentals of Electric Circuits - Matthew Sadiku, Charles Alexander
(Latest Edition "5th", ISBN-10: 0073380571 or ISBN-13: 978-0073380575)
5. Basic Engineering Circuit Analysis - J. David Irwin, R. Mark Nelms
(Latest Edition "9th", ISBN-10: 0470128690 or ISBN-13: 978-0470128695)
6. Electric Circuits - James W. Nilsson, Susan Riedel
(Latest Edition "9th", ISBN-10: 0136114997 or ISBN-13: 978-0136114994)
7. The Analysis and Design of Linear Circuits - Roland E. Thomas, Albert J. Rosa, Gregory J. Toussaint
(Latest Edition "7th", ISBN-10: 1118065581 or ISBN-13: 978-1118065587)

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Engineering Drawing

Pre-requisites	Nil
Co-requisite	Nil
Course Code	EL127
Semester	2nd
Effective	24TL batch and onwards
Theory Marks	0
Practical Marks	50
Credit Hours	0 + 1
Minimum Contact Hours	0 + 48
Assessment (Practical)	30% lab rubrics, 20% open-ended lab. / mini-project, 50% final lab. examination

Upon completion of this course, students will be able to achieve:

Table 23: PR: CLOs, Mapping of CLOs to PLOs of Engineering Drawing

CLOs	Description	Taxonomy	PLOs
1.1p	Ability to draw basic drawing objects.	P3	5
2.1p	Ability to read basic engineering drawing.	C3	1
3.1p	Apply engineering drawing skills using Auto CAD tool.	P2	5

Table 24: Tentative Assessment Methods of CLOs of Engineering Drawing

CLOs	Quiz / Assignment / Lab Rubrics	Mid Exam	Final Exam	Lab Exam	Project / OEL/CEP	Learning Levels	PLOs
1.1p	[Lab-40%]			[Test-30%]	[30%]	P3	5
2.1p				[ViVa-100%]		C3	1
3.1p				[ViVa-100%]		P2	5

Lab Outline

Types of lines and usage, dimensioning, orthographic first angle projection, orthographic third angle projection, introduction to computer aided drawing, isometric projection, sectional drawing and assembly drawing. Reading and preparing electrical engineering drawings such as wiring diagram, power system layout diagram, PCB drawing etc.

Suggested Teaching and Assessment Methods

Lectures (audio / video aids), Lab demontration / experimentation, Written Assignments / Quizzes, Tutorials, Case Studies relevant to engineering disciplines, Semester Project, Guest Speaker, Industrial / Field Visits, Group discussion, Report Writing.

Assessment: Viva-voce Project Report writing / Presentation, Lab experiment evaluation, Assignments, Quizzes, Final Term.

Recommended Textbooks

1. First Year Engineering Drawing by A. C. Parkinson.
2. Engineering Graphics with AutoCAD 2023 by Jim Bethune; David Byrnes, - ISBN-13: 9780137929993, ISBN-10: 0137929994 (Latest Edition)
3. A Textbook of Engineering Drawing ; Author, RK Dhawan ; Publisher, S. Chand Publishing, 2019 ; ISBN, 9352837371, 9789352837373 (Latest Edition)

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	Academic Council	Res. No. x	Dated: xx

Electronic Devices & Circuits

Pre-requisites	Nil
Co-requisite	Nil
Course Code	ES113
Semester	2nd
Effective	24TL batch and onwards
Theory Marks	100
Practical Marks	50
Credit Hours	3 + 1
Minimum Contact Hours	48 + 48
Assessment (Theory)	20% sessional work, 30% mid-semester, 50% final examination
Assessment (Practical)	30% lab rubrics, 20% open-ended lab. / mini-project, 50% final lab. examination

Course Objectives

Diodes and transistors are the building blocks of every electronic and communication system. The aim of this subject is to provide the knowledge about the construction and working of basic electronic devices. Good knowledge about this subject will enable them to build large electronic systems successfully.

Course Learning Outcomes

Upon completion of this course, students will be able to achieve:

Table 25: TH: CLOs, Mapping of CLOs to PLOs of Electronic Devices & Circuits

CLOs	Description	Taxonomy	PLOs
1.1	Explain the basics, working and characteristics of Semiconductor material and diodes.	C2	1
2.1	Analyze the working and behaviour of transistors and their types and be able to understand different transistor applications.	C4	2

Table 26: PR: CLOs, Mapping of CLOs to PLOs of Electronic Devices & Circuits

CLOs	Description	Taxonomy	PLOs
1.1p	Reproduce basic electronic circuits on board using discrete components i.e. resistors, diodes and transistors, and develop project using discrete components and/or circuit simulation platform.	P3	5
2.1p	Demonstrate effectively as an individual or in a group while performing laboratory experiments.	A3	3

Table 27: Tentative Assessment Methods of CLOs of Electronic Devices & Circuits

CLOs	Quiz / Assignment / Lab Rubrics	Mid Exam	Final Exam	Lab Exam	Project / OEL/CEP	Learning Levels	PLOs
1.1	[Quiz-40%]	[Q1-30%]	[Q1-30%]			C2	1
2.1	[Quiz-40%]	[Q2-30%]	[Q2-30%]			C4	2
1.1p	[Lab-40%]			[Test-30%]	[30%]	P3	5
2.1p				[ViVa-100%]		A3	3

Contents

I. Introduction to Diodes

- Atomic structure of elements, energy level diagram of intrinsic and extrinsic semiconductor, doping, formation of P/N type material, semiconductor diodes, forward and reverse characteristics of

diode, types of diodes, equivalent circuits of diodes, diode as a switch, special purpose diodes, applications of diodes, half wave and full wave rectifiers, clipper and clamper circuits, voltage multipliers

II. Bipolar Junction Transistors

- Bipolar Junction Transistor (BJT), transistor operation, types of transistor, transistor biasing configurations, DC and AC analysis of BJT, transistor as a switch and an amplifier

III. Field Effect Transistors

- Field Effect Transistor (FET), FET biasing and configuration techniques, DC and AC analysis of FET and its applications as a switch and amplifier, MOSFET

Lab Outline

The emphasis is first on understanding the characteristics of diodes and transistors. Based on this understanding students are required to construct more complex circuits such as rectifier circuits and power supplies.

- Diode: Data sheet reading, analyzing diode characteristics on a curve tracer, finding a defective diode among a batch of non-defective diodes, various kinds of diode and their uses, and drawing of symbols.
- Transistor: Determining type (N and P) of an unknown bipolar transistor, labeling leads of an unknown transistor, analyzing transistor characteristics on a curve tracer, finding a defective transistor among a batch of non-defective transistors, various kinds of transistors and their uses, and drawing of symbols.
- Simulation of Basic Electronic Circuits using PSpice/Multisim

Recommended Books

1. Electronic Devices and Circuit Theory - Robert L. Boylestad, Louis Nashelsky
(Latest Edition “10th”, ISBN-10: 0135026490 or ISBN-13: 978-0135026496)
2. Introductory Electronic Devices and Circuits: Electron Flow Version - Robert T. Paynter
(Latest Edition “7th”, ISBN-10: 0131716395 or ISBN-13: 978-0131716391)
3. A Practical Book on Basic Electronics - Qurban A. Memon, Irfan A. Halepoto
(Latest Edition “1st”, ISBN-10: 9698680144)
4. The First Practical Book on Electronic Workshop - B. S. Chowdhry and Ahsan Ursani
(Latest Edition “1st”, ISBN-10: 9698680039)

Reference Material

1. Microelectronic Circuits - Adel S. Sedra, Kenneth C. Smith
(Latest Edition “6th”, ISBN-10: 0195323033 or ISBN-13: 978-0195323030)
2. Microelectronic Circuit Design - Richard C. Jaeger, Travis Blalock
(Latest Edition “5th”, ISBN-10: 0073529605 or ISBN-13: 978-0073529608)

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	Academic Council	Res. No. x	Dated: xx

Ideology and Constitution of Pakistan

Pre-requisites	Nil
Co-requisite	Nil
Course Code	PS107
Semester	2nd
Effective	24TL batch and onwards
Theory Marks	50
Practical Marks	-
Credit Hours	2 + 0
Minimum Contact Hours	32 + 0
Assessment (Theory)	20% sessional work, 30% mid-semester, 50% final examination

Course Objectives

This course is designed to provide students with a fundamental exploration of the ideology and the constitution of Pakistan. The course focuses on the underlying principles, beliefs, and aspirations that have been instrumental in shaping the creation and development of Pakistan as a sovereign state. Moreover, the course will enable students to understand the core provisions of the Constitution of the Islamic Republic of Pakistan concerning the fundamental rights and responsibilities of Pakistani citizens to enable them function in a socially responsible manner.

Course Learning Outcomes

By the end of this course, students will be able to:

Table 28: TH: CLOs, Mapping of CLOs to PLOs of Basic Electronics

CLOs	Description	Taxonomy	PLOs
1.1	Demonstrate enhanced knowledge of the ideology of Pakistan with special reference to the contributions of the founding fathers of Pakistan.	C2	1
2.1	Demonstrate fundamental knowledge about the constitution of Pakistan 1973 and its evolution with special reference to state structure.	C4	2
3.1	Explain about the guiding principles on rights and responsibilities of Pakistani citizens as enshrined in the Constitution of Pakistan 1973.	C4	2

Table 29: Tentative Assessment Methods of CLOs of Basic Electroncis

CLOs	Quiz / Assignment / Lab Rubrics	Mid Exam	Final Exam	Lab Exam	Project / OEL/CEP	Learning Levels	PLOs
1.1	[Quiz-40%]	[Q1-30%]	[Q1-30%]			C2	1
2.1	[Quiz-40%]	[Q2-30%]	[Q2-30%]			C4	2
3.1	[Quiz-40%]	[Q2-30%]	[Q2-30%]			C4	2

Contents

I. Introduction to the Ideology of Pakistan:

- Definition and significance of ideology, Historical context of the creation of Pakistan (with emphasis on socio-political, religious, and cultural dynamics of British Idia 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, etc., Contributions of women and students in the freedom movement for separate homeland for Muslims of British India.

II. Two-National 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).

III. Introduction to the Constitution of Pakistan:

- Definition and importance of a constitution, Ideological factors that shapped the Constitution(s) of Pakistan (Objectives Resolution 1949), Overview of constitutional developments in Pakistan.

IV. 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 federation.

V. 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).

VI. Constitutional Amendments:

- Procedures for amending the Constitution, Notable constitutional amendments and their implications.

Recommended Books

1. The idea of Pakistan - Stephen P. Cohen (Latest Edition)
2. Ideology of Pakistan - Javed Iqbal (Latest Edition)
3. The struggle for Pakistan - I. H. Qureshi (Latest Edition)
4. Pakistan the Formative Phase - Khalid Bin Sayeed (Latest Edition)
5. Ideology of Pakistan - Sharif-ul-Mujahid (Latest Edition)
6. The struggle for Pakistan: A Muslim Homeland and Global Politics - Ayesha Jalal (Latest Edition)
7. Jinnah, Pakistan and Islamic Identity: The search for Saladin - Akbar S. Ahmed (Latest Edition)
8. The Making of Pakistan: A Study in Nationalism - K. K. Aziz (Latest Edition)
9. Pakistan: A New History - Ian Talbot (Latest Edition)
10. Pakistan in the Twentieth Century: A Political History - Lawrence Ziring (Latest Edition)
11. The Constitution of Pakistan 1973 - Original
12. Constitutional and Political Development of Pakistan - Hamid Khan (Latest Edition)
13. The Parliament of Pakistan - Mahboob Hussain (Latest Edition)
14. Constitutional Development in Pakistan - G. W. Choudhary (Latest Edition)
15. Constitution-Making in Pakistan: The Dynamics of Political Order G. W. Choudhary (Latest Edition)

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