Annexure B

DEPARTMENT OF ELECTRONIC ENGINEERING

Recommended Syllabus for B.E Electronic Engineering
With effective from 2021/F and onwards

Course Scheme

Sr. No.	Course Code	Course Title	Credit Hours	Knowledge Area	Pre-requisite Courses (if any)
1	HUM-1003	Functional English	(3+0)	Humanities	
2	HUM-1002	Pakistan Studies	(2+0)	Humanities	
3	MATH-1004	Calculus	(3+0)	Natural Sciences	
4	BS-1001	Applied Physics	(3+0)	Natural Sciences	
5	ESE-1501	Computer Fundamentals & Programming	(0+2)	Computing	
6	ESE-1101	Linear Circuit Analysis	(3+1)	Engineering Foundation	
7	ESE-1102	Electronic Workshop	(0+1)	Engineering Foundation	
		Total Cr. Hrs.	**14+4=18**		

Second semester

Sr. No.	Course Code	Course Title	Credit Hours	Knowledge Area	Pre-requisite Courses (if any)
1	HUM-1001	Islamic Studies	(2+0)	Humanities	
2	HUM-1005	Communication & Presentation Skills	(3+0)	Humanities	
3	MATH-1005	Linear Algebra	(3+0)	Natural Sciences	
4	ESE-1502	Object Oriented Programming	(3+1)	Computing	Computer Fundamentals & Programming
5	ESE-1103	Computer Aided Design	(0+1)	Engineering Foundation	
6	ESE-1104	Electronic Devices & Circuits	(3+1)	Engineering Foundation	
		Total Cr. Hrs.	**14+3=17**		

Third Semester

Sr. No.	Course Code	Course Title	Credit Hours	Knowledge Area	Pre-requisite Courses (if any)
1	MATH-2005	Complex Variables & Transforms	(3+0)	Natural Sciences	
2	ESE-2503	Data Structure & Algorithm Design	(2+1)	Computing	Object Oriented Programming
3	ESE-2105	Electrical Network Analysis	(3+1)	Engineering Foundation	
4	ESE-2106	Digital Logic Design	(3+1)	Engineering Foundation	
5	ESE-2107	Electronic Circuit Design	(3+1)	Engineering Foundation	Electronic Devices & Circuits
		Total Cr. Hrs.	**14+4=18**		

Fourth semester

Sr. No.	Course Code	Course Title	Credit Hours	Knowledge Area	Pre-requisite Courses (if any)
1	MATH-2006	Differential Equations	(3+0)	Natural Sciences	
2	ESE-2108	Electrical Machines	(3+1)	Engineering Foundation	
3	ESE-2109	Electromagnetic Field Theory	(2+0)	Engineering Foundation	Calculus, DE
4	ESE-2201	Instrumentation & Measurement	(3+1)	Major Based Core (Breadth)	
5	ESE-2202	Microprocessor & Microcontroller Systems	(3+1)	Major Based Core (Breadth)	
		Total Cr. Hrs.	**14+3=17**		

DEPARTMENT OF ELECTRONIC ENGINEERING

Recommended Syllabus for B.E Electronic Engineering
With effective from 2021/F and onwards

Fifth semester

Sr. No.	Course Code	Course Title	Credit Hours	Knowledge Area	Pre-requisite Courses (if any)
1	HUM-3005	Critical Thinking	(3+0)	Humanities	
2	MATH-3004	Probability and Random Variables	(2+0)	Natural Sciences	
3	ESE-3203	Analog & Digital Communications	(3+1)	Core (Breadth)	
4	ESE-3204	Signals & Systems	(3+1)	Core (Breadth)	
5	ESE-3205	Power Electronics	(3+1)	Core (Breadth)	
		Total Cr. Hrs.	**14+3=17**		

Sixth semester

Sr. No.	Course Code	Course Title	Credit Hours	Knowledge Area	Pre-requisite Courses (if any)
1	ESE-3601	Engineering Economics & Project Management	(3+0)	Management Sciences	
2	MATH-3005	Numerical Analysis	(2+0)	Natural Sciences	
3	ESE-3206	Control Engineering	(3+1)	Core (Breadth)	Complex Variables & Transforms
4	ESE-3301	Digital Signal Processing & Filter Design	(3+1)	Core (Depth)	
5	ESE-3302	Industrial Automation & Robotics	(3+1)	Core (Depth)	
		Total Cr. Hrs.	**14+3=17**		

Seventh semester

Sr. No.	Course Code	Course Title	Credit Hours	Knowledge Area	Pre-requisite Courses (if any)
1	ESE-4401	Computer Networks & Data Communication	(3+1)	Inter-Disciplinary Engineering Breadth	
2	ESE-4701	Elective-I (Microwave Engineering)	(3+0)	Core (Depth)	
3	ESE-4702	Elective-II(Embedded Systems Design)	(3+1)	Core (Depth)	
4	HUM-406	Research Method & Thesis Writing	(3+0)	Humanities	
5	ESE-4909	FYP Part-I	(0+3)	Senior Design Project	
		Total Cr. Hrs.	**12+5=17**		

Eight semester

Sr. No.	Course Code	Course Title	Credit Hours	Knowledge Area	Pre-requisite Courses (if any)
1	ESE-4402	Wireless & Mobile Communications	(3+0)	Inter-Disciplinary Engineering Breadth	
2	ESE-4703	Elective-III (Digital Instrumentation System)	(2+1)	Core (Depth)	
3	ESE-4602	Entrepreneurship	(3+0)	Management Sciences	
4	HUM-408	Professional Psychology	(3+0)	Humanities	
5	ESE-4909	FYP Part-II	(0+3)	Senior Design Project	
		Total Cr. Hrs.	**11+4=17**		
		Total	**136**		

Course Contents of Undergraduate Courses for the Department of Electronic Engineering

With CLOs and PLOs

Title of Course	**:**	Functional English		
Course Code	**:**	HUM-1003		
Discipline	**:**	B.E. (Electronic Engineering)		
Semester	**:**	1st Semester, First Year		
Effectiveness	**:**	Batch 2021/Fall onward		
Course Type	**:**	Compulsory		
Pre-Requisite	**:**	NA		
Marks	**:**	Theory: 100		Practical: 00
Credit Hours	**:**	3 CH		00 CH
Teaching Scheme	**:**	3 Hours / Week		00 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester		

Aim:

The aim of **Functional English** is to develop communicative **skills** of the learners in listening, speaking, writing and reading.

Objective:

The main objective of this course is to enhance English language skills of the students and develop their critical thinking.

Contents:

Basics of Grammar, parts of speech and use of articles, sentence structure, active and passive voice, practice in unified sentence, analysis of phrase, clause and sentence structure, transitive and intransitive verbs, punctuation and spelling.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
Sr. No	**Course Learning Outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Introduction to Functional English and Basic Grammar	P-1	C-1
CLO 2	Using & Solving Basic Sentence Structures in different Tenses, Sentence Structures and different language expressions	P-2	C-3
CLO 3	Formulating Creative Writing for Formal Written Communication like Circular, Cover Letters, Official Correspondence	P-12	C-5

Recommended Book:

1. Practical English Grammar by A. J. Thomson and A. V. Martinet. Exercises, Latest edition. Oxford University Press.
2. Writing. Intermediate by Marie-Christine Boutin, Suzanne Brinand and Francoise Grellet. Oxford Supplementary Skills, Latest Edition
3. Reading. Upper Intermediate. Brain Tomlinson and Rod Ellis. Oxford Supplementary Skills, Latest Edition

Title of Course	**:**	Pakistan Studies		
Course Code	**:**	HUM-1002		
Discipline	**:**	B.E. (Electronic Engineering)		
Semester	**:**	1st Semester, First Year		
Effectiveness	**:**	Batch 2021/Fall onward		
Course Type	**:**	Compulsory		
Pre-Requisite	**:**	NA		
Marks	**:**	Theory:	100	Practical: 00
Credit Hours	**:**	1 CH		00 CH
Teaching Scheme	**:**	2 Hours / Week		00 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester		

Aim: This course aims at enhancing students' knowledge about history, culture, and geography of Pakistan and to inculcate patriotism in the hearts of students so that they may become a good citizen.

Objective:
Develop vision of historical perspective, government, politics, contemporary Pakistan, ideological background of Pakistan. Study the process of governance, national development, issues arising in the modern age and posing challenges to Pakistan.

Contents:

Historical Perspective
Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-e-Azam Muhammad Ali Jinnah, Factors leading to Muslim separatism, People and Land, Indus Civilization, Muslim advent, Location and geo-physical features.

Government and Politics in Pakistan
Political and constitutional phases:1947-58, 1958-71, 1971-77, 1977-88, 1988-99, 1999 onward

Contemporary Pakistan
Economic institutions and issues, Society and social structure, Ethnicity, Foreign policy of Pakistan and challenges, Futuristic outlook of Pakistan

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning Outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Introducing historical and ideological background of Pakistan.	PLO-12	C-1
CLO 2	Discussing Pakistan's Government and political instability over time and debating about the form of government it should adopt.	PLO-12	A-2
CLO 3	Comparing and understanding issues that are currently affecting people or places and that are unresolved in Pakistan.	PLO-6	A-4

Recommended Books:

1. Burki, Shahid Javed. *State & Society in Pakistan,* The Macmillan Press Ltd, Latest Edition.
2. Akbar, S. Zaidi. *Issue in Pakistan's Economy.* Karachi: Oxford University Press, Latest Edition.
3. S.M. Burke and Lawrence Ziring. Pakistan's Foreign policy: An Historical analysis. Karachi: Oxford University Press, Latest Edition.
4. Mehmood, Safdar. *Pakistan Political Roots & Development.* Lahore, Latest Edition.
5. Wilcox, Wayne. *The Emergence of Bangladesh.,* Washington: American Enterprise, Institute of Public Policy Research, Latest Edition.
6. Amin, Tahir. *Ethno -National Movement in Pakistan,* Islamabad: Institute of Policy Studies, Islamabad.

Title of Course	**:**	Calculus	
Course Code	**:**	MATH-1004	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	1st Semester, First Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	NA	
Marks	**:**	Theory: 100	Practical: 00
Credit Hours	**:**	3 CH	00 CH
Teaching Scheme	**:**	3 Hours / Week	00 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim: The main aim of this course is to give students some basic ideas of calculus, which is the mathematics of motion. The purpose is not just making the students learn these ideas but to enable them to apply these ideas to solve problems of practical nature.

Objectives:
Teach the concepts of calculus and analytic geometry and the applications of these concepts to the solution of engineering problems.

Contents:
Introduction to functions, introduction to limit, continuity, derivatives and their applications, integral calculus with applications for solving the real world problems and analyzing the convergence/divergence of sequence and series, vector algebra, vector calculus, introduction to analytical geometry, straight line in R3, planes, cylindrical and spherical coordinates, surfaces, cylinders and cones, spheres, spherical trigonometry.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No	**Course Learning Outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Identify functions and sketch their graphs using tools of calculus in relevant engineering problems.	PLO 2	C-1
CLO 2	Apply differential and integral calculus to interpret the physical systems and processes.	PLO 3	C-3
CLO 3	Evaluate area and volume using vector calculus	PLO4	C-3

Recommended Books:

1. George B. Thomas and Ross L. Finney, "Calculus and Analytic Geometry," Addison-Wesley, Latest Edition, ISBN: 0201531747.
2. George F. Simmons, "Calculus with Analytic Geometry," McGraw-Hill, Latest Edition, ISBN: 0070576424.
3. Gerald B. Folland, "Advanced Calculus," Prentice Hall, Latest Edition, ISBN: 0130652652.
4. Monty J. Strauss, Gerald L. Bradley and Karl J. Smith, "Calculus," Prentice Hall, Latest Edition, ISBN: 1465208887.

Title of Course	**:**	Applied Physics		
Course Code	**:**	BS-1003		
Discipline	**:**	B.E. (Electronic Engineering)		
Semester	**:**	1st Semester, First Year		
Effectiveness	**:**	Batch 2021/Fall onward		
Course Type	**:**	Compulsory		
Pre-Requisite	**:**	NA		
Marks	**:**	Theory:	100	Practical: 00
Credit Hours	**:**	3 CH		00 CH
Teaching Scheme	**:**	**3 Hours / Week**		**00 Contact Hours / Week**
Assessment	**:**	**20% Sessional, 30% Mid Semester Examination, 50% Final Semester Examination.**		

Aim: This freshmen level course has been designed to provide an introduction to the ideas and concepts of Physics that would serve as a foundation for subsequent electronic engineering courses.

Objectives:
Teach the fundamentals of classical physics including the electrostatics, electrodynamics, solid-state physics, optics, and thermodynamics in relation to the cooling of electronics.

Contents:
Electrostatics: Coulomb's law, electric field and potential, capacitance, dielectrics. Electrodynamics: Magnetic field and force, sources of magnetic field, electromagnetic induction, inductance. Solid-state physics: Crystal lattices, unit cells, energy bands, allowed and forbidden states, conductors, semiconductors, insulators. Semiconductors: Composition, purity, n- and p-type materials, carrier properties and distribution. Carrier action: Diffusion, drift, generation, recombination. Conductivity, mobility, pn junction diode, forward and reverse characteristics of a diode, ideal diode, practical diode, equivalent circuit of a diode, current equation of a diode, diode as a switch. Different types of diodes. Applications of diodes: Half- and full-wave rectifiers, clipper and clamper circuits, voltage multipliers
Optics: Optical absorption, photoluminescence, photoconductivity, photoelectric effect, lasers, superconductivity. Heat and Thermodynamics in relation to cooling of electronics.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	State fundamental laws of Electrostatic, Electrodynamics, optics and Thermodynamics	P-1	C-1
CLO 2	Differentiate materials used in Electronic Devices	P-1	C-2
CLO 3	Determine characteristics of PN junction	P-1	C-3
CLO 4	Explain operational characteristics of Diode and transistors	P-1	C-2

Recommended Books:

1. David Halliday, Robert Resnick, and Jearl Walker, "Fundamentals of Physics", Latest Edition, John Wiley & Sons, ISBN: 0471465097.
2. Arthur Beiser, "Schaum's Outline of Applied Physics", Latest Edition, McGraw-Hill, ISBN: 0071426116.

Title of Course	**:**	Computer Fundamentals and Programming	
Course Code	**:**	ESE-1501	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	1st Semester, First Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	NA	
Marks	**:**	Theory: 00	Practical: 100
Credit Hours	**:**	0 CH	02 CH
Teaching Scheme	**:**	0 Hours / Week	06 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim: This course helps the students to understand basic knowledge of computer programs and capable of designing different C language programs and flowcharts.

Objectives:
Teach the structure, operation, programming, and applications of computers.

Contents:
History, classification, social impact of computer age, computers in office, industry and education. basic components, CPU, memory, peripheral devices, storage media and devices, physical and logical storage, data organization, file storage, programs and software, system software, application software, operating systems, programming languages, compilation and interpretation, problem specification, algorithms, flow chart, pseudo code, basic programming techniques, data types and declaration, header file and linkage, variables and constants, arrays, input/output, termination, remark, control structures, branching, conditional structures, repetition and loops, basic library functions, social impact of computer age, computers in office, industry and education.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Define Structure and operation of computers.	PLO-1	C-1
CLO 2	Identify the applications of computer in domestic, commercial, and industrial application	PLO-1	C-1
CLO 3	Manipulate with guidance the C-language programs for various applications	PLO-5	P-3
CLO 4	Practice with algorithms to develop small scale computer programming	PLO-5	P-3

Lab Outline:
Computation of number system, implementation of Boolean functions, basic machines organization including motherboard, memory, I/O cards, networking devices, use of flow charts, introduction to office tools, overview of different browsers including open-source browsers, introduction to various operating systems, coding, executing and debugging simple programs, implementation of simple control structures, implementation of simple functions, implementation of different function styles.

Recommended Books

1. Deitel&Deitel, “C How to Program,” Prentice Hall, Latest Edition, ISBN:013299044X.
2. Robert Lafore, “Object-Oriented Programming in C++,” Prentice Hall, Latest Edition, ISBN: 0672323087.
3. William Stallings “Computer Organization and Architecture: Designing for Performance”, Prentice Hall, Latest Edition, ISBN:0136073735.
4. Ivor Horton's “Beginning ANSI C++: The Complete Language”, Latest Edition ASIN: B0042NGRS0
5. Reema Thareja, “Computer Fundamentals & Programming in C”, OUP, 2012, ISBN: 978-0198078883

Title of Course	**:**	Linear Circuit Analysis		
Course Code	**:**	ESE-1101		
Discipline	**:**	B.E. (Electronic Engineering)		
Semester	**:**	1st Semester, First Year		
Effectiveness	**:**	Batch 2021/Fall onward		
Course Type	**:**	Compulsory		
Pre-Requisite	**:**	NA		
Marks	**:**	Theory:	100	Practical: 50
Credit Hours	**:**	3 CH		01 CH
Teaching Scheme	**:**	3 Hours / Week		03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester		

Aim: The aim of this course is the analysis of physical circuits using circuit laws and theorems. Transient analysis of first order circuits with unit step inputs and switched dc sources is emphasized to promote understanding of time-domain linear circuit response.

Objectives:
Teach the methods used in the analysis of electrical circuits.

Contents:
Physical foundation of electric circuits; electric current; electromotive force; resistance; conventional current; Ohm's law; work, energy, and power; conductance; efficiency; real and ideal sources; resistive networks; Kirchhoff's voltage and current laws; voltage divider rule; current divider rule; series and parallel-connected sources; voltage and current source conversions; mesh analysis; nodal analysis; network theorems (Superposition, Thevenin's, Norton's, and Maximum Power Transfer) with independent and dependent sources; capacitance and capacitors; inductance and inductors; electromagnetic induction; alternating current fundamentals; pharos representation of alternating current; AC voltage and current relationships for pure resistance; inductive and capacitive circuits; wye-delta transformations. Transient and Steady State analysis of first order RC and RL circuits with unit step forcing function followed by more complex series and parallel RLC circuits combinations.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Study the knowledge of Electrical components and circuits.	P-1	C1
CLO 2	Apply network laws & theorems on DC circuits.	P-1	C3
CLO 3	Describe the behavior of different combination of passive circuits (RC, RL, and RLC).	P-1	C2
CLO 4	Illustrate concept of phasor for AC circuits.	P-3	C2

Lab Outline:
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 Books:

1. William Hayt, Jack Kemmerly, Steven Durbin Engineering Circuit Analysis," McGraw-Hill Science/Engineering/Math, Latest Edition, ISBN: 0073529575
2. J. David Irwin, Robert M. Nelms "Basic Engineering Circuit Analysis," Wiley, Latest Edition, ISBN:0470633220
3. Robert L. Boylestad Introductory Circuit Analysis" Prentice Hall, Latest Edition, ISBN: 0137146663
4. Muhammad H. Rashid, "Introduction to PSpice Using OrCAD for Circuits and Electronics," Prentice Hall, Latest Edition, ISBN: 0131019880.
5. Allan H. Robbins, Wilhelm Mmiller, "Circuit Analysis: Theory and Practice", Cengage Learning, Latest Edition, ISBN: 978-1133281085.

Title of Course	**:**	Electronic Workshop	
Course Code	**:**	ESE-1102	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	1st Semester, First Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	NA	
Marks	**:**	Theory: 00	Practical: 50
Credit Hours	**:**	0 CH	01 CH
Teaching Scheme	**:**	0 Hours / Week	03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim: This lab focuses on providing the students hands-on experience in the use of electrical equipment and appliances. In this lab, the students will also be able to design and fabricate beginner level printed circuit boards.

Objective:
To introduce students with the basic electronics tools and PCB soldering

Lab Outline:
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.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Relate general safety regulations with Electrical Safety procedure	PLO-1	C-1
CLO 2	Try tools and equipment used in Electronic Workshop	PLO-1	P-3
CLO 3	Practice electrical wiring scheme for domestic applications	PLO-1	P-3
CLO 4	Make Simple PCB electronic circuits.	PLO-1	P-4

Recommended Books:

1. A.J. Chapman, "Workshop Technology", Latest Edition, Elsevier Butter-worth Heinemann, ISBN-13: 978-0713132724.
2. Choudhruy H. S. K., Elements of Workshop Technology", Vol-1, Media Promoters, ISBN-13: 978-8185099149.
3. R.P. Sing, "Electrical Workshop: A Textbook" , Latest Edition, International Publishing House, ISBN-13: 978-8189866716

Title of Course	**:**	Islamic Studies	
Course Code	**:**	HUM-1002	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	2nd Semester, First Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	NA	
Marks	**:**	Theory: 50	Practical: 00
Credit Hours	**:**	2 CH	00 CH
Teaching Scheme	**:**	2 Hours / Week	00 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim:

Objectives:
This course is aimed at:
To provide Basic information about Islamic Studies
To enhance understanding of the students regarding Islamic Civilization
To improve student's skill to perform prayers and other worships
To enhance the skill of the students for understanding of issues related to faith and religious life.

Contents:
Introduction to Quranic Studies: 1) Basic Concepts of Quran , 2) History of the Holy Quran 3) Uloom-ul-Quran; Study of Selected Text of the Holy Quran: 1) Verses of Surah Al-Baqara Related to Faith(Verse No-284-286), 2) Verses of Surah Al-Hujrat Related to Adab Al-Nabi (Verse No-1-18), 3) Verses of Surah Al-Mumanoon Related to Characteristics of the faithful (Verse No-1-11), 4) Verses of Surah al-Furqan Related to Social Ethics (Verse No.63-77), 5) Verses of Surah Al-Inam Related to Ihkam (Verse No-152-154)

Study of Selected Text of the Holy Quran
1) Verses of Surah Al-Ihzab Related to Adab al-Nabi (Verse No.6, 21, 40, 56, 57, 58.)
2) Verses of Surah Al-Hashar (18,19,20) Related to thinking, Day of Judgment
3) Verses of Surah Al-Saf Related to Tafakar, Tadabar (Verse No-1,14)

Seerat of the Holy Prophet (S.A.W) I
1) Life of Muhammad Bin Abdullah (Before Prophet Hood)
2) Life of Holy Prophet (S.A.W) in Makkah
3) Important Lessons Derived from the life of Holy Prophet (S.A.W) in Makkah

Seerat of the Holy Prophet (S.A.W) II
1) Life of the Holy Prophet (S.A.W) in Madina
2) Important Events of Life Holy Prophet (S.A.W) in Madina
3) Important Lessons Derived from the life of the Holy Prophet (S.A.W) in Madina

Introduction to Sunnah
1) Basic Concepts of Hadith
2) History of Hadith

3) Kinds of Hadith
4) Uloom –ul-Hadith
5) Sunnah & Hadith
6) Legal Position of Sunnah

Selected Study from Text of Hadith
Introduction to Islamic Law & Jurisprudence
1) Basic Concepts of Islamic Law & Jurisprudence
2) History & Importance of Islamic Law & Jurisprudence
3) Sources of Islamic Law & Jurisprudence
4) Nature of Differences in Islamic Law
5) Islam and Sectarianism

Islamic Culture & Civilization
1) Basic Concepts of Islamic Culture & Civilization
2) Historical Development of Islamic Culture & Civilization
3) Characteristics of Islamic Culture & Civilization
4) Islamic Culture & Civilization and Contemporary Issues

Islam & Science
1) Basic Concepts of Islam & Science
2) Contributions of Muslims in the Development of Science
3) Quran & Science

Islamic Economic System
1) Basic Concepts of Islamic Economic System
2) Means of Distribution of wealth in Islamic Economics
3) Islamic Concept of Riba
4) Islamic Ways of Trade & Commerce

Political System of Islam
1) Basic Concepts of Islamic Political System
2) Islamic Concept of Sovereignty
3) Basic Institutions of Govt. in Islam

Islamic History
1) Period of Khlaft-E-Rashida
2) Period of Ummayyads
3) Period of Abbasids

Social System of Islam
1) Basic Concepts of Social System of Islam
2) Elements of Family
3) Ethical Values of Islam

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Explain the concept of Islam and Science	P-8	C2
CLO 2	Explain the Economic system according to Islam	P-8	C2
CLO 3	Discuss the socio-economic and political system according to Islam	P-6	C2

Recommended Books:

1. Hameed ullah Muhammad, “Emergence of Islam”, IRI, Islamabad, Latest Edition

2. Hameed ullah Muhammad, “Muslim Conduct of State”, Latest Edition
3. Hameed ullah Muhammad, “Introduction to Islam”, Latest Edition
4. Mulana Muhammad Yousaf Islahi”, Latest Edition
5. Hussain Hamid Hassan, “An Introduction to the Study of Islamic Law” leaf Publication Islamabad, Pakistan.
6. Ahmad Hasan, “Principles of Islamic Jurisprudence” Islamic Research Institute, International Islamic University, Islamabad, Latest Edition
7. Mir Waliullah, “Muslim Jurisprudence and the Quranic Law of Crimes” Islamic Book Service, Latest Edition

Title of Course	**:**	Communications and Presentation Skills	
Course Code	**:**	HUM-1004	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	2nd Semester, First Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	NA	
Marks	**:**	Theory: 100	Practical: 00
Credit Hours	**:**	3 CH	00 CH
Teaching Scheme	**:**	3 Hours / Week	00 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim:

The aim of this course is to enable the students to communicate their ideas and to construct well-written engineering reports.

Objective:

To enhance the interpersonal communication skills to enable the students to communicate effectively in their professional career.

Contents:

Interpersonal and Intercultural communication, Communication: Concepts and Aspects,Intrapersonal Communication, Interpersonal Communication, Intercultural Communication, International Communication, Official Correspondence (Using Digital Sources). Inclusive Communication and Stereotyping, Personality Traits: Extrovert, introverts and Ambivert, Public Relations and Communications, Inclusive and Non-Inclusive Communication. Presentations, Debating and Interviewing, Learning and Practicing Presentations, Learning Argumentations, Logic and Reasoning, Practicing Interviewing, meetings, and negotiations.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	**Identifying**, understanding, and promoting interaction or communication that takes place in between two or more people of different cultural background, either through a verbal or non-verbal medium	P-10	A-1
CLO 2	**Initiating** inclusive communication so that students understand and express themselves in different ways	P-2	A-3
CLO 3	**Performing** public speaking via excellent communication skills, enthusiasm, and the ability to engage with an audience ranging from speaking to a small group to a large audience.	P-12	A-5

Recommended Books:

1. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2, Latest Edition. Oxford University Press 1986. ISBN 0 19 431350 6.
2. Writing. Intermediate by Marie-Chrisitine Boutin, Suzanne Brinand and Francoise Grellet. Oxford Supplementary Skills, Latest Edition. ISBN 019 435405 7 Pages 45-53 (note taking).
3. Writing. Upper-Intermediate by Rob Nolasco. Oxford Supplementary Skills, Latest Edition. ISBN 0 19 435406 5 (particularly good for writing memos, introduction to presentations, descriptive and argumentative writing).
4. Reading. Advanced. Brian Tomlinson and Rod Ellis. Oxford Supplementary Skills, Latest Edition. ISBN 0 19 453403 0.
5. Reading and Study Skills by John Langan, Latest Edition
6. Study Skills by Riachard York, Latest Edition

Title of Course	**:**	Linear Algebra		
Course Code	**:**	BS-1008		
Discipline	**:**	B.E. (Electronic Engineering)		
Semester	**:**	2nd Semester, First Year		
Effectiveness	**:**	Batch 2021/Fall onward		
Course Type	**:**	Compulsory		
Pre-Requisite	**:**	Calculus		
Marks	**:**	Theory:	100	Practical: 00
Credit Hours	**:**	3 CH		00 CH
Teaching Scheme	**:**	3 Hours / Week		00 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester		

Aim: The aim of this course is to understand several important concepts in linear algebra, including systems of linear equations and their solutions; matrices and their properties; determinants and their properties; vector spaces; linear independence of vectors; subspaces, bases, and dimension of vector spaces; inner product spaces; linear transformations; and Eigen values and eigenvectors.

Objective:
Introduce the matrix theory and the use of matrices in the solution of engineering problems.

Contents:
Algebra of matrices; inverse of a matrix; Gauss-Jordan method for the solution of a system of linear algebraic equations; vectors in the plane and in three dimensions; vector spaces; subspaces; span and linear independence; basis and dimension; homogeneous systems; coordinates and isomorphism; rank of a matrix; determinant; inverse of a matrix; applications of determinants; determinants from a computational point of view; properties of determinants; eigenvalues and eigenvectors; systems of linear differential equations; diagonalization; Hermitian matrices; singular value decomposition; quadratic forms; positive definite matrices; non-negative matrices; floating-point numbers; Gaussian elimination; pivoting strategies; matrix norms and condition numbers; orthogonal transformations; eigenvalue problem; least square problems.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Illustrate how to solve a system of linear equations that appears in various fields of Electronic Engineering	P-2	C2
CLO 2	Interpret the vector equations and linear transformations which are used in various fields of Electronic Engineering	P-2	C3
CLO 3	Apply the basic knowledge of vector spaces, Eigen value and Eigen vectors which are help full in engineering	P-2	C4
CLO 4			

Recommended Books

1. Bernard Kolman and David Hill, "Elementary Linear Algebra," Prentice Hall, Latest Edition, ISBN: 0132296543.

2. Kenneth Hardy, "Linear Algebra for Engineers and Scientists Using Matlab," Prentice Hall, Latest Edition, ISBN: 0139067280.
3. Stephen Goode, "Differential Equations and Linear Algebra," Prentice Hall, Latest Edition, ISBN: 0130457949.
4. Gilbert Strang, "Int
5. roduction to Linear Algebra", Wellesley-Cambridge Press, Latest Edition, ISBN: 978-0980232714.

Title of Course	**:**	Object Oriented Programming	
Course Code	**:**	ESE-1502	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	2nd Semester, First Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	Computer Fundamentals & Programming	
Marks	**:**	Theory: 100	Practical: 50
Credit Hours	**:**	3 CH	01 CH
Teaching Scheme	**:**	3 Hours / Week	03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim: To make students learn about the fundamental concepts of object-oriented programming. The course covers a number of basic and advanced data structure concepts including arrays, structures, linked lists, vectors, stacks, queues, trees.

Objective:
Teach the concepts of data structure and its use in computer programs.

Contents:
Conventional/Procedural vs Object-oriented programming, Concepts of object oriented paradigm, Object-oriented Design, Objects and Classes, member functions, public, private, and protected members, dynamic memory management, constructors and destructors, Data Encapsulation, Inheritance, Polymorphism, Overloading and Overriding, Abstract Classes and Interfaces, Event-driven programming, Event propagation, Exception handling, Threading, Multi-threading, Packages, Recursion, Use of stacks, queues and lists, Building GUI-based applications.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Describe the fundamental concept & important terminologies related to object-oriented programming.	PLO 1	C2
CLO 2	Apply principles of OOP in C++ environment.	PLO 1	C3
CLO 3	Apply OOP techniques to avoid extensive coding and manage memory.	PLO 1	C3
CLO 4	Develop C++ code to solve real world problem using OOP concept.	PLO 2	C5

LAB OUTLINE:
Implementation using simple programs for basic arrays, single-dimensional arrays, two-dimensional arrays, algorithm implementations, implementation of simple data structures like array, implementation of stacks, queues and priority

queues, linked list, doubly linked list, circular linked list, tree searching algorithms implementation of hash algorithms, simple sorting techniques including bubble sorting and selection sorting, advanced searching schemes including binary searching and quick searching.

Recommended Books:

1. Robert Lafore, "Data Structures and Algorithms in Java", Latest Edition, Prentice Hall, ISBN: 0672324539.
2. Robert Lafore, "Object-Oriented Programming in C++", Latest Edition, Prentice Hall, ISBN: 0672323087.

Title of Course	**:**	Electronic Devices and Circuits	
Course Code	**:**	ESE-1104	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	2nd Semester, First Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	Applied Physics, Linear Circuit Analysis	
Marks	**:**	Theory: 100	Practical: 50
Credit Hours	**:**	3 CH	01 CH
Teaching Scheme	**:**	3 Hours / Week	03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim: One of the main goals of this course is to explain the basic concepts of semi-conductor diode and its current-voltage relationship. Various applications of junction diode are discussed, and various types of diodes are also explained. Bipolar Junction Transistors (BJTs) and Field-Effect Transistors (FETs) are evolved as two PN-junction devices. Relations of various currents and voltages in these transistors are explained in detail. The effect of temperature on these semiconductor devices is highlighted.

Objective:
Introduce the basic concepts of electronics and electronic devices including, transistors, transistor biasing, amplifiers and Operational Amplifiers.

Contents:
Bipolar Junction Transistor: Operation, npn and pnp transistors, unbiased transistor, DC biasing of a transistor, static characteristics, DC circuit analysis, load line, operating point and bias stabilization. Transistor as an amplifier. Transistor biasing configurations: Common emitter, common base, common collector.Amplifier analysis: Transistor as an amplifier, hybrid model of a transistor, small-signal analysis, large-signal analysis, gain calculation of single-stage amplifier, Field Effect Transistor. FET biasing techniques: Common drain, common source and common gate, fixed bias and self-bias configurations, voltage divider biasing. Universal JFET bias curve. Darlington pair.
MOSFET, Characteristics and Parameters, MOSFET Biasing, IGBT
Operational Amplifier, Op-Amp Input Modes and parameters, Negative Feedback, Non inverting Amplifier, Voltage Follower, Inverting Amplifier, Effect of negative feedback on Op-amp impedances.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
Sr. No	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Apply biasing techniques for amplifier circuits	P- 2	C3
CLO 2	Compare BJT and FET amplifier configuration	P- 1	C4
CLO 3	Develop small signal model of transistor based amplifiers	P- 3	C2
CLO 4	Discuss operational amplifier characteristics	P- 1	C2

Lab outline:

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, operational Amplifier.

Recommended Books:

1. Adel S. Sedra and Kenneth C. Smith "Microelectronic Circuits," Oxford University Press, Latest Edition, ISBN: 0199339139.
2. Behzad Razavi "Fundamentals of Microelectronics," Wiley, Latest Edition, ISBN 1118156323.
3. Robert L. Boylestad and Louis Nashelsky "Electronic Devices and Circuit Theory", Prentice Hall, Latest Edition, ISBN-0132622262.
4. Thomas L. Floyd "Electronic Devices (Conventional Current Version)" Prentice Hall, Latest Edition, ISBN: 0132549867.

Title of Course	**:**	Complex Variables and Transforms	
Course Code	**:**	BS-202	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	1st Semester, Second Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	Linear Algebra	
Marks	**:**	Theory: 100	Practical: 00
Credit Hours	**:**	3 CH	00 CH
Teaching Scheme	**:**	3 Hours / Week	00 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim: To discuss the complex number system, different types of complex functions, analytic properties of complex numbers, theorems in complex analysis to carryout various mathematical operations in complex plane, roots of a complex equation. Cauchy–Riemann equations in the Cartesian and polar coordinates, Cauchy's integral formula, Cauchy–Goursat theorem, convergence of sequence and series, Taylor series, Laurent's series. Integral transforms with a special focus on Laplace integral transform.

Objective:
Introduce the concepts of complex variables, Laplace transform, and Fourier transform, and the use of transforms in the solution of engineering problems.

Contents:
Introduction to complex number systems, Argand'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.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Apply Laplace transform to solve linear differential equations	P- 2	C3
CLO 2	Apply Z-transform to solve linear Difference Equations	P- 2	C3
CLO 3	Evaluate Fourier series and transform	P- 2	C5
CLO 4	Apply transform for solving complex engineering Problems	P- 2	C3

Recommended Books:

1. Erwin Kreyszig, "Advanced Engineering Mathematics," John Wiley & Sons, Latest Edition, ISBN: 0470458364.

Title of Course	**:**	Data Structure and Algorithm Design	
Course Code	**:**	ESE-2503	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	1st Semester, Second Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	Object Oriented Programming	
Marks	**:**	Theory: 50	Practical: 50
Credit Hours	**:**	2 CH	01 CH
Teaching Scheme	**:**	2 Hours / Week	03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim: Data structures will be taught using Object-Oriented class templates available for data structures. The students of this course will also learn about designing, managing, and analyzing small to moderate data structures. In addition, using C++ language, a variety of basic concepts of object-oriented programming is also covered.

Objectives:
To understand the basic data structures and the abstract data structures and user defined data structures and their applications to represent various information types. Design and analysis of various algorithms for solving various searching, and sorting problems

Contents:
Data types, Arrays, Records, Set structure, Abstract Data Types, Sequential allocation, Linked allocation. Stacks (Sequential as well as Linked Implementation) Queues. (Sequential as well as Linked Implementation), Linked Lists, Recursive versus Iterative Algorithms, Applications, Towers of Hanoi, Linked Lists, Traversal, Insertion, Deletion, Doubly linked lists, Root Node, Terminal Node, Branch Node, Level of a Node, Degree of a node. , Binary Tree, Tree traversal, (In-order/Pre-order/Post-order traversal), Conversion of tree into binary tree/ Bin tree into a Heap. Traversing and searching in a tree, Insertion: Deletion, Heap, Heap-sort, Graphs. Adjacency Matrix, Traversal, DFS, BFS, Path lengths, Shortest Path Searching & Sorting Algorithms, Insertion sort, Selections sort, Merge sort, Radix sort, Hashing.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Identify data structure suitable for engineering problems.	P- 1	C1
CLO 2	Transform and analyze algorithms for stack and queues.	P- 2	C4
CLO 3	Transform algorithms for binary trees and graphs	P- 2	C4
CLO 4	Implement sorting & searching algorithm.	P- 2	C3

Recommended Books:

1. Horowitz Sahni, "Fundamentals of Data Structures in C++", Latest Edition.
2. Lipshutz, "Data Structures", Schaum Outline Series, Latest Edition
3. Weiss, "Data structures and algorithm analysis in C++", Latest Edition
4. M. Tanenbaum, "Data structures using C and C++", Latest Edition

Title of Course	**:**	Electrical Network Analysis	
Course Code	**:**	ESE-2105	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	1st Semester, Second Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	Linear Circuit Analysis	
Marks	**:**	Theory: 100	Practical: 50
Credit Hours	**:**	3 CH	01 CH
Teaching Scheme	**:**	3 Hours / Week	03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim: In this course students will be taught to analyze RLC circuit in time domain, in phasor form, in frequency domain and in S-domain. Student will learn single and three phase systems, their power measurement methods and power factor correction for efficient transmission of power. Students will be given the concept to formulate equations and choose among the different methods to analyze an electrical network.

Objective:
Teach the methods used in the analysis of electrical circuits.

Contents:
Integro-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 Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Analyze the natural and forced behavior of RC/RL & RLC circuit	P- 2	C4
CLO 2	Review the fundamentals of AC System	P- 1	C2
CLO 3	Derive time domain, phasor domain & frequency domain response of second order circuit	P- 4	C3
CLO 4	Transform simple networks for applications of filters and power factor correction.	P- 3	C4

Lab outline:

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 Books:

1. William Hayt, Jack Kemmerly, Steven Durbin "Engineering Circuit Analysis" McGraw-Hill Science/Engineering/Math, Latest Edition, ISBN: 0073529575
2. J. David Irwin, Robert M. Nelms "Basic Engineering Circuit Analysis," Wiley, Latest Edition, ISBN: 0470633220
3. Robert L. Boylestad "Introductory Circuit Analysis" Prentice Hall, Latest Edition, ISBN: 0137146663
4. Muhammad H. Rashid, "Introduction to PSpice Using OrCAD for Circuits and Electronics," Prentice Hall, Latest Edition, ISBN: 0131019880.

Title of Course	**:**	Digital Logic Design
Course Code	**:**	ESE-2106
Discipline	**:**	B.E. (Electronic Engineering)
Semester	**:**	1st Semester, Second Year
Effectiveness	**:**	Batch 2021/Fall onward
Course Type	**:**	Compulsory
Pre-Requisite	**:**	Electronic Devices and Circuits
Marks	**:**	Theory: 100 Practical: 50
Credit Hours	**:**	3 CH 01 CH
Teaching Scheme	**:**	3 Hours / Week 03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester

Aim: One of the main goals of this course is to teach students the fundamental concepts in classical digital design and to clearly demonstrate the way in which digital circuits are designed and analyzed today. The purpose is to make students familiar with modern hierarchy of digital hardware and enlighten them the state-of-the-art computer hardware design methodologies. Moreover, the contents of the course provide students the basic idea of how to design and simulate logic circuits.

Objective:

Introduce the concepts and tools for the design of digital electronic circuits.

Contents:
Basic concepts and tools to design digital hardware consisting of both combinational and sequential logic circuits, number systems, logic gates Boolean algebra, Karnaugh maps, Tabulation Techniques, combinational logic design, sequential circuits and state machines, memory and simple programmable logic devices (SPLDs).
Verilog / VHDL 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.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Explain fundamental concepts of digital logic design including number systems and Logic Gates	P- 1	C2
CLO 2	Apply Boolean algebra for the analysis and design of digital electronic circuits	P- 3	C3
CLO 3	Analyze combinational and sequential digital circuits	P- 2	C4
CLO 4	Develop a small-scale project based on digital logic circuits	P- 3	C5

Lab outline:
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 Books:

1. M. Morris Mano, Charles Kime "Logic and Computer Design Fundamentals," Prentice Hall, Latest Edition ISBN: 013198926X.
2. Thomas L. Floyd, "Digital Fundamentals," Prentice Hall, Latest Edition, ISBN: 0132359235.
3. Roger Tokheim, "Digital Electronics: Principles and Applications, Student Text with MultiSIM CD-ROM" Career Education, Latest Edition, ISBN: 0078309816.
4. William Kleitz, "Digital Electronics: A practical Approach with VHDL", Pearson, Latest Edition, ISBN: 0132543036.

Title of Course	**:**	Electronic Circuit Design	
Course Code	**:**	ESE-2107	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	1st Semester, Second Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	Electronic Devices and Circuits	
Marks	**:**	Theory: 100	Practical: 50
Credit Hours	**:**	3 CH	01 CH
Teaching Scheme	**:**	3 Hours / Week	03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim: The objective of this course is to provide the students an insight into analysis and design of the electronic circuits that find extensive application in such fields as computers, control systems, digital instrumentation, communications, radar etc. This course is devoted to the study of analog circuits emphasizing amplifiers.

Objective:
Teach the operation, analysis, and design of electronic amplifiers and oscillators.

Contents:
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, Colpitt oscillator, Hartley oscillator, Wein Bridge oscillator, Clapp oscillator.
Basic Operational Amplifier Circuits: Comparators, Summing Amplifiers, Integrators and Differentiator, Instrumentation Amplifiers, Log and Antilog Amplifiers

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	**Infer** the frequency characteristics and stability analysis of power amplifiers and oscillators	P- 1	C2
CLO 2	Analyze various electronic circuits using operational amplifiers	P- 2	C4
CLO 3	Design operational amplifier based electronic circuits	P- 3	C5

LAB OUTLINE:
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 Books:

1. Adel S. Sedra and Kenneth C. Smith "Microelectronic Circuits," Oxford University Press, Latest Edition, ISBN: 0199339139.
2. Behzad Razavi "Fundamentals of Microelectronics," Wiley, Latest Edition, ISBN: 1118156323.
3. Robert L. Boylestad and Louis Nashelsky "Electronic Devices and Circuit Theory", Prentice Hall, Latest Edition, ISBN: 0132622262.
4. Thomas L. Floyd "Electronic Devices (Conventional Current Version)" Prentice Hall, Latest Edition, ISBN: 0132549867.

Title of Course	**:**	Differential Equations	
Course Code	**:**	BS-201	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	2nd Semester, Second Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	Calculus, Linear Algebra	
Marks	**:**	Theory: 100	Practical: 00
Credit Hours	**:**	3 CH	00 CH
Teaching Scheme	**:**	3 Hours / Week	00 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim:

Objective:
Introduce differential equations and teach methods to solve these equations.

Contents:
Formulation, order, degree, and linearity of a differential equation; complementary and particular solutions; initial- and boundary-value problems; solution of ordinary linear differential equations of first order; Bernoulli's differential equation; solution of ordinary differential equations of second order; origin and formulation of partial differential equations; solutions of first-, second-and higher-order partial differential equations; homogeneous partial differential equations of order one; Lagrange's method of solution.
Linear equations of second order, such as wave equation and heat equation, used in engineering and physical sciences; solution of such equations using Fourier series; review of power series; series solutions near ordinary points; Legendre equation; types of singular points – Euler's Equation; series solutions near regular singular points; series solutions near regular singular points – the general case. Bessel's Equation and Bessel Functions.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	**Solve** Differential Equations for common Engineering systems.	P- 2	C3
CLO 2	**Solve** Partial Differential Equations for common Engineering systems.	P- 2	C3
CLO 3	**Demonstrate** the concepts of Fourier Series	P- 2	C3
CLO 4			

Recommended Books:

1. Erwin Kreyszig, "Advanced Engineering Mathematics," John Wiley & Sons, Latest Edition, ISBN: 0470458364.
2. John Polking, Al Boggess, and David Arnold "Differential Equations," Prentice Hall, Latest Edition, ISBN: 0131437380.
3. Stephen Goode, "Differential Equations and Linear Algebra," Prentice Hall, Latest Edition, ISBN: 0130457949.

Title of Course	**:**	Electrical Machines	
Course Code	**:**	ESE-2108	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	2nd Semester, Second Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	Linear Circuit Analysis, Electrical Network Analysis	
Marks	**:**	Theory: 100	Practical: 50
Credit Hours	**:**	3 CH	01 CH
Teaching Scheme	**:**	3 Hours / Week	03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim: The voltage-current characteristics, voltage regulation of DC generators, torque speed characteristics, speed regulation of DC motors and the generalized concepts of electromechanical energy conversion are included mainly in this course. Working principles, construction and operation of single phase and three phase transformers will be studied. In this course working principles, construction, characteristics and equivalent circuit of three phase synchronous generators, synchronous motors and induction motors, Single phase and special purpose motors are discussed in detail.

Objective:
Teach the concepts, construction, principles of operation, and characteristics of electrical machines.

Contents:
Magnetic circuits and calculations: Single-phase and poly¬phase 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 Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Examine magnetic circuits to perform transformer analysis using standard testing procedures including open-circuit & short-circuit tests, efficiency and circuit analysis involving transformers.	P-2	C4
CLO 2	Examine construction, working principles, characteristics, losses and efficiency of DC Machines (Motors, Generators)	P- 3	C4

CLO 3	Examine construction, working principles, characteristics, and equivalent circuit of three phase synchronous generators, synchronous motors and induction motors.	P- 2	C4
CLO 4	Compare various types of electrical machines in terms of their advantages and disadvantages.	P- 2	C4

Lab Outline:

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 Books:

1. Stephen Umans "Fitzgerald & Kingsley's Electric Machinery" McGraw-Hill Science/Engineering/Math, Latest Edition, ISBN: 0073380466.
2. Stephen Chapman "Electric Machinery Fundamentals" McGraw-Hill Science/Engineering/Math, Latest Edition, ISBN:0073529540.
3. Theodore Wildi "Electrical Machines, Drives and Power Systems" Prentice Hall, Latest Edition, ISBN:0131776916.

Title of Course	**:**	Electromagnetic Field Theory	
Course Code	**:**	ESE-2109	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	2nd Semester, Second Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	Applied Physics, Calculus	
Marks	**:**	Theory: 50	Practical: 00
Credit Hours	**:**	2 CH	00 CH
Teaching Scheme	**:**	2 Hours / Week	00 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim:

Objective:
Introduce the concepts and mathematical methods to understand and analyze electromagnetic fields and waves.

Contents:
Vector Algebra, Cartesian Coordinate System, Cylindrical Coordinate System,, Spherical Coordinate System, Coulomb's Law, Electric Field Intensity of Point Charge, Electric Field Intensity of Line Charge, Electric Field Intensity of Sheet Charge, Electric Flux & Electric Flux Density, Gauss's Law, Applications of Gauss's Law, Divergence & Divergence Theorem, Maxwell's First Equation (Electrostatics), Energy expended in moving a charge in an Electric Field, The Line Integral, Potential Difference & Potential Field, Potential Field of a System of Charges, Potential Gradient, Dipole, Energy density in Electrostatic Field, Biot Savart Law & its applications, Ampere's Circuital Law & its applications, Curl, Stoke's Theorem, Magnetic Flux & Magnetic Flux Density, Faraday's Law, Displacement Current & Displacement Current Density, Maxwell's equations in point & integral forms, Generation of Electromagnetic waves, Electromagnetic wave propagation in free space, Electromagnetic wave propagation in perfect & lossy dielectric, Pointing vector, Electromagnetic wave propagation in good conductors.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Explain the basic concepts of vector algebra, coordinate systems, gradients, divergence and curl operations.	P-1	C-2
CLO 2	Apply the concept of electromagnetic fields in the region surrounded by different static and moving charge configurations.	P-2	C-3
CLO 3	Analyze time-dependent fields and Maxwell's equations for electromagnetic wave propagation in different mediums.	P-2	C-4

Recommended Books:

1. William Hayt and John A. Buck, "Engineering Electromagnetic," McGraw-Hill, Latest Edition, ISBN: 0073104639.
2. Sadiku, Matthew N, "Elements of Electromagnetic," Oxford University Press, Latest Edition, ISBN: 0195103688.

Title of Course	:	Instrumentation and Measurement
Course Code	:	ESE-2201
Discipline	:	B.E. (Electronic Engineering)
Semester	:	2nd Semester, Second Year
Effectiveness	:	Batch 2021/Fall onward
Course Type	:	Compulsory
Pre-Requisite	:	Linear Circuit Analysis, Electrical Network Analysis
Marks	:	Theory: 100 Practical: 50
Credit Hours	:	**3** CH 01 CH
Teaching Scheme	:	3 Hours / Week 03 Contact Hours / Week
Assessment	:	20% Sessional, 30% Mid Semester Examination, 50% Final Semester.

Aim: This aim of the course is to cover the basic use and application of sensors, transducers, and electronic measuring instruments. The theory of analogue DC and AC measuring instruments is first established which is then used to study analog electronic and digital meters. Different types of sensors and transducer are studied with their analog and digital interfacing. The use and application of different measuring instruments are also covered.

Objective:
Introduce the concepts and the methods and instruments for the measurement of electrical and non-electrical quantities.

Contents:
Precision measurements terminologies including resolution, sensitivity, accuracy, and uncertainty; engineering units and standards; principles of different measurement techniques; instruments for measurement of electrical properties, pressure, temperature, position, velocity, flow rates (mass and volume) and concentration; systems for signal processing and signal transmission: signal conditioning ; modern instrumentation techniques; static and dynamic responses of instrumentation and signal conditioning; basic data manipulation skills using personal computers and graphs; data acquisition systems; principles of operation, construction and working of different analog and digital meters, oscilloscope, recording instruments, signal generators, transducers, and other electrical and non-electrical instruments; types of bridges for measurement of resistance, inductance, and capacitance; power and energy meters; high-voltage measurements.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	***Describe*** *the fundamental concepts of instrumentation.*	P-1	C2
CLO 2	***Interpret*** *different electrical and non-electrical quantitites.*	P-2	C3
CLO 3	***Analyze*** *the integration of transducers with analog and digital hardware.*	P-2	C2
CLO 4	***Examine*** *the data from different process-controlled loops.*	P-2	C6

Lab outline:

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 Books:

1. Klaas B. Klaassen and Steve Gee, "Electronic Measurement and Instrumentation," Cambridge University Press, 1996, ISBN: 0521477298.
2. Kevin James, "PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control," Newnes, Latest Edition, ISBN: 0750646241.

Title of Course	**:**	Microprocessor and Microcontroller Systems	
Course Code	**:**	ESE-2202	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	2nd Semester, Second Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	Digital Logic Design	
Marks	**:**	Theory: 100	Practical: 50
Credit Hours	**:**	3 CH	01 CH
Teaching Scheme	**:**	**3** Hours / Week	03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim: To develop in-depth understanding of microprocessor and microcontroller systems.

Objective:
Teach the architecture, programming, interfacing, and applications of microprocessors and microcontrollers.

Contents:
Introduction to Intel family microprocessors, instruction set architecture (ISA), assembly language programming, hardware model, read/write cycles, exception/interrupt processing, memory systems, I/O devices, DMA, interfacing to memory and I/O devices, analog-to-digital and digital-to-analog converters, introduction to PIC/Atmel 8051, microcontroller addressing modes, architecture and its programming.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Explain the basic architecture of 8086/8088 microprocessor and 8051 microcontrollers	P-1	C2
CLO 2	Implement assembly language program to perform a given task using 8086/8088 microprocessor	P-3	C3
CLO 3	Use techniques to Interface memory and I/O devices to 8086/8088 microprocessor.	P-1	C3
CLO 4	Produce Assembly language codes for 8051 microcontrollers based electronic systems.	P-3	C3

Lab outline:
Study of Intel microprocessor ISA using its training boards, implementation of interfacing techniques (using gates, decoders, and SPLDs) to memory system and different I/O devices, learning and implementation of interrupt-driven I/O, learning and implementation of simple microcontroller based circuits, followed by a course project for demonstration of the practical skills developed.

Recommended Books:

1. Barry B. Brey "The Intel Microprocessors" Prentice Hall, Latest Edition, ISBN: 0135026458.
2. Douglas V. Hall, "Microprocessor and Interfacing", Tata McGraw-Hill, Latest Edition, ISBN: 0070601674.
3. Muhammad Ali Mazidi, Janice Gillispie-Mazidi "80X86 IBM PC and Compatible Computers: Assembly Language, Design, and Interfacing" Prentice Hall, Latest Edition, ISBN: 013061775X.
4. Muhammad Ali Mazidi, Janice Mazidi and RolinMcKinlay, "8051 Microcontroller and Embedded Systems," Prentice Hall, Latest Edition, ISBN: 013119402X.

Title of Course	**:**	Critical Thinking		
Course Code	**:**	HUM-3005		
Discipline	**:**	B.E. (Electronic Engineering)		
Semester	**:**	1st Semester, Third Year		
Effectiveness	**:**	Batch 2021/Fall onward		
Course Type	**:**	Compulsory		
Pre-Requisite	**:**	NA		
Marks	**:**	Theory:	100	Practical: 00
Credit Hours	**:**	3 CH		00 CH
Teaching Scheme	**:**	3 Hours / Week		00 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester		

Aim:

Objectives:

Contents:

The Power of critical thinking

- Claims and reasons.
- Reasons and arguments
- Arguments in the rough

The Environment of critical thinking

- Perils of haunted mind
- Self and the power of the group
- Subjective and social relativism
- Skepticism

Making sense of arguments

- Argument's basics
- Patterns
- Diagramming arguments
- Assessing long arguments

Reasons for belief and doubt

- Conflict experts and evidence
- Personal experience
- Fooling ourselves
- Claims in the news.

Faulty reasoning

- Irrelevant premises
- Genetic fallacy, composition, division
- Appeal to the person, equivocation, appeal to popularity
- Appeal to tradition, appeal to ignorance, appeal to emotion

- Red herring, straw man

Unacceptable premises
- Begging the question, false dilemma
- Slippery slope, hasty generalization
- Faulty analogy

Deductive reasoning: Propositional logic
- Connectives and truth values
- Conjunction, disjunction, negation
- Conditional, checking for validity.
- Simple arguments, tricky arguments
- Streamlined evaluation.

Deductive reasoning: Categorical logic
- Statements and classes
- Translations and standard form
- Terms, quantifiers
- Diagramming categorical statements
- Sizing up categorical syllogisms

Inductive reasons
- Enumerative induction
- Sample size, representativeness, opinion polls
- Analogical induction
- Casual arguments, testing for causes.
- Casual confusions

Inference to the best explanation
- Explanations and inference
- Theories and consistency
- Theories and criteria
- Testability, fruitfulness, scope, simplicity
- Conservatism

Judging scientific theories
- Science and not science
- The scientific method, testing scientific theories
- Judging scientific theories
- Copernicus versus Ptolemy, evolution versus creationism
- Science and weird theories
- Making weird mistakes
- Leaping to the weirdest theory, mixing what seems with what is
- Misunderstanding the possibilities
- Judging weird theories
- Crop circles, talking with the dead.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Discover the state of relevance of Logic to Nation Building	P-6	C3
CLO 2	Discover the fallacies of relevance from those of ambiguity	P-10	C3
CLO 3	Differentiate the valid and invalid arguments, true and false propositions etc. with vivid examples	P-10	C3
CLO 4	Discriminate all the laws of thought, use these laws in the form of truth tables	P-10	C3

Recommended Books:

1. Vaughn Lewis, 2005, The Power of Critical Thinking, Oxford University Press, Latest Edition
2. Paulsen David W., Cederblom Jerry:2000, Critical Reasoning, Wadsworth, Latest Edition
3. Restall Greg, Logic: An Introduction, Routledge, Latest Edition

Title of Course	**:**	Probability and Random Variables		
Course Code	**:**	BS-301		
Discipline	**:**	B.E. (Electronic Engineering)		
Semester	**:**	1st Semester, Third Year		
Effectiveness	**:**	Batch 2021/Fall onward		
Course Type	**:**	Compulsory		
Pre-Requisite	**:**	NA		
Marks	**:**	Theory:	100	Practical: 00
Credit Hours	**:**	3 CH		00 CH
Teaching Scheme	**:**	3 Hours / Week		00 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester.		

Aim: The main aim of this course is to help the students to learn the basic ideas of the theory of probability and random variables. The theoretical part is supported by the examples of applicable nature especially from the areas of Electronic Engineering. The course will help students to aptly deal with the problems of probability and random functions later in their engineering degree program when the study various core courses like Digital Communications, Mobile Communications etc.

Objective:

Understand elements of probability theory and its application to various Problems in engineering. Become familiar with discrete and continuous probability distributions. Be able to transform, compute densities and expectations of random variables and processes. Become familiar with random processes and the second moment theory. Be able to construct simple probabilistic models of queuing phenomenon encountered in engineering.

Contents:

1. **Fundamental Concepts of Probability – Six Lectures** Set Operation, Sample Space, Events and Probabilities, Probability Axioms, Conditional Probability, Independence, Bayes' Theorem
2. **Discrete Random Variables – Six Lectures** Probability Mass Function, Bernoulli, Geometric, Binomial and Poisson Random Variable, Variance and Standard Deviation, Conditional Probability Mass Function
3. **Continuous Random Variables – Six Lectures** CDF of Continuous Random Variables, Probability density function, Expected Value, Uniform, Gaussian, Standard Normal Random Variables, Probability Models, Conditional Expected Values of Continuous Random Variables
4. **Pairs of Random Variables – Six Lectures** Joint CDF, Joint PMF, Marginal PMF, Joint PDF, Functions of Two Random Variables, Covariance, Correlation, Relation of Eigen values and Eigen vectors of Covariance Matrix, Orthogonal and Uncorrelated Random Variables, Conditional Joint PDF, Bivariate Gaussian Random Variables
5. **Error Functions and Q-Functions**
6. **Introduction to Stochastic Processes**

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**

CLO 1	Solve Probability Based Problems	P-2	C3
CLO 2	Compute densities and random variable and process	P-2	C2
CLO 3	Construct simple probabilistic Models of Queuing phenomenon encountered in engineering	P-2	C3
CLO 4			

Recommended Books:

1. Probability, Random Variables and Stochastic Processes by Athanasios Papoulis and S. U. Pillai, Latest Edition McGraw Hill.
2. An Exploration of Random Processes for Engineers, by B. Hajek, Latest Edition.
3. Introduction to probability Models, S. M. Ross, Latest Edition.
4. D. P. Bertsekas, and J. N. Tsitsiklis. Introduction to Probability. Athena Scientific Press, Latest Edition.

Title of Course	**:**	Analog and Digital Communications	
Course Code	**:**	ESE-3203	
Discipline	**:**	**B**.E. (Electronic Engineering)	
Semester	**:**	1st Semester, Third Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	Electronic Circuit Design	
Marks	**:**	Theory: 100	Practical: 50
Credit Hours	**:**	3 CH	01 CH
Teaching Scheme	**:**	3 Hours / Week	03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim: It will give them a detailed knowledge of modulation and demodulation, analogue modulation techniques, carrier recovery schemes and phase-locked loops (PLLs). It will provide the knowledge of sampling theorem and reconstruction of signals. Also, an introduction to information theory, source coding, channel capacity, and communication channel models shall be discussed.

Objectives:
Develop a fundamental understanding of communication systems, signal modulation techniques (Analog & Digital) and effects of noise & interference.

Contents:
Introduction to communication systems, Amplitude modulation, Angle modulation, Pulse modulation, PCM, Delta-Sigma Modulation, DPCM and ADPCM, Transmission of Digital signals, Sampling theory and Nyquist Criterion, ASK, BPSK, QPSK, DPSK, FSK and MSK), Coherent and Non coherent detection, Performance analysis in terms of BER & bandwidth, Matched Filters and Correlator, Introduction to ISI.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Explain different analog modulation and demodulation techniques	P-1	C2
CLO 2	Evaluate fundamental communication system parameters, SNR, Bandwidth, Power	P-1	C5
CLO 3	Analyze digital communication systems	P-2	C4
CLO 4	Design analog communication system to meet desired applications	P-3	C6

Lab outline:
Study of different modulation techniques including amplitude modulation, frequency and pulse modulation, study of demodulation techniques; use of training modules/simulation tools (e. g MATLAB/ Simulink); a mini project.

Recommended Books:

1. B. P. Lathi and Zhi Ding, “Modern Digital and Analog Communication Systems” Oxford University Press, Latest Edition, ISBN: 0195331451.
2. Wayne Tomasi, “Electronic Communication System, Fundamentals Through Advanced,” Prentice Hall, Latest Edition ISBN-10: 0130494925.
3. Simon Haykin and Michael Moher, “Communication Systems,” Wiley; 5th Edition, 2009, ISBN: 0471697907.
4. Leon W. Couch, “Digital and Analog Communication Systems,” Prentice Hall; Latest Edition, ISBN: 0132915383

Title of Course	**:**	Signals and Systems		
Course Code	**:**	ESE-3204		
Discipline	**:**	B.E. (Electronic Engineering)		
Semester	**:**	1st Semester, Third Year		
Effectiveness	**:**	Batch 2021/Fall onward		
Course Type	**:**	Compulsory		
Pre-Requisite	**:**	NA		
Marks	**:**	Theory: 100		Practical: 50
Credit Hours	**:**	3 CH		01 CH
Teaching Scheme	:	3 Hours / Week		03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester		

Aim: The objective of this course is to develop the understanding of the basic ideas of the Signals & Systems encountered in engineering. The focus will be on the methods for characterizing and analyzing continuous-time and discrete time signals and systems. Students will learn some transform techniques (Laplace transform, Z-transform and Fourier transform) that are useful for the understanding of Digital communication systems, Feedback control systems, Satellite and mobile communications, Digital signal processing and Digital image processing.

Objective:
Introduction to various types of signals and systems with an emphasis on fundamental tools for Continues time signal processing.

Course:
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, introduction to analog filter design.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Analyze various system properties such as linearity, time invariance, causality, bounded-input and bounded-output stability	P-2	C4
CLO 2	Analyze continuous time signal using Fourier Series & Transforms.	P-2	C4
CLO 3	Apply the convolution integral formulas to determine the output of continuous time/discrete time systems	P-4	C3
CLO 4	Evaluate and design analog filters using MATLAB	P-3	C5

Lab Outline:
Developing and understanding signal systems and transforms using MATLAB.

Recommended Books:

1. V. Oppenheim, A. S. Willsky and S. H. Nawab, "Signals and Systems," Prentice Hall, Latest Edition, ISBN: 0138147574.
2. Simon Haykin and Barry Van Veen “Signals and Systems”, Wiley, Latest Edition, ISBN: 0471164747.
3. Luis Chaparro, “Signals and Systems using MATLAB” Academic Press , Latest Edition, ISBN: 0123747163.

Title of Course	**:**	Power Electronics
Course Code	**:**	ESE-3205
Discipline	**:**	B.E. (Electronic Engineering)
Semester	**:**	1st Semester, Third Year
Effectiveness	**:**	Batch 2021/Fall onward
Course Type	**:**	Compulsory
Pre-Requisite	**:**	Applied Physics, Linear Circuit Analysis, Electronic Devices and Circuits
Marks	**:**	Theory: 100 Practical: 50
Credit Hours	**:**	3 CH 01 CH
Teaching Scheme	**:**	3 Hours / Week 03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester

Aim: The aim of this subject is to understand the fundamental concepts and basic theory involved in modelling and analysis of the power electronic components that comprise power electronic devices such as power supplies, inverters, converters, and their control systems.

Objectives:
Teach the semiconductor devices and circuits for the conversion of different electrical power into a required form. Introduce the applications of power electronics including rectifiers, inverters, DC-DC converters, and AC controllers.

Contents:
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 Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Express comprehensive knowledge of components, circuits and control techniques used in the switching mode rather than in the linear mode	P-1	C2
CLO 2	Illustrate the topologies of power electronic circuits for applications in controlled rectification and inversion.	P-2	C2
CLO 3	Illustrate the topologies of power electronic circuits for applications in dc-dc conversion and ac-ac conversion.	P-2	C3
CLO 4	Develop applications circuits of power electronics converters.	P-3	C4

Lab outline:

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 Books:

1. Robert W. Erickson and Dragan Maksimovic, "Fundamentals of Power Electronics," Springer, Latest Edition, ISBN: 0792372700.
2. Muhammad H. Rashid "Power Electronics: Circuits, Devices & Applications" Prentice Hall, Latest Edition, ISBN-10: 0133125904.
3. Ned Mohan, William P. Robbins and Tore M. Undeland, "Power Electronics: Converters, Applications and Design," Media Enhanced, Latest Edition, John Wiley & Sons, ISBN: 0471429082.
4. Daniel Hart, "Power Electronics," McGraw-Hill Science/Engineering/Math, Latest Edition, ISBN: 0073380679

Title of Course	**:**	Engineering Economics and Project Management	
Course Code	**:**	ESE-3601	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	2nd Semester, Second Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	NA	
Marks	**:**	Theory: 100	Practical: 00
Credit Hours	**:**	3 CH	00 CH
Teaching Scheme	**:**	3 Hours / Week	00 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim: To understand the importance of team working, effective use of financial spreadsheet models to provide solutions to management problems and effective communication through written reports to both specialist and non-specialist audiences.

Objectives:
Introduce the concepts of economics that engineers need to know to carry out engineering tasks and projects.

Contents:
Fundamentals of engineering economics, measures of financial effectiveness, no monetary values
Economic environment: Consumer and producer goods, measures of economic worth, price, supply and demand relationships. Selection between alternatives: Present economy, selection among materials and designs, basic investment philosophy, alternatives having identical lives, alternatives having different lives. Value analysis: Important cost concepts, cost-benefit analysis, feasibility studies, value analysis in designing and purchasing. Linear programming: Mathematical statement of linear programming problems, graphic solution, simplex procedure, duality problem. Depreciation and valuation: Types of depreciation, economic life, profit and interest, returns to capital, discrete and continuous compounding, discounting, sinking and fund problems. Capital financing and budgeting: Types of ownership, types of stock, partnership and joint stock companies, banking and specialized credit institution. Theory of production: Factors of production, laws of returns, break-even charts and relationships. Industrial relationship: Labor problems, labor organizations, prevention and settlement of disputes.
Principles of management; decision making; stress management; conflict management; crisis management; leadership; motivation; delegation of powers; role of projects in organization's competitive strategy, standard methodologies for managing projects, project life cycle, design implementation interface, estimating, contractual risk allocation, scheduling: PBS and WBS, integration of scope, time, resource and cost dimensions of a project; evaluation of labor, material, equipment, and subcontract resources; scheduling techniques such as CPM/PERT and GERT, critical chain, solving real-world project schedules, cost budgeting, cost baseline, cash flow analysis, earned value analysis, cost control, proposal presentation, application of software for project management.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Analyze the elementary economic analysis for Engineering applications	P-2	C4

CLO 2	Evaluate present worth, future worth and annual worth analysis on one or more economic alternatives.	P-4	C3
CLO 3	Compare the life cycle cost of multiple projects and make a quantitative decision between alternate facilities.	P-2	C4
CLO 4	Discover some project management techniques and apply them to control project's progress.	P-11	C3

Recommended Books:

1. Leland T. Blank and Anthony J. Tarquin, “Engineering Economy,” McGraw-Hill Science/Engineering/Math; Latest Edition, ISBN: 0073376302

Title of Course	**:**	Numerical Analysis	
Course Code	**:**	BS-3002	
Discipline	:	B.E. (Electronic Engineering)	
Semester	**:**	2nd Semester, Third Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	NA	
Marks	**:**	Theory: 50	Practical: 00
Credit Hours	**:**	2 CH	00 CH
Teaching Scheme	**:**	2 Hours / Week	00 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim:

Objectives:
To teach the numerical solutions of the engineering problems using computer software/MATLAB.

Contents:
Floating point number systems, error analysis, solutions of equations, interpolation, splines, numerical differentiation and integration, numerical methods in linear algebra, systems of linear equations, method of least squares, eigenvalues, eigenvectors, solution of ordinary and partial differential equations. This subject is to be supplemented with extensive computer exercises.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Retrieve ordinary differential Equations from given data	P-2	C2
CLO 2	Solve difference equation numerically and Analytically	P-2	C3
CLO 3	Analyze any experimental data using numerical methods.	P-2	C4
CLO 4			

Recommended Books:

1. Joe D. Hoffman and Steven Frankel, "Numerical Methods for Engineers and Scientists", CRC Press, Latest Edition, ISBN: 0824704436.
2. Steven C. Chapra and Raymond P. Canale, "Numerical Methods for Engineers," McGraw-Hill Science/Engineering/Math, Latest Edition, ISBN: 007339792X.
3. Curtis F. Gerald, "Applied Numerical Analysis", Latest Edition, Addison Wesley, ISBN: 0321133048.

Title of Course	**:**	Control Engineering	
Course Code	**:**	ESE-3206	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	2nd Semester, Third Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	Signals and Systems	
Marks	**:**	Theory: 100	Practical: 50
Credit Hours	**:**	3 CH	01 CH
Teaching Scheme	**:**	3 Hours / Week	03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim: This course presents an introduction to feedback control systems. It is aimed at setting up the background and knowledge in control systems. Control systems have importance in all fields of engineering. The objective is to provide the student with the basic concepts of control theory as developed over the years in both frequency and time domain.

Objectives:
Study and understand the principle of system modeling, analysis and feedback control design.

Contents:
Introduction to control systems; open-loop and closed-loop systems, transfer functions, block diagrams, signal flow graphs; introduction to modeling; formation of differential equations of electrical, mechanical and other systems, transfer functions; performance analysis of closed-loop system; stability, Routh's stability criterion, types and analysis of feedback control systems; root locus, Bode plots, polar plots, Nyquist stability criterion, gain and phase margins, Nichol's chart; steady-state and transient response of first-order, second-order and higher-order systems; introduction to state-space concepts and design techniques, formation and solution of state equations, eigenvalues and eigenvectors, transfer function matrices; Controller design using frequency response and root locus methods.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Explain electromechanical system by mathematical modeling.	P-1	C2
CLO 2	Determine transient and steady state behavior of system using standard test signals	P-2	C3
CLO 3	Analyze linear and nonlinear system for steady state error, absolute stability and relative stability	P-2	C4
CLO 4	Analyze controller design using different techniques	P-3	C4

Lab Outline:
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 rootlocus, Bode plot, and Nyquist plot using MATLAB; PI, PD and PID controller design, analysis of servo system and higher order systems.

Recommended Books:

1. Katsuhiko Ogata, "Modern Control Engineering," Prentice Hall, Latest Edition, ISBN: 0136156738.
2. Norman S. Nise, "Control Systems Engineering," Wiley, Latest Edition, ISBN: 9780470547564.
3. Anand Kumar, "Control Systems", Prentice-Hall of India Pvt. Ltd, Latest Edition, ISBN: 8120331974.

Title of Course	**:**	Digital Signal Processing and Filter Design	
Course Code	**:**	ESE-3301	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	2nd Semester, Third Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	Signals and Systems	
Marks	**:**	Theory: 100	Practical: 50
Credit Hours	**:**	3 CH	01 CH
Teaching Scheme	**:**	3 Hours / Week	03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim: To make students familiar with the most important methods in DSP, including digital filter design, transform-domain processing, and importance of Signal Processors. To make students aware about the meaning and implications of the properties of systems and signals.

Objectives:
Students will be able to analyze signals and systems in both temporal and spectral domain. The students will be able to design digital filters for practical applications and calculate the computational efficiency of systems using DFT based algorithms.

Contents:
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 band limited 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 Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Determine the dynamics of a Linear Time invariant and causal digital System.	P-2	C3
CLO 2	Use sampling theorem relation between time domain and frequency domain signals	P-2	C3
CLO 3	Determine the behavior of digital systems using DTFT and z-transforms	P-2	C3
CLO 4	Design finite and infinite impulse response (FIR & IIR) filters	P-3	C6

Lab outline:

Review of MATLAB and Complex Exponentials, Introduction to DSP KIT, Audio Processing using DSP Kit, A/D and D/A Conversion : Digital Images, DFT and Spectral Leakage, Sampling, Quantization and Aliasing Using DSK, DFT Properties and Block Convolution, Frequency Response, Band pass And Nulling Filters, Frequency Response and Pole Zero Plots of FIR/IIR Filters, Delays And FIR Filtering (DSK), FIR Filter Design Using Windowing, IIR Filter Design using Analog Design Techniques

Recommended Books:

1. Alan V. Oppenheim, Ronald W. Schafer “Discrete-Time Signal Processing”, Prentice Hall, Latest Edition, ISBN: 0131988425
2. Richard G. Lyons “Understanding Digital Signal Processing” , Latest Edition, ISBN: 0137027419

Title of Course	**:**	Industrial Automation and Robotics	
Course Code	**:**	ESE-3302	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	2nd Semester, Third Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	NA	
Marks	**:**	Theory: 100	Practical: 50
Credit Hours	**:**	3 CH	01 CH
Teaching Scheme	**:**	3 Hours / Week	03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester**.**	

Aim: Students will understand the techniques and applications of Automation and Robotics Programming in an industrial environment. They will learn to design and implement robotic systems and apply what they learned to a career in the Automation and Robotics field.

Objectives:

Students will understand the techniques and applications of Automation and Robotics Programming in an industrial environment. They will learn to design and implement robotic systems and apply what they learned to a career in the Automation and Robotics field.

Contents:

Introduction to Electromechanical Engineering. Fundamentals of control system. Theory of Automation, introduction to automatic control systems, implementation of industrial control systems, Feedback and feed-forward systems, computer interfacing, digital input/output processing, control of dc and ac motors, stepper motor control, servo motors control, position control friction, backlash and resilience machine tool control, remote position control; process control, pneumatic controllers, analog and digital electronic process controllers, hybrid systems; hydraulic control systems, hydraulic pumps and valves, actuators, PI Controllers, PD Controllers, PID Controllers,

Introduction to Robotics: Fundamentals, Classification and components of Robots, Robots degrees of freedom, Joints, Coordinates, Reference Frames, Languages.

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 Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**

CLO 1	**Describe** automation and robotics associated hardware (sensors, actuators etc) used to automate industrial processes.	P-1	C2
CLO 2	**Apply** forward kinematics, inverse dynamics, and robot transformation on Industrial Robot	P-2	C3
CLO 3	**Use** sensors, actuators, and controllers for industrial automation applications	P-1	C3
CLO 4	**Develop** PLC program to automate industrial processes	P-3	C6

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

Recommended Books:

1. John J. Craig, "Introduction to Robotics: Mechanics and Control," Prentice Hall, Latest Edition, ISBN: 0201543613.
2. Saeed B. Niku., "Introduction to Robotics: Analysis, Control, Applications," Wiley, Latest Edition, ISBN: 0470604468.
3. J. L. Fuller, "Robotics: Introduction, Programming, and Projects," Prentice Hall, Latest Edition, ISBN: 0130955434.

Title of Course	**:**	Computer Networks and Data Communications	
Course Code	**:**	ESE-4401	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	1st Semester, Final Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Elective (Interdisciplinary Engineering Elective)	
Pre-Requisite	**:**	Analog and Digital Communications	
Marks	**:**	Theory: 100	Practical: 50
Credit Hours	**:**	3 CH	01 CH
Teaching Scheme	**:**	**3** Hours / Week	03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim: To introduce the basics of data communications and computer networks. To examine and understand network protocols and architectures. To educate the student in modern networking technologies.

Objectives:
Teach the concepts, techniques, and devices of computer-based communication networks including modulation techniques, multiplexing, digital carrier systems, GSM, TCP/IP, LAN systems, network security, and VoIP.

Contents:
Communication concept and terminology, transmission impairments, transmission media (guided and unguided), synchronization code, modulation techniques, error detection, HDLC protocol, multiplexing (FDM and simple TDM), digital carrier systems (ISDN and SONET/SDH), asymmetric digital subscriber line (ADSL), circuit switching, packet switching, routing algorithms, X-25, ATM and frame relay, cellular digital packet data and Global System for Mobile Communication (GSM), network types, network topologies, ISO-OSI model, TCP/IP introduction, LAN Systems (Ethernet, token ring, FDDI), LAN devices (repeaters, hubs, bridges, switches), principles of internetworking, wireless internetworking, IP multicasting, routing protocols, connection oriented protocol, network security requirements, public encryption and digital signatures, network management protocol, e-mail protocols, hyper text transfer protocol, DNS (domain name system) introduction to VoIP.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Study the fundamental components of data communication, transmission media along with its types, transmission impairments, and protocol suite.	P-1	C1
CLO 2	Describe the layers of the OSI and TCP/IP models and explain the function(s) of each layer along with a few relevant protocols.	P-1	C2
CLO 3	Apply subnetting as well as routing mechanisms to relevant applications.	P-3	C3
CLO 4	Detect and correct the errors in binary codes using error detection/corrections techniques.	P-4	C4

Lab outline:

Demonstration of various multiplexing techniques, demonstration of circuit switching and packet switching, TCP/IP modules, small scale network design.

Recommended Books:

1. William Stallings, "Data and Computer Communications," Pearson, Latest Edition, ISBN: 0133506487.
2. Andrew S. Tanenbaum and David J. Wetherall," Computer Networks," Pearson, Latest Edition, ISBN: 0132126958.
3. Behrouz A Forouzan, "Data Communications and Networking," McGraw-Hill Science/Engineering/Math, Latest Edition, ISBN-10: 0073376221.

Title of Course	**:**	Embedded System Design	
Course Code	**:**	ESE-4702	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	1st Semester, Final Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Elective (Elective-II)	
Pre-Requisite	**:**	Digital Logic Design, Microprocessor & Microcontroller System	
Marks	**:**	Theory: 100	Practical: 50
Credit Hours	**:**	3 CH	01 CH
Teaching Scheme	**:**	3 Hours / Week	03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester**.**	

Aim: To provide students with basic knowledge and skills in embedded systems design.

Objectives:
Introduce the trends and challenges in the design of embedded systems and teach chip technologies and design tools needed for these systems.

Contents:
Trends and challenges in embedded system design, introduction to the design and use of single-purpose processors (hardware) and general-purpose processors (software), memories and buses, hardware/software tradeoffs, advanced computation models, control systems, chip technologies, modern design tools, embedded processor selection, hardware/firmware partitioning, glue logic, circuit design, circuit layout, circuit debugging, development tools, firmware architecture, firmware design, and firmware debugging; study of 8-bit microcontroller; microcontroller architecture and instruction set.
Each student will be required to build and debug a micro-controller board. The course will culminate with a significant final project which would extend the base microcontroller board completed earlier in the course. Learning may be supplemented with periodic guest lectures by embedded systems engineers from industry.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Explain the modern design challenges in embedded systems and issues in making the systems stand alone.	P 2	C 2
CLO 2	Prepare C language code for microcontroller-based systems	P 3	C 3
CLO 3	Design algorithm for embedded systems	P 4	C 6
CLO 4	Use modern design tools VHDL/Verilog	P 5	C 3

Lab outline:
Microcontroller based system design, Integration of Inputs/ Outputs devices with FPGA. Analysis using Xilinx ISE

Recommended Books:

1. Frank Vahid and Tony D. Givargis, "Embedded System Design: A Unified Hardware/Software Introduction", Latest Edition, John Wiley & Sons ISBN: 0471386782.

Title of Course	**:**	Microwave Engineering	
Course Code	**:**	ESE-4701	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	1st Semester, Final Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Elective	
Pre-Requisite	**:**	Electromagnetic Field Theory/ Calculus	
Marks	**:**	Theory: 100	Practical: 00
Credit Hours	**:**	3 CH	00 CH
Teaching Scheme	**:**	3 Hours / Week	00 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim:
Microwave Engineering introduces the student to the RF/microwave analysis methods and design techniques.

Objectives:
1. An understanding of microwave waveguides, passive & active devices, tubes and network analysis.
2. An ability to analyze and design microwave matching networks.
3. An ability to perform microwave measurements.

Contents: Maxwell equations. Microwave Components, Waveguides, Waveguide Junctions, Directional Couplers, Isolators, Circulators, Resonators, Microwave Generators, Microwave Tubes, Two Cavity Klystron, Reflex Klystron, TWT, Magnetron, Microwave Semiconductor Devices, Gunn Diode, Impact Diode, PIN Diode, Mixers, Detectors, Microwave Measurements, Measurement of Frequency, VSWR, Power, Noise and Impedance, Transmission Line, Smith Chart, Impedance Transformation, Scattering Parameters and ABCD Parameters, Magic TEE, Isolators, Faraday Rotators, Signal Flow Graphs, Planer Transmission Lines Including Microstrip Line, Even and Odd Mode Analysis, Periodic Structure, Microwave Tube Devices, Velocity Modulation, Bouncing Process in Klystron, Crossed Field Tube Devices, TWT, Microwave Solid State Devices, Varactor, PIN Diode, Tunnel Diode and Gunn Diodes.

Course Learning Outcomes (CLOs)

S. No	CLOs	PLOs	Learning Level
CLO 1	Describe TEM, TE and TM wave propagation modes, Transmission line theory, Waveguides, characteristics of microwave components and Matching Networks Designs.	P-1	C-2
CLO 2	Apply wave propagation modes to obtain solutions for rectangular and circular waveguide, strip-line, and excitation of waveguide.	P-2	C-3

CLO 3	Analyze effects of mismatch of generator and load with transmission line using Smith chart, Impedance and scattering matrix	P-3	C-4
CLO 4	Evaluate tuning of microwave network using Smith chart and analytic solution, using lumped elements and stubs, including power dividers and couplers	P-4	C-5

Recommended Books:

a. Microwave Engineering by David M Pozar by John Wiley

b. Foundations for Microwave Engineering by R E Collins, McGraw-Hill

Title of Course	**:**	Research Methods and Thesis Writing	
Course Code	**:**	HUM-406	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	1st Semester, Final Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	NA	
Marks	**:**	Theory: 100	Practical: 00
Credit Hours	**:**	3 CH	00 CH
Teaching Scheme	**:**	3 Hours / Week	00 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester**.**	

Aim: The aim of this course is to provide participants with the opportunity to improve their skills in presenting, writing a research article and other academic texts. Enhance language skills and develop critical thinking.

Objectives:
By the end of the course, a student should be able to Write research proposals, Write research paper and Develop Technical reports

Contents:
Presentation skills, Essay writing: Descriptive, narrative, Essay writing: Discursive, argumentative, Academic writing: How to write a proposal for research paper/term paper, How to write a research paper/term paper (emphasis on style, content, language, form, clarity, consistency), Technical Report writing: Progress report writing: Extensive reading is required for vocabulary building.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	**Summarize** the literature review to critically Illustrate literature with time management, identifying and formulating research problem; planning and implementing specific research tasks.	P 4	**C-2**
CLO 2	**Prepare** and format proposals, elements along with technical manuals and SOPs. Besides, Construct professional presentation skills.	P 9	**C-3**
CLO 3	**Examine** and differentiate the content and structure of various technical and academic research documents e.g. dissertations, research papers/articles.	P 6	**C-4**
CLO 4	**Justify** the difference between formal and informal reports and assess the use of different type of reports, such as;	P 6	**C-5**

	progress reports, research report, recommendation report, evaluation report, feasibility report and internship reports		

Recommended Books:

1. Writing. Advanced by Ron White. Oxford Supplementary Skills. , Latest Edition. ISBN 0 19 435407 3 (particularly suitable for discursive, descriptive, argumentative and report writing).
2. College Writing Skills by John Langan. McGraw-Hill Higher Education, Latest Edition.
3. Patterns of College Writing (4th edition) by Laurie G. Kirszner and Stephen R. Mandell. St. Martin's Press.
4. The Mercury Reader. A Custom Publication. Compiled by northern Illinois University. General Editors: Janice Neulib; Kathleen Shine Cain; Stephen Ruffus and Maurice Scharton. (A reader which will give students exposure to the best of twentieth century literature, without taxing the taste of engineering students).

Title of Course	**:**	Wireless and Mobile Communication		
Course Code	**:**	ESE-4402		
Discipline	**:**	B.E. (Electronic Engineering)		
Semester	**:**	2nd Semester, Final Year		
Effectiveness	**:**	Batch 2021/Fall onward		
Course Type	**:**	Compulsory		
Pre-Requisite	**:**	NA		
Marks	**:**	Theory:	100	Practical: 00
Credit Hours	**:**	3 CH		00 CH
Teaching Scheme	**:**	3 Hours / Week		00 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester		

Aim: This course aims at providing comprehensive overview of wireless communications. Satellite networks, mobile cellular networks, mobile ad-hoc networks and wireless sensor networks.

Objectives:
The aim of the course is to introduce students to the basic conception and architecture of modern mobile systems, focusing on radio interface.

Contents:
Evolution of Mobile Communications, Principles and Regulations (GSM Standards From ETSI, 3GPP Standards R-99), Technical Features of AMPS, GSM, GPRS, GERAN, UMTS, Systems and Protocol Architecture (e.g. IPv4 – IPv6, UTRAN), Cellular Security and Cryptography (e.g. A8, A3, A5 Algorithms), Wireless Technologies and Engineering (Air Interface, Core Network), Emerging Wireless Communication Industry (National and International).

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	**Illustrate** the radio channel characteristics and **elaborate** the basic wireless communication principles.	P-2	C-2
CLO 2	**Determine** the fundamental operation and design problems of wireless communication systems and apply basic techniques to design wireless radio links.	P-3	C-3
CLO 3	**Analyze** the Classification of mobile communication systems and **examine** basic technical standards related to 2G/3G/4G wireless systems.	P-4	C-4
CLO 4	**Assess** the improved data services in cellular communication and investigate the measures to increase the capacity in GSM systems-sectorization and Spatial Filtering for Interference Reduction.	P-6	C-5

Recommended Books:

1. Mobile Communications by Jochess Schiller, 2nd Edition, Addison Wesley, Latest Edition
2. Theodore S. Rappaport, "Wireless Communications: Principles and Practice", Latest Edition, Prentice Hall, ISBN: 0130422320.
3. Jochen Schiller, "Mobile Communications", Latest Edition, Addison-Wesley, ISBN: 0321123816.

Title of Course	**:**	Digital Instrumentation Systems	
Course Code	**:**	ESE-4703	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	2nd Semester, Final Year	
Effectiveness	**:**	Batch 2021/Fall onward	
Course Type	**:**	Elective (Elective-III)	
Pre-Requisite	**:**	Instrumentation and Measurement	
Marks	**:**	Theory: 50	Practical: 50
Credit Hours	**:**	2 CH	01 CH
Teaching Scheme	**:**	3 Hours / Week	03 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester	

Aim: This course addresses the latest developments on the use of software-based equipment.

Objectives:
Teach the instrumentation and interfacing techniques for microprocessor/microcontroller-based measurement of quantities.

Contents:
Advanced instrumentation techniques; microprocessor/microcontroller -based instrumentation systems; analog-to-digital and digital-to-analog converters; interfacing techniques, data acquisition software, and virtual Instruments; intelligent instrumentation systems. Some part of smart sensors, fusion sensor system and applications.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Illustrate the digital instrumentation system and its components along with the conversion of analog to digital and digital to analog signals.	P-1	C-2
CLO 2	Use microprocessor and microcontroller-based instrumentation systems including the integration of transducers with analog and digital hardware and software to achieve the required output.	P-3	C-3
CLO 3	Analyze available data acquisition techniques and familiarize with physiological DAQ system.	P-4	C-4

Lab outline:
Laboratory activities include the design, construction, and analysis of microprocessor-based measurement circuits, data acquisition circuits, instrumentation devices, and automatic testing. 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 Books:

1. Ronald Tocci, Neal Widmer and Greg Moss, "Digital Systems: Principles and Applications," Latest Edition, Prentice Hall, ISBN: 0131725793.
2. William J. Dally and John W. Poulton, "Digital Systems Engineering," Latest Edition, Cambridge University Press, ISBN: 0521592925.

Title of Course	**:**	Entrepreneurship		
Course Code	**:**	ESE-4602		
Discipline	**:**	B.E. (Electronic Engineering)		
Semester	**:**	2nd Semester, Final Year		
Effectiveness	**:**	Batch 2021/Fall onward		
Course Type	**:**	Compulsory		
Pre-Requisite	**:**	NA		
Marks	**:**	Theory:	100	Practical: 00
Credit Hours	**:**	3 CH		00 CH
Teaching Scheme	**:**	3 Hours / Week		00 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester		

Aim: The purpose of the course is that the students acquire necessary knowledge and skills required for organizing and carrying out entrepreneurial activities, to develop the ability of analyzing and understanding business situations in which entrepreneurs act and to master the knowledge necessary to plan entrepreneurial activities.

Objectives:
Entrepreneurship is an important component in the process of economic development. The purpose of this course is to analyse the theories of entrepreneurship and to go for case studies of successful entrepreneurs.

Contents:
Introduction: The concept of entrepreneurship, The economist view of entrepreneurship, The sociologist view, Behavioural approach, Entrepreneurship and Management
The Practice of Entrepreneurship: The process of entrepreneurship, Entrepreneurial Management, The entrepreneurial business, Entrepreneurship in service institutions, The new venture
Entrepreneurship and Innovation: The innovation concepts, Importance of innovation for entrepreneurship, Sources of innovative opportunities, The innovation process, Risks involved in innovation
Developing Entrepreneur: Entrepreneurial profile, Trait approach to understanding entrepreneurship, Factors influencing entrepreneurship, The environment, Socio cultural factors, Support systems
Entrepreneurship Organization: Team work, Networking organization, Motivation and compensation, Value system
Entrepreneurship and SMES: Defining SMEs, Scope of SMEs, Entrepreneurial, managers of SME, Financial and marketing problems of SMEs
Entrepreneurial Marketing: Framework for developing entrepreneurial marketing, Development entrepreneurial marketing plan, Entrepreneurial marketing strategies, Product quality and design
Entrepreneurship and Economic Development: Role of entrepreneur in the economic development and generation of services, Employment creation and training, Ideas, knowledge and skill development, The Japanese experience
Case Studies of Successful Entrepreneurs

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Discuss entrepreneurship and entrepreneurial process and its significance in economic development.	P-6	C-2

CLO 2	Develop idea of the support structure and promotional agencies assisting ethical entrepreneurship.	P-8	C-6
CLO 3	Develop a framework for technical, economic and financial feasibility.	P-11	C-6
CLO 4	Evaluate an opportunity and prepare a written business plan to communicate business ideas effectively	P-10	C-5

Recommended Books:

1. Paul Burns and Jim Dew Hurst: Small Business and Entrepreneurship, Latest Edition
2. P.N. Singh: Entrepreneurship for Economic Growth, Latest Edition
3. Peter F. Drucker: Innovation and Entrepreneurship Peter F. Drucker, Latest Edition
4. John B. Miner: Entrepreneurial Success, Latest Edition

Title of Course	**:**	Professional Psychology		
Course Code	**:**	HUM-408		
Discipline	**:**	B.E. (Electronic Engineering)		
Semester	**:**	2nd Semester, Final Year		
Effectiveness	**:**	Batch 2021/Fall onward		
Course Type	**:**	Compulsory		
Pre-Requisite	**:**	NA		
Marks	**:**	Theory:	100	Practical: 00
Credit Hours	**:**	3 CH		00 CH
Teaching Scheme	**:**	3 Hours / Week		00 Contact Hours / Week
Assessment	**:**	20% Sessional, 30% Mid Semester Examination, 50% Final Semester		

Aim: An increased understanding of the current and historical experience of professional psychologists, the development of the field and its professional and ethical challenges. A knowledge of the ethical principles, practice standards, regulations and laws governing the practice of psychology and how they apply to typical situations encountered by psychologists. An enhanced ability for ethical reflection and an increased ability to apply this kind of thinking to everyday ethical challenges.

Objectives:
Learn about human behavior in profession and how phycology plays role in professional environment

Contents:
1. Introduction to professional psychology
2. Psychological testing
3. Educational psychology
4. Industrial/organizational psychology
5. Social psychology
6. Health psychology
7. Clinical psychology
8. Positive psychology
9. Legal, ethical, and professional issues.

Course Learning Outcomes (CLOs)

Mapping of CLOs and PLOs			
S. No.	**Course Learning outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	Investigate psychological theories in professional practice	P-6	C-5
CLO 2	Justify scientific foundations of professional psychology	P-6	C-5
CLO 3	Formulate a plan to work with diverse populations	P-10	C-6

CLO 4	Appraise legal and ethical matters professionally	P-6	C-6

Books recommended:

a) Crow, L., & Crow, A. Educational Psychology, New Delhi: Eurosia Publishing House Latest edition
b) Spiegel, P.K., & Koocher, G.P., Ethics in Psychology, New York: Oxford University Press. Latest edition
c) Snyder, C.R., & Lopes, S.J., Handbook of Positive Psychology, New York: Oxford University Press Latest edition.
d) Compton, W.C., Introduction to Positive Psychology, USA, Thomson Wadsworth. Latest edition
e) Debra, L.N. & James Campbell Quick, Organizational Behavior (3rd ed), Cincinnati: South Western. Latest edition

Title of Course	**:**	Final Year Project (FYP)-I and II	
Course Code	**:**	ESE-4909	
Discipline	**:**	B.E. (Electronic Engineering)	
Semester	**:**	1st and 2nd Semester, Final Year	
Effectiveness	**:**	Batch-2021/Fall onward	
Course Type	**:**	Compulsory	
Pre-Requisite	**:**	NA	
Marks	**:**	Theory: 0	Practical: 200
Credit Hours	**:**	0 CH	6 CH
Teaching Scheme	**:**	6 Hours / Week	6 Contact Hours / Week
Assessment	**:**	20% Initial Proposal, 30% Mid Semester Examination, 20% Final Presentation, 30% Report.	

Mapping of CLOs and PLOs			
S. No.	**Course Learning Outcomes**	**PLOs**	**Blooms Taxonomy**
CLO 1	To describe the scope and objectives of FYDP using the fundamental knowledge and skills acquired during first three years of engineering.	PLO 1 Engineering Knowledge	C2 Comprehension
CLO 2	To analyze the problem statement of FYDP in accordance with the existing literature.	PLO 2 Problem Analysis	C4 Analysis
CLO 3	To execute a particular method and apply it using a standardized engineering tool for designing of the proposed FYDP.	PLO 3 Design/Development of Solutions	P4 Mechanism
CLO 4	To demonstrate the developed solution by means of simulation or existing literature relevant to the FYDP.	PLO 4 Investigation	P5 Complete Overt Response
CLO 5	To use modern engineering tool(s) to solve the identified problem and carry out the FYDP.	PLO 5 Modern Tool Usage	P3 Guided Response
CLO 6	To justify the outcomes of FYDP in order to have positive social impact.	PLO 6 Engineer & Society	A3 Value
CLO 7	To defend the impact of proposed concept on social and environmental sustainability.	PLO 7 Environment & Sustainability	A4 Organize
CLO 8	To organize the FYDP in logical, ethical and well-planned way in proposal, thesis report, poster and in oral presentation.	PLO 8 Ethics	A4 Organize

CLO 9	To present the solution of identified problem being a part of an effective team/individually and complete the project within defined deadlines.	PLO 9 Individual & Teamwork	A2 Respond
CLO 10	To communicate to a panel of experts effectively.	PLO 10 Communication	A2 Respond
CLO 11	To organize the FYDP by practicing management principles including punctuality, commitment, decision making and dedication.	PLO 11 Project Management	A4 Organize
CLO 12	To justify the FYDP in a broader context and pursue autonomous lifelong learning through creativity, innovation and technological advancement.	PLO 12 Life-Long Learning	A3 Value