Scheme of Instruction, Examination

(With effect from the academic year 2022-23)

B.E. I to VIII Semesters

of

Four Year Under Graduate Degree Programme

in

Computer Science & Engineering

with specialization in

Internet of Things and Cyber Security including Blockchain Technology

B.E. CSE(IOT-CS-BCT)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

MATURI VENKATA SUBBA RAO (MVSR) ENGINEERING COLLEGE(A)
NADERGUL, HYDERABAD-501510
(Sponsored by Matrusri Education Society, Estd.1980)
Approved by AICTE & Affiliated to Osmania University, Estd.1981
ISO 9001:2015 Certified Institution, Accredited by NAAC
website: www.mvsrec.edu.in

2022 – 2026

Date 27 Dec 2022 V5.22

Four Year Degree Programme
in
B.E in CSE (Internet of Things and Cyber Security including Blockchain Technology)

SCHEME OF INSTRUCTION & EXAMINATION

SEMESTERS I TO VIII

Structure of Undergraduate Engineering program:

S. No.	Course Work – Subject Area	Credits/ Semester								ICB Credits
		I	II	III	IV	V	VI	VII	VIII	
1	Humanities and Social Sciences (HS)	**3**	**2**	**3**						**8**
2	Basic Sciences (BS)	**9**	**9**	**3**						**21**
3	Engineering Sciences (ES)	**10**	**5**	**3**						**18**
4	Professional Subjects –Core (PC)			**12**	**20**	**18**	**12**	**12**		**74**
5	Professional Subject-Electives (PE)						**6**	**6**	**3**	**15**
6	Open Subjects – Electives (OE)						**3**	**3**	**3**	**9**
7	Project Work, Seminar and/or Internships (PW)					**2**	**1**	**5**	**7**	**15**
8	Mandatory Courses (MC) (Non-Credit)									
	TOTAL	**22**	**16**	**21**	**20**	**20**	**22**	**26**	**13**	**160**
	Contact Hours/ Week	**29**	**23**	**26**	**27**	**25**	**26**	**34**	**20**	

B.E. CSE(IOT CS BC) I - SEMESTER

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/ week	CIE	SEE	Duration of SEE (Hr.)	
Theory Courses										
1	U21BSN01MT	Engineering Mathematics-I	3	1	-	4	30	70	3	4
2	U21BSN01CH	Engineering Chemistry	3	-	-	3	30	70	3	3
3	U21HSN01EG	English	2	-	-	2	30	70	3	2
4	U21ESN01CS	Programming for Problem Solving using C	3	-	-	3	30	70	3	3
5	U22ESN01EC	Basic Electronics and Sensors	3	-	-	3	30	70	3	3
Practical/ Laboratory Courses										
6	U21BSN81CH	Chemistry Lab	-	-	4	4	25	50	3	2
7	U21HSN81EG	English Laboratory	-	-	2	2	25	50	3	1
8	U21ESN82ME	Basic Workshop Practice	-	-	2	2	25	50	3	1
9	U21ESN81CS	Programming for Problem Solving using C Lab	-	-	4	4	25	50	3	2
10	U22ESN81EC	Basic Electronics and Sensors Lab	-	-	2	2	25	50	3	1
		Total	**14**	**1**	**14**	**29**	**275**	**600**	**-**	**22**

* **3 Weeks** induction program will be organized before commencement of the coursework of Semester – I

BS: Basic Science,
ES: Engineering Science
HS: Humanities and Social Sciences

L: Lecture
T: Tutorial
P: Practical
D: Drawing

CIE: Continuous Internal Evaluation
SEE: Semester End Evaluation

Note:

1. Each contact hour is a clock hour
2. The duration of the practical class is two hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

B.E. CSE(IOT CS BC) II - SEMESTER

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/ week	CIE	SEE	Duration of SEE (Hr.)	
Theory Courses										
1	U21BSN02MT	Engineering Mathematics-II	3	-	-	3	30	70	3	3
2	U21BSN01PH	Engineering Physics	3	-	-	3	30	70	3	3
3	U22ESN02CS	Problem Solving using Python Programming	3	-	-	3	30	70	3	3
4	U21HSN02EG	Effective Technical Communication in English	2	-	-	2	30	70	3	2
5	U21MCN01PO	Indian Constitution	2	-	-	2	30	70	3	-
Practical/ Laboratory Courses										
6	U21BSN81MT	Computational Mathematics Lab	-	-	2	2	25	50	3	1
7	U21BSN81PH	Physics Lab	-	-	4	4	25	50	3	2
8	U22ESN82CS	Problem Solving using Python Programming Lab	-	-	2	2	25	50	3	1
9	U21ESN82CE	Engineering Drawing Practice	-	-	2	2	25	50	3	1
		Total	**13**	**-**	**10**	**23**	**250**	**550**	**-**	**16**

BS: Basic Science,
ES: Engineering Science
HS: Humanities and Social Sciences

L: Lecture
T: Tutorial
P: Practical
D: Drawing

CIE: Continuous Internal Evaluation
SEE: Semester End Evaluation

Note:

1. Each contact hour is a clock hour
2. The duration of the practical class is two hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

B.E in CSE (IOT-CS-BT) III – SEMESTER *(Tentative)*

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	Pr/ Drg	Contact Hrs/ week	CIE	SEE	Duration of SEE (Hrs.)	
1	U21ESN01EC	Logic and Switching Theory	3	-	-	3	30	70	3	3
2	U21PC301CS	Database Management Systems	3	-	-	3	30	70	3	3
3	U21PC302CS	Data Structures using C ++	3	-	-	3	30	70	3	3
4	U21PC303CS	Discrete Mathematics	2	1	-	3	30	70	3	3
5	U21BSN03MT	Engineering Mathematics - III	3	-	-	3	30	70	3	3
6	U21MCN01CE	Environmental Science	2	-	-	2	30	70	3	-
7	U21HSN01CO	Finance & Accounting	3	-	-	3	30	70	3	3
Practical/ Laboratory Courses										
8	U21PC381CS	Database Management Systems Lab	-	-	4	4	25	50	3	2
9	U21PC382CS	Data Structures using C + + Lab	-	-	2	2	25	50	3	1
		Total	**19**	**1**	**06**	**26**	**260**	**590**	**-**	**21**

B.E in CSE (IOT-CS-BCT) IV– SEMESTER*(Tentative)*

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	Pr/ Drg	Contact Hrs/ week	CIE	SEE	Duration of SEE (Hrs.)	
1	U22PC401CB	Object Oriented Software Development using JAVA	3	1	-	4	30	70	3	4
2	U22PC402CB	Computer Organization and Assembly Language Programming	3	-	-	3	30	70	3	3
3	U22PC403CB	Data Communication and Computer Networks	3	-	-	3	30	70	3	3
4	U22PC404CB	Algorithm Analysis and Design	3	-	-	3	30	70	3	3
5	U22PC405CB	Formal Language Automata Theory	3	-	-	4	30	70	3	3
6	U21MCN01PY	Essence of Indian Tradition and Knowledge	2	-	-	2	30	70	3	-
Practical/ Laboratory Courses										
7	U22PC481CB	Object Oriented Software Development using JAVA Lab	-	-	4	4	25	50	3	2
8	U22PC482CB	Computer Organization and Assembly Language Programming Lab	-	-	2	2	25	50	3	1
9	U22PC483CB	Data Communication and Computer Networks Lab	-	-	2	2	25	50	3	1
10		*Summer Internship	-	-	-	-	-	-	-	-
Total			**17**	**1**	**08**	**27**	**255**	**570**	**-**	**20**

* To be conducted after the IV Semester in the Summer Vacation and to be evaluated in V Semester

*** Software Engineering will be part of Object Oriented Development using JAVA**

***** Automata Languages & Computation includes Compiler Design

B.E in CSE (IOT-CS-BCT) V – SEMESTER*(Tentative)*

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	Pr/ Drg	Contact Hrs/ week	CIE	SEE	Duration of SEE (Hrs.)	
1	U22PC501CB	Web Technologies	3	-	-	3	30	70	3	3
2	U22PC502CB	Fundamentals of Operating Systems	3	-	-	3	30	70	3	3
3	U22PC503CB	Sensors & Actuators	3	-	-	3	30	70	3	3
4	U22PC504CB	Fundamentals of Cryptography & Cryptanalysis	3	-	-	3	30	70	3	3
5	U22PC505CB	Cloud Computing	3	-	-	3	30	70	3	3
Practical/ Laboratory Courses										
6	U22PC581CB	Web Technologies & Cloud Computing Lab	-	-	2	2	25	50	3	1
7	U22PC582CB	Fundamentals of Operating Systems Lab	-	-	2	2	25	50	3	1
8	U22PC584CB	Cryptography & Cryptanalysis Laboratory	-	-	2	2	25	50	3	1
9	U22SI01CB	Summer Internship (Eval)	-	-	4	4	50	-	-	2
		Total	**15**	**-**	**10**	**25**	**275**	**500**	**-**	**20**

B.E in CSE (IOT-CS-BCT) VI – SEMESTER(Tentative)

S. No.		Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	Pr/ Drg	Contact Hrs/ week	CIE	SEE	Duration of SEE (Hrs.)	
1	U22PC601CB	Internet of Things & Applications	3	-	-	3	30	70	3	3
2	U22PC602CB	Cyber Security & Ethical Hacking	3	-	-	3	30	70	3	3
3	U22PC603CB	Block chain Applications	3	-	-	3	30	70	3	3
4	U22PE61xCB	Professional Elective I	3	-	-	3	30	70	3	3
5	U22PE62xCB	Professional Elective II	3	-	-	3	30	70	3	3
6	U22OE6xxx	Open Elective – I	3	-	-	3	30	70	3	3
Practical/ Laboratory Courses										
7	U22PC681CB	Internet of Things & Applications Lab	-	-	2	2	25	50	3	1
8	U22PC682CB	Cyber Security & Ethical Hacking Lab	-	-	2	2	25	50	3	1
9	U22PC683CB	Block chain Applications Lab	-	-	2	2	25	50	3	1
10	U22PW81CB	Mini-Project	-	-	2	2	25	50	-	1
		*Internship	-	-	-	-	-	-	-	-
Total			**18**	**-**	**08**	**26**	**280**	**620**	**-**	**22**

* To be conducted after the VI Semester in the Summer Vacation and to be evaluated in VII Semester

Professional Elective – I		
S. No.	**Course Code**	**Course Title**
1	U22PE611CB	Data Analytics for IOT
2	U22PE612CB	Embedded System
3	U22PE613CB	Mobile Computing
4	U22PE614CB	Advanced JAVA & JEE

Professional Elective – II		
S.No.	**Course Code**	**Course Title**
1	U22PE621CB	Artificial Intelligence
2	U22PE622CB	Advanced Computer Architecture
3	U22PE623CB	Adhoc Sensor Networks & IoT Standards

B.E in CSE (IOT-CS-BCT) VII– SEMESTER*(Tentative)*

S. No.		Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	Pr/ Drg	Contact Hrs/ week	CIE	SEE	Duration of SEE (Hrs.)	
1	U22PC701CB	Industrial Internet of Things	3	-	-	3	30	70	3	3
2	U22PC702CB	Digital Forensics	3	-	-	3	30	70	3	3
3	U22PC703CB	Smart Contracts	3	-	-	3	30	70	3	3
4	U22PE73xCB	Professional Elective III	3	-	-	3	30	70	3	3
5	U22PE74xCB	Professional Elective IV	3	-	-	3	30	70	3	3
6	U22OE7xxx	Open Elective – II	3	-	-	3	30	70	3	3
Practical/ Laboratory Courses										
7	U22PC781CB	Industrial Internet of Things Lab	-	-	2	2	25	50	3	1
8	U22PC782CB	Digital Forensics Lab	-	-	2	2	25	50	3	1
9	U22PC783CB	Smart Contracts Lab	-	-	2	2	25	50	3	1
10	U22PW82CB	Project Work - I	-	-	6	6	50	-	-	3
11	U22SI02CB	Summer Internship	-	-	4	4	50	-	-	2
		Total	**18**	**-**	**16**	**34**	**355**	**570**	**-**	**26**

Professional Elective – IV		
S. No	**Course Code**	**Course Title**
1	U22PE731CB	Machine Learning
2	U22PE732CB	Advanced Operating Systems
3	U22PE733CB	Cryptography & Network Security

Professional Elective – V		
S. No	**Course Code**	**Course Title**
1	U22PE741CB	Information Retrieval System
2	U22PE742CB	System Modelling and Simulation
3	U22PE743CB	Web 3.0

B.E in CSE (IOT-CS-BCT) VIII– SEMESTER*(Tentative)*

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	Pr/ Drg	Contact Hrs/ week	CIE	SEE	Duration of SEE (Hrs.)	
1	U22PE85xCB	Professional Elective – V	3	-	-	3	30	70	3	3
2	U22OE82xx	Open Elective – III	3	-	-	3	30	70	3	3
3	U22PW83CB	Project Work - II	-	-	14	14	50	100	-	7
Total			**6**	**-**	**14**	**20**	**110**	**240**	**-**	**13**

Professional Elective – V		
S. No.	**Code**	**Course Title**
1	U22PE851CB	Deep Learning
2	U22PE852CB	Robotic Process Automation
3	U22PE853CB	Cyber Laws And Ethics

B.E. CSE(IOT CS BC) I - SEMESTER

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/ week	CIE	SEE	Duration of SEE (Hr.)	
Theory Courses										
1	U21BSN01MT	Engineering Mathematics-I	3	1	-	4	30	70	3	4
2	U21BSN01CH	Engineering Chemistry	3	-	-	3	30	70	3	3
3	U21HSN01EG	English	2	-	-	2	30	70	3	2
4	U21ESN01CS	Programming for Problem Solving using C	3	-	-	3	30	70	3	3
5	U22ESN01EC	Basic Electronics and Sensors	3	-	-	3	30	70	3	3
Practical/ Laboratory Courses										
6	U21BSN81CH	Chemistry Lab	-	-	4	4	25	50	3	2
7	U21HSN81EG	English Laboratory	-	-	2	2	25	50	3	1
8	U21ESN82ME	Basic Workshop Practice	-	-	2	2	25	50	3	1
9	U21ESN81CS	Programming for Problem Solving using C Lab	-	-	4	4	25	50	3	2
10	U22ESN81EC	Basic Electronics and Sensors Lab	-	-	2	2	25	50	3	1
		Total	**14**	**1**	**14**	**29**	**275**	**600**	**-**	**22**

* **3 Weeks** induction program will be organized before commencement of the coursework of Semester – I

BS: Basic Science,
ES: Engineering Science
HS: Humanities and Social Sciences

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D: Drawing

CIE: Continuous Internal Evaluation
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Note:

1. Each contact hour is a clock hour
2. The duration of the practical class is two hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

Course Code	Course Title						Core/Elective
U21BSN01MT	**Engineering Mathematics - I**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**1**	**-**	**-**	**30**	**70**	**4**

Course Objectives

The objectives of this course is to

- Introduce the concepts of sequences, series and their properties
- Introduce the concepts of mean value theorems and curvature
- Introduce the concepts of multiple integrals
- Study vector differential and vector integral calculus

Course Outcomes

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

- Determine the convergence of infinite series using various tests of convergence
- Solve problems based on the fundamental theorem of differential calculus, find radius of curvature, evaluate and envelopes and expand functions using Taylor & MacLaurin series
- Evaluate Double and Triple integrals in Engineering Problems
- Solve problems based on vector differentiation.
- Solve problems based on vector integration

UNIT-I

Infinite Series: Introduction to sequences, Infinite series, general properties of infinite series, geometric series, series of positive terms, Harmonic series(p-series),Comparison test, D‟ Alembert‟s ratio test, Raabe‟s test, Cauchy‟s nth root test, Alternating series, absolute and conditional convergence

UNIT-II

Differential Calculus: Rolle‟s theorem, Lagrange‟s mean value theorem, Cauchy‟s mean value theorem(without proofs) and their applications, Taylor and Maclaurin series, Curvature, Radius of curvature(Cartesian form),Centre of Curvature, Evolute and Involute, Envelope of a family of curves

UNIT-III

Multiple Integrals: Introduction to functions of two and three variables, Double integrals, Change of order of integration, Change of variables from Cartesian to Plane Polar coordinates, Triple integrals(Cartesian)

UNIT-IV

Vector Differentiation: Scalar and vector point functions, Vector operator del, Gradient, Unit normal vector, Directional derivative, Angle between surfaces, Divergence, solenoidal vector, Curl, Irrotational vector, Laplace operator applied to scalar and vector point functions.

UNIT-V

Vector Integration: Line integral-work done, Surface integral, Volume integral, Green‟s theorem in a plane, Stoke‟s theorem, Gauss divergence theorem(without proofs) and their verifications.

Text Books:

1. R. K. Jain &S. R .K. Iyengar, *Advanced Engineering Mathematics*, Narosa Publications, 5th Edition 2016.
2. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publications, 44th Edition, 2018.

Reference Books:

1. B.V. Ramana, Higher Engineering Mathematics, 23rd reprint, 2015.
2. N. Bali, M. Goyal, *AtextbookofEngineeringMathematics*, Laxmi publications, 2010
3. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley, 9th Edition, 2012.
4. B. Thomas Jr. and Ross L. Finney *Calculus and Analytic Geometry*.
5. M. Tom. Aposta, l *Calculus: One -Variable Calculus with An Introduction to Linear Algebra*, Vol 1

Course Code	Course Title						Core/Elective
U21BSN01CH	**Engineering Chemistry**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

The objectives of this course is to

- To relate how the basic concepts and principles of chemistry can be applied to practical utility in a broader perspective of the society.
- To distinguish the ranges of electromagnetic spectrum and its interaction with matter and to develop knowledge of various spectroscopic techniques at atomic and molecular levels.
- To identify and apply various principles of electrochemistry and corrosion which are essential for an engineer in industry
- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineerTo provide an overview of ordinary differential equations and their applications.

Course Outcomes

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

- Explain and apply the knowledge of various electrodes, electrode potentials and Nernst equation to construct electrochemical cells and thereby to calculate EMF of cell.
- Analyze different types of corrosion, mechanism, factors affecting metallic corrosion and control corrosion by various methods.
- Explain the origin of UV-Vis absorption in terms of electronic transitions in determination of structures of various molecules and Analyze microscopic chemistry in terms of atomic and molecular orbitals
- Identify and make use of various polymers as material for engineering applications.
- Classify various energy sources and illustrate the importance and applications of renewable and non-renewable energy sources.
- Relate the concepts liquid crystals, composites and green chemistry to modify engineering processes and materials.

UNIT – I

Electro Chemistry &Corrosion and It's control (9 Periods): Electro Chemistry: Electrochemical Cells-Electrolytic and galvanic cells-notation.Cell Reaction and Cell EMF.Electrodepotential, Standard electrode potential. Electrochemical series and Applications. Free Energy and EMF. Nernst equation and its derivation, Applications -Numerical problems. Types of electrodes-Standard hydrogen electrode, Calomel electrode Silver-Silver Chloride, Quinhydrone and glass electrodes. Determination of pH using Quinhydrone electrode coupled with saturated Calomel electrode.

Corrosion: Definition,Causes and effects. Types of corrosion, Chemical corrosion, and its mechanism. Electrochemical corrosion and its mechanism.Galvanic corrosion, Concentration cell Corrosion-Waterline and Pitting corrosion. Factors effecting rate of corrosion. Corrosion control methods- Cathodic Protection –Sacrificial anode and impressed current cathode methods. Surface Coatings-Types. Electro plating and Electroless plating of metal coatings.

UNIT– II

Molecular Structure & Spectroscopic techniques (9 Periods): Regions of electromagnetic spectrum, Molecular spectroscopy. Rotational Spectroscopy: Rotation of molecules, rotational spectra of rigid diatomic molecules, selection rules.Vibrational Spectroscopy: The vibrating diatomic molecule, simple and anharmonic oscillators of a diatomic molecule, selection rules, applications of IR spectroscopy. NMR Spectroscopy: Criteria for NMR activity (Magnetic and nonmagnetic nuclei), basic concepts and principle of ^{1}H NMR spectroscopy, Chemical shift, Magnetic Resonance Imaging.

UNIT - III

Polymeric Materials (9 Periods): Polymers: Basic terminology - Monomer and its functionality, Polymers, and degree of polymerization. Types of Polymerizations- Chain Growth,Step Growth Polymerization – Examples. Plastics, Fibers, Elastomers – Characteristics and Examples. Preparation, Properties & Uses of the following polymers- PVC, Bakelite,Nylon 6:6,Buna-S, Butyl Rubber and Silicone Rubber. Conducting polymers: Concept, Classification of conducting polymers with examples. Mechanism ofconduction in trans Poly-acetylene.Enhancement of conduction by doping. Applications of conducting polymers. Biodegradable polymers: Concept, Preparation, Properties, and applications of polylactic acid.

UNIT - IV

Energy Sources (9 Periods): Introduction-Renewable and non-renewable energy sources with Examples. Chemical fuels:Definition, Classification of chemical fuels-primary, Secondary and Solid, Liquid, Gaseous fuels -examples. Solid fuels: Coal& its composition, and its rankingLiquid fuels: Petroleum- Fractional distillation of petroleum. Cracking and its significance. Knocking, Octane Numberand Cetane number. Gaseous Fuels: LPG, CNG-composition, properties and uses.Biodiesel: Concept -Transesterification- Carbon neutrality. Advantages of Biodiesel. Batteries: Definition, Types of batteries-Primary batteries; Zn-Carbon battery. Secondary batteries; Construction, working & applications of Lead-acid, Lithium -ion batteries. Fuel cells: Definition, Types of fuels cells, Construction, Applications of working of H_2-O_2fuel cellsand Methanol-O_2fuel cells. Solar cells: Concepts of photovoltaic cell and its applications.

UNIT - V

Liquid Crystals,Composites,and GreenChemistry (9 Periods): Liquid Crystals:Introduction, classification of liquid crystals-Thermotropic and Lyotropic liquid crystals - Chemical constitution & liquid crystalline behavior. Molecular ordering in liquid crystals- Nematic, Smectic and Cholesteric liquid crystals - Applications. Composite materials:Concept,composition, and characteristic properties of composites.Classification of composites based on matrix, reinforcement, and ply. Advantages and applications of composites. Green Chemistry:Concept, Principles of green Chemistry withExamples.

Text Book:

1. PC Jain, M Jain Engineering Chemistry, Dhanapathi Rai and sons (16th edition), New Delhi

Reference Books:

1. Sashi Chawla, Textbook of Engineering Chemistry, Dhanapathi Rai &sons, New Delhi.
2. O.G. Palanna, Engineering Chemistry, TMH Edition.
3. Puri, Sharma and Pathania Principles of physical chemistry, Vishal Publishing Co.
4. Polymer chemistry by Gowariker.
5. Fundamentals of Molecular Spectroscopy, by C.N. Banwell, McGraw Hill Publication.
6. Fundamentals ofSpectroscopy by Y. R. Sharma.
7. Shikha Agarwal, Engineering Chemistry fundamentals and applications, Cambridge University press.

Course Code	Course Title						Core/Elective
U21HSN01EG	**English**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**2**	**-**	**-**	**-**	**30**	**70**	**2**

Course Objectives

The objectives of this course is to enhance the English language abilities of students by

- Using authentic material for language learning
- Developing appreciation to a variety of content-rich texts
- Strengthening their grammar and vocabulary
- Improving reading and comprehension skills and also encouraging them to think critically and creatively
- Honing their writing skills

Course Outcomes

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

- Demonstrate the skill of reading to summarize, paraphrase and give an accurate account of authentic texts of various genres
- Infer and make predictions based on the comprehension of a text
- Employ Academic Vocabulary appropriately with a distinction of its formal and informal use
- Apply different reading strategies to comprehend different texts and decode new words encountered
- Undertake guided and extended writing using accurate grammatical structures and vocabulary

UNIT - I

Reading : A.G. Gardener – "On Saying Please"
Vocabulary : Word formation-Prefixes, Suffixes, Root Words
Grammar : Articles, Prepositions, Determiners
Writing : Guided Writing (Expanding the outline/Writing from verbal cues)

UNIT - II

Reading : Fritz Karinthy – "Refund "
Vocabulary : Word formation- Compounding and Blending, Contractions
Grammar : Transitions, Connectives
Writing : Paragraph-writing

UNIT - III

Reading : Narayan Murthy – "Value System"
Vocabulary : Synonyms, Antonyms, One Word Substitutes
Grammar : Voice
Writing : Letter-writing

UNIT - IV

Reading : Robert Frost – "Stopping by Woods on a Snowy Evening"
Vocabulary : Homophones, Homonyms, Homographs
Grammar : Narration (Direct-Indirect Speech)
Writing : Precis writing

UNIT - V

Reading	:	Stephen Leacock – "On the Need for a Quiet College"
Vocabulary	:	Inclusive Language, Euphemisms
Grammar	:	Tenses
Writing	:	Paraphrasing and Summarizing

Reference Books:

1. Board of Editors. Language and Life: A Skills Approach. Orient BlackSwan, 2018.
2. Sudharshana, NP and C Savitha, English For Engineers. Cambridge University Press, 2018.
3. Kumar, Sanjay and Pushp Lata, English Language and Communication Skills for Engineers. Oxford University Press,
4. Mark Cholij .Towards Academic English – Developing Effective Writing Skills, Foundation Books, CUP , 2007.
5. Terry O"Brien Little Red Book – Perfect Written English . Rupa Publications, 2012.
6. Murphy Raymond . Intermediate English Grammar. CUP 2nd Edition, 2016.
7. Lott"s Hester - Senior School Grammar and Composition .Orient Black Swan privateLtd., 2018
8. Mathur Archana. Become Proficient in Speaking and Writing - Good English V&S Publishers, 2013

Course Code	Course Title						Core/Elective
U21ESN01CS	**Programming for Problem Solving Using C**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

The objectives of this course is to impart knowledge of

- To introduce the concept of computing environment, number systems, algorithms, flowcharts and implementation using variables with various data types and selection statements.
- To introduce the logic building techniques using control statements and arrays
- To understand modular and structure programming using functions and strings
- To learn the alternative to iteration using recursion and familiarization with structures and macros
- To understand memory management using pointers and dealing with files

Course Outcomes

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

- Formulate simple algorithms/flowcharts there by translating them into programs using variables with various data types and selection statements.
- Implement logic building techniques using control statements and arrays
- Apply modular and structure programming using functions and strings
- Analyze the iteration with recursion and implementation of structures and macros.
- Illustration of memory management techniques using pointers and implement the file handling approach

UNIT - I

Introduction to computers: Introduction to components of a computer system, Operating system, Number system: Decimal, binary, octal, hexa decimal systems.
Algorithms/Flowcharts: Logical and Numerical problem solving
Introduction to C Programming: Structure of C, Execution phases in C (Compiler, interpreter, Linker, loader), C-tokens, syntax & semantics in compilation, Identifiers, variables, keywords, Data Types, Operators, precedence & associativity rules, Expression evaluation, Type conversion.
Selection statements: simple if, if-else, else-if ladder, nested if-else, switch

UNIT - II

Iteration statements: while, do-while, for, **Unconditional statements:** break, continue, goto, return
Arrays: 1-D arrays, **Searching Techniques:** Linear, binary search, **Sorting algorithms:** bubble sort and selection sort,2-D arrays: Matrices

UNIT - III

Strings: Defining & initializing strings, String manipulation functions (predefined, user-defined)
Functions: Taxonomy of functions, built-in functions, parameter passing techniques: call by value, Passing arrays to functions: Idea of call by reference
Storage classes: auto, register, static, extern

UNIT - IV

Recursive functions: Recursion definition, Iteration vs Recursion, Example programs: GCD, Factorial, sum of digits, fibonacci
Structures: Defining & accessing structured data, Array of structures, passing structure to function, nested structures, Difference between structure & union
Preprocessor directives: Macros, #define, #if, #elif

UNIT - V

Pointers: Introduction to pointers, Defining pointers, pointer arithmetic, Array of pointers, pointer to array, Null pointer, generic pointer, double pointers, passing pointer to function: call by address, Accessing structure using pointer, self-referential structure, Dynamic memory allocation

File Handling: I/O streams, File operations, file modes, Sequential/Random accessing files, command line arguments.

Text Book:

1. B.A. Forouzan and R.F.Gieverg, "A structured Programming Approach in C" language learning 2013.

Reference Books:

1. "C How to program" by Paul Deitel & Harvey Deitel 7th edition,PHI
2. "Computer Fundamentals and Programming in C" - A.K. Sharma,Universities Press,2nd edition,2018
3. "Programming in ANSI C" - E. Balagurusamy, TMH, 2008
4. Byron Gottfried - "Theory and practice of Programming with C", Schaum"s Outline McGrawHill,1990
5. "Programming in C"- Pradip Dey,Manas Ghosh, Oxford University Press, 2nd edition
6. Brian W Kernighan and Dennis M Ritchie, "The C programming Language", Prentice Hall of India,1988

Course Code	Course Title						Core/Elective
U22ESN01EC	**BASIC ELECTRONICS AND SENSORS**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Engineering Physics	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives :

1. Understand the characteristics of PN diode, zener diode, and illustrate their applications as rectifier and regulator.
2. Understand the construction and characteristics of transistors (BJT & FET) and analyze small signal model of CE amplifier
3. Classify negative feedback amplifiers, oscillators and analyze their parameters.
4. Understand the working of different transducers and their applications .
5. Study of sensors and Data acquisition system.

Course Outcomes :

1. Illustrate the applications of PN and Zener diode.
2. Explain the structure and working of BJT & FET and analyze their characteristics.
3. Classify Feedback Amplifiers & Oscillator circuits.
4. Demonstrate the applications of Transducers.
5. Classify sensors and demonstrate their applications.

UNIT- I

PN Junction Diode: Formation, characteristics and application. **Rectifiers:** types of rectifiers, ripple factor, efficiency, PIV, TUF of half wave rectifier and full wave center tapped rectifier, comparison of rectifiers. **Filters (Qualitative treatment only):** Types of filters and circuits. **Zener diode:** Construction, characteristics, application as regulator.

UNIT -2

Transistor: BJT (N-P-N) construction, working, biasing, modes (regions) of operation, characteristics of CE configuration, BJT as an amplifier (CE), Exact and approximate h-parameter model, analysis of CE amplifier using approximate h-parameter models, comparison of (CB,CE, CC) configurations. **FET:** (Qualitative treatment only) (N-Channel) JFET construction, working, V-I characteristics, parameters, comparison with BJT.

UNIT -3:

FeedBack (Qualitative treatment only): Concept, block diagram, types, comparison, negative feedback, advantages, Topologies of four negative feedback amplifier. **Oscillators:** (Qualitative treatment only) RC phase shift, Hartley, Colpitts and Crystal oscillator.

UNIT - 4

Transducers: Definition, classification, requirements. Construction and operation of strain guage, LVDT and capacitive transducers to measure force. **Temperature Transducers**: Resistance Thermometers, Thermistor, Thermo couple.

UNIT- 5

Sensors: Definition, Characteristics of Sensors, Light Sensors: Photo Diode, LDR, LED, LCD. **Data Acquisition System**: Block Diagram, R-2R Ladder DAC, Successive approximation ADC.

Text Books:

1) S.Salivahanan, N.Suresh Kumar, Electronic Devices and Circuits, McGraw Hill Education,
   4th edition.
2) D. Patranabis, Sensors and Transducers, PHI 2nd Edition 2013.

References:

1) Millman and Halkias, "Integrated electronics" - Tata Mcgraw-hill.

2) Robert Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 11th ed., Pearson India Publications,2015.

(E.V NAGA LAKSHMI)

Kavitha 27/10/22 (T. Kavitha) (BOS member)

K. Usha (Dr. K. Usha) (BOS Member)

(Dr. B. Sasala) BOS member

(Dr. S. Suryanarayana) HoD - ECE

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Univ. College of Engineering
Osmania University
Hyderabad-500 007

Course Code	Course Title						Core/Elective
U21BSN81CH	**Chemistry Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	**4**	**25**	**50**	**2**

Course Objectives

During the course the student is expected to

- Introduce practical applications of chemistry concepts to solve engineering problems.
- Measure the molecular or ionic properties such as conductance, redox potentials.
- To determine the rate constant of reactions from concentrations as a function of time.
- Know the laboratory practices implemented in a research and industrial chemistry laboratory setting.
- To learn to Synthesize polymers

Course Outcomes

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

- Estimate the hardness of water sample.
- Apply the principles of Electrochemistry & Colorimetry in quantitative estimations.
- Measure the properties of liquids such as surface tension and Viscosity.
- Estimate the rate constants, of reactions from concentration of reactants/ products as a function of time.
- Synthesize Polymer.

List of experiments:

1. Estimation of Fe (II) by Permanganometry.
2. Estimation of Fe (II) by Dichrometry.
3. Estimation of hardness of water by EDTA method.
4. Estimation of HCl by Potentiometry.
5. Potentiometric estimation of Iron Fe (II) by Permanganometry.
6. Estimation of HCl by Conductometry.
7. Estimation of CH3COOHby Conductometry.
8. Estimation of HCl & CH3COOH in mixture by Conductometry.
9. Estimation of HCl by pH metry.
10. Verification of Beer-Lamberts Law and estimation of Manganese in KMnO4by Colorimetry.
11. Determination of viscosity of liquids using Oswald‟s viscometer
12. Determination of Surface tension by using Stalagmometer.
13. Synthesis of nylon 6,6.
14. Determination of rate constant of acid catalyzed hydrolysis of methyl acetate.
15. Determination of Partition Coefficient of CH3COOH in n-Butanol and Water.

Text Books:

1. Vogel‟s text book of Practical organic chemistry, 5th Edition.

Reference Books:

1. Senior Practical Physical Chemistry, B.D. Khosala, A. Gulati and V. Garg (R. Chand & Co.,Delhi)
2. Text book on experiments and Calculations in Engineering Chemistry-S.S.Dara.
3. An introduction to practical chemistry, K.K. Sharma and D.S. Sharma (Vikas Publications, NewDelhi)
4. Laboratory manual on Engineering Chemstry,S.K.Bhasin& Sudha Rani (Dhanpat Rai Publishing Company)

Course Code	Course Title						Core/Elective
U21HSN81EG	**English Laboratory**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	**2**	**25**	**50**	**1**

Course Objectives

The objectives of this course is to enhance the listening and speaking skills of students by

- Giving them sufficient practice in listening with comprehension.
- Providing them ample opportunities to improve their public speaking skills.
- Training them in the use of correct pronunciation, stress, and intonation.
- Sensitizing them to the use of verbal and non-verbal communication appropriate to the context.
- Encouraging them to learn the art of conversation to suit formal and informal situation.
- Preparing them to make formal presentations and face interviews.

Course Outcomes

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

- Listen, understand, and interpret formal and informal spoken language
- Speak English with acceptable pronunciation, stress, and intonation
- Present themselves with confidence in formal situations
- Be able to perform in fluency, accuracy and time management based activities such as JAM and Picture Perception
- Participate in individual and group activities with relative ease.

List of Activities

1. Listening for Comprehension
2. Pronunciation, Intonation, Stress, and Rhythm
3. Conversation Skills
4. Introducing Oneself and others
5. Asking for and Giving Information
6. Making Requests and Responding to them Appropriately
7. Giving Instructions and Responding to them Appropriately
8. Making Formal Announcements and Emceeing
9. Picture Perception
10. JAM
11. Role play
12. Group Discussions
13. Interview Skills
14. Presentation Skills

Reference Books:

1. Board of Editors. *Language and Life: A Skills Approach*. Orient BlackSwan, 2018.
2. Balasudbramanian, T. *A Textbook of English Phonetics for Indian Students*. Macmillan, 1981
3. CIEFL. *EXERCISES IN Spoken English*. Parts. I- III. Oxford University Press. Pillai,
4. Radhakrsihna G. Spoken *English For You – Level II*. 8the Edition. Emerald Publishers, 2014.
5. Sethi, J and PV Dhamija. *A Course in Phonetics and Spoken English*. 2ndEdition. Prentice Hall India Learning Private Limited, 1999.
6. Aslam Mohammad and Aadil Amin Kak. *Introduction to English Phonetics and Phonology*, Foundation Books, CUP, 2011.
7. Hari Mohan Prasad and Ranjinish Mohan . *How to Prepare for Group Discussion and Interview*, 3rd Edition, Mc Graw Hill Education , 2012.

Course Code	Course Title						Core/Elective
U21ESN82ME	**Basic Workshop Practice**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	**2**	-	**25**	**50**	**1**

Course Objectives

The objectives of this course is to

- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.
- To provide hands on experience about use of different engineering materials, tools, equipment"s and processes those are common in the engineering field.
- To gain a good basic working knowledge required for the production of various engineering products.
- To study different hand operated power tools, uses and their demonstration.
- Adopt safety practices while working with various tools.

Course Outcomes

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

- Demonstrate an understanding of and comply with workshop safety regulations.
- Identify and apply suitable tools for different trades of Engineering processes including material removing, measuring and chiselling.
- Undertake jobs connected with Engineering Workshop trades including sheet metal and house wiring.
- Apply basic electrical engineering knowledge for house wiring practice.

A. TRADE FOR EXERCISES:

Course Objective: To impart hands-on practice on basic engineering trades and skills.

1. **House wiring**-Exercises-Single lamp, parallel/Series connection of 2 bulbs and Stair case wiring.
2. **Sheet metal**-Forming and Bending. Model making. Exercises-Taper Tray, Open Scoop, Funnel.

B. IT WORKSHOP: Computer hardware, identification of parts, Disassembly, Assembly of computer to working condition, operating system installation.

1. System Assembling, Disassembling and identification of Parts / Peripherals
2. Operating System Installation-Install Operating Systems like Windows, Linux along with necessary Device, Drivers.
3. MS-Office / Open Office
   a) Word - Formatting, Page Borders, Reviewing, Equations, symbols.
   b) Spread Sheet - organize data, usage of formula, graphs, charts.
   c) Power point - features of power point, guidelines for preparing an effective presentation.
   d) Access - creation of database, validate data.
4. Trouble Shooting-Hardware trouble shooting, Software trouble shooting.

Reference Books:

1. Venugopal.K, "Workshop manual", Anuradha Publications, Kumbakonam, TN, 2012
2. K.C. John, "Mechanical Workshop" 2ndEdn., PHI, 2010.
3. Hajra Choudary, "Elements of Workshop Technology" Vol. 1, Asian Publishers, Edn., 1993.
4. Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance, K.L. James, Eastern. Economy Edition.

Note: At least three exercises to be done from each trade.

Course Code	Course Title						Core/Elective
U21ESN81CS	**Programming for Problem Solving Using C Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	**4**	**25**	**50**	**2**

Course Objectives

The objectives of this course is to impart knowledge of

- Understand the fundamentals of programming in C Language.
- Write, compile and debug programs in C.
- Formulate solutions to problems and implement them in C.
- Effectively choose programming components to solve computing problems
- To apply the sorting and searching techniques on given set of data

Course Outcomes

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

- Choose appropriate data type for implementing programs in C language.
- Design and implement modular programs involving input output operations, decision making and looping constructs.
- Implement search and sort operations on arrays.
- Apply the concept of pointers for implementing programs on dynamic memory management and string handling.
- Design and implement programs to store data in structures and files.

Write C programs for following:

1. Express and compute few mathematical equations in C language

Selection statements:

2. Finding roots of a quadratic equation
3. Implement arithmetic calculator using switch
4. Check whether entered year is a leap year or not

Iteration statements:

5. Find maximum and minimum value in a given set of numbers
6. Print multiplication table of value X upto Y times
7. Print prime numbers between M & N, Check for armstrong number or not
8. Convert a decimal number to binary and vice versa
9. Display pyramid of numbers and pascal triangle upto N rows

Arrays:

10. Find maximum, minimum and sum of all numbers in a 1-D array
11. Implement linear & binary search using 1-D array
12. Implement bubble sort & selection sort using 1-D array
13. Find the sum and product of two matrices using 2-d arrays
14. Check whether a matrix is an identity matrix or not using 2-d arrays
15. **Programs on Strings:** perform string manipulation functions , convert a lowercase string into uppercase
16. Demonstrate on call by value & call by reference using functions
17. **Programs on Recursion:** GCD, sum of digits, fibonacci series, factorial

Structures & Union:

18. Using an array of structures, Store 5 students information (name, roll no, subject1,subject2,subject3,total_marks), compute total_marks of each student and display details of each student.
19. Store 3 employee information (name, salary, designation) and access each employee using union.

Pointers:

20. Demonstrate on pointer arithmetic
21. Find the biggest and smallest of array using pointer to array
22. Implement dynamic memory allocation

Files:

23. Writing/reading/appending some data to a file
24. Copy the contents of one file to other file
25. Count the frequency of characters, lines and words in a given file

Text Books:

1. "C How to program" by Paul Deitel & Harvey Deitel 7th edition,PHI
2. "Computer Fundamentals and Programming in C" - A.K. Sharma, Universities Press,2nd edition,2018
3. "Programming in ANSI C" - E. Balagurusamy, TMH, 2008
4. Byron Gottfried - "Theory and practice of Programming with C", Schaum"s Outline McGrawHill,1990
5. "Programming in C"- Pradip Dey,Manas Ghosh, Oxford University Press, 2nd edition
6. Brian W Kernighan and Dennis M Ritchie, "The C programming Language", Prentice Hall of India,1988

U22ESN81EC

BASIC ELECTRONICS AND SENSORS LAB.

Course Code	Course Title						Core/Elective
	BASIC ELECTRONICS AND SENSORS LAB						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Engg. Physics Lab	-	-	-	2	25	50	1

Course Objectives:

- Understand characteristics of Diode
- Study the Transistor Configurations
- Study the characteristics of FET
- Understand the concepts of oscillators
- Study the characteristics of Sensors.

Course Outcomes:

- Analyze diode circuits & application
- Analyze the characteristics of BJTs & FETs
- Understand the RC and LC oscillator circuits and calculate the frequency of oscillation
- Understand the characteristics of various sensors

List of Experiments :

1. CRO Applications, Measurements of R. L and C using LCR meter
2. Characteristics of Semi Conductor Diodes (Si, Ge and Zener)
3. Half wave and Full-Wave Rectifiers
4. Zener diode as a voltage regulator
5. Static Characteristics of BJT- Common emitter configuration
6. Static Characteristics of FET
7. Study of CE Amplifier
8. RC- Phase Shift Oscillator
9. Hartley and Colpitts Oscillator
10. Characterize the temperature sensor (Thermister)
11. Study the characteristics of Photo Diode.

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* Note:- Minimum of 8 experiments to be done.

E.U NAGA LAKSHMI

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K. Usha
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For the academic years 2022-2026

B.E. CSE(IOT CS BC) II - SEMESTER

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/ week	CIE	SEE	Duration of SEE (Hr.)	
Theory Courses										
1	U21BSN02MT	Engineering Mathematics-II	3	-	-	3	30	70	3	3
2	U21BSN01PH	Engineering Physics	3	-	-	3	30	70	3	3
3	U22ESN02CS	Problem Solving using Python Programming	3	-	-	3	30	70	3	3
4	U21HSN02EG	Effective Technical Communication in English	2	-	-	2	30	70	3	2
5	U21MCN01PO	Indian Constitution	2	-	-	2	30	70	3	-
Practical/ Laboratory Courses										
6	U21BSN81MT	Computational Mathematics Lab	-	-	2	2	25	50	3	1
7	U21BSN81PH	Physics Lab	-	-	4	4	25	50	3	2
8	U22ESN82CS	Problem Solving using Python Programming Lab	-	-	2	2	25	50	3	1
9	U21ESN82CE	Engineering Drawing Practice	-	-	2	2	25	50	3	1
		Total	**13**	**-**	**10**	**23**	**250**	**550**	**-**	**16**

BS: Basic Science,
ES: Engineering Science
HS: Humanities and Social Sciences

L: Lecture
T: Tutorial
P: Practical
D: Drawing

CIE: Continuous Internal Evaluation
SEE: Semester End Evaluation

Note:

1. Each contact hour is a clock hour
2. The duration of the practical class is two hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

Course Code	Course Title						Core/Elective
U21BSN02MT	**Engineering Mathematics - II**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

The objectives of this course is to

- Provide an overview of ordinary differential equations and their applications.
- Study Linear algebra and its uses in solving system of linear equations.
- Study Eigenvalue problems and Quadratic forms.
- Study the special functions Gamma and Beta functions.

Course Outcomes

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

- Solve first order differential equations.
- Solve higher order differential equations.
- Solve system of linear equations.
- Solve eigenvalue problems and Quadratic forms.
- Apply Beta and Gamma Functions to evaluate definite integrals

UNIT - I

Differential Equations of First Order (13 hours): Exact differential equations, Integrating factors, Linear differential equations, Bernoulli"s and Riccati"s. Applications of first order differential equations - Orthogonal trajectories of a given family of curves(Cartesian form)Newton"s Law of Cooling, Growth and Decay.

UNIT - II

Differential Equations of Higher Order (12 hours): Solutions of second and higher order linearhomogeneous equations with constants coefficients,Solutions of non-homogeneous linear differential equations with constants coefficients, Method of reduction of order, Method of variation of parameters,Applications of second order differential equations-LCR circuits.

UNIT - III

Matrices (10 hours):: Rank of a matrix, Elementary Row/Column operations, Echelon form, Normal form, Linear dependence and independence of vectors, System of linear equations, Linear transformation.

UNIT - IV

Eigenvalues and Eigenvectors (10 hours): Eigenvalues, Eigenvectors, properties of Eigenvalues,Cayley -Hamilton theorem(without proof), Quadratic forms, Reduction of quadratic form to canonical form, Rank, Index, Signature and Nature of quadratic forms.

UNIT - V

Special Functions (10 hours): Gamma function, Beta function, properties of Gamma and Beta functions, relation betweenBeta and Gamma functions, evaluation of definite integrals using Beta and Gamma functions.

Text Books:

1. R. K. Jain & S .R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition 2016.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications, 44th Edition, 2018.

Reference Books:

1. B.V. Ramana, Higher Engineering Mathematics, 23rd reprint, 2015.
2. N. Bali, M. Goyal, *AtextbookofEngineeringMathematics*, Laxmi publications, 2010
3. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley, 9th Edition, 2012.
4. B. Thomas Jr. and Ross L. Finney *Calculus and Analytic Geometry*.
5. M. Tom. Aposta,l *Calculus: One -Variable Calculus with An Introduction to Linear Algebra*, Vol 1

Course Code	Course Title						Core/Elective
U21BSN01PH	**Engineering Physics**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

The objectives of this course is to

- To introduce principles of Wave Mechanics and Electromagnetic theory
- To explain the properties and applications of semiconducting materials
- To explain the properties and applications of Magnetic and Superconducting materials
- To explain the principles of Laser technology, Optical fibers and their applications in various disciplines
- To introduce Nano Science and Nanotechnology

Course Outcomes

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

- Recall the principles of Wave Mechanics and apply them to solve particle in a box, list the fundamental laws of electricity and magnetism and make use of these laws to derive Maxwell"s Electromagnetic wave equation and Poynting theorem.
- Explain and illustrate Semiconducting materials along with their applications.
- Classify Magnetic Materials and explain properties, Identify applications of Ferro Magnetic Materials and Superconducting Materials.
- Explain the principle of Laser and Optical Fiber; Summarize different types of Laser sources and optical fibers; identify the applications of Laser and Optical Fiber.
- Summarize various types of Nanomaterials, their preparation methods and list out various Characterization Techniques and applications of Nanomaterials.

UNIT - I

WAVE MECHANICS AND ELECTROMAGNETIC THEORY (8): De-Broglie"s hypothesis, Wave function and its physical significance, Schrodinger"s time independent wave equation, Schrodinger"s time dependent wave equation, Particle in 1D potential box. Gauss"s laws in electrostatics and magnetostatics, Faraday"s law and Ampere"s law in Electromagnetic induction, Maxwell"s equations in Integral and differential forms, Conducting current and Displacement current, Electromagnetic wave equation in dielectric medium, Poynting theorem.

UNIT - II

SEMICONDUCTORS AND DEVICES (8): Introduction to Semiconductors - Intrinsic and Extrinsic Semiconductors, Concept of hole, Expression for Carrier concentration and conductivity in Intrinsic Semiconductors, Hall Effect and its applications. Semiconductor devices P-N junction diode, LED,Thermistor.

UNIT - III

MAGNETIC MATERIALS AND SUPER CONDUCTORS(8): Introduction- Basic definitions of magnetism- Origin of Magnetic moment, Classification of Magnetic materials- Dia, Para, Ferro, Anti-ferro and Ferri Magnetic materials Types of magnetic materials and their properties, Weiss molecular field theory of Ferromagnetism, Hysteresis of Ferromagnetic material based on domain theory, Soft and Hard magnetic materials, Ferrites and their applications.

Superconductors and their properties, Meissner effect, Type-I and Type-II Superconductors, BCS Theory, High Tc superconductors, Applications of Superconductors.

UNIT - IV

MODERN OPTICS (8): Introduction to LASERs, Characteristics of Lasers, Spontaneous and Stimulated emissions, Components of LASERs, LASERs operating in UV- Vis-IR Regions, Types of LASERS- Solid State LASER(RUBY LASER), Gas LASER(He-Ne Laser), and Semiconductor LASER, Applications of LASERs.

Introduction to Optical fibre, Basic principle – Total internal reflection, Propagation of light through the fibre - Numerical Aperture and Acceptance angle, Step-Index and Graded- Index optical fibres, Applications of Optical fibres.

UNIT - V

NANO MATERIALS AND EXPERIMENTAL TECHNIQUES (8) : Origin of Nano Science- Bulk and Nano materials, types of nanomaterials, Surface to volume ratio and Quantum confinement effect, properties of nanomaterials, fabrication of nanomaterials- Top-down approach and Bottom-up approach, Ball milling method**,** and Sol-Gel methods, Elementary ideas of Carbon nanotubes (CNT"S)**.** Material characterization techniques- X- Ray diffraction, RAMAN Spectroscopy, SEM and TEM, Applications of nanomaterials.

Text Books:

1. M.S. Avadhanulu and P.G. Kshirasagar, A text book Engineering Physics, S. Chand and Co., 9th edition, 2010.
2. R.K. Gaur and S.L. Gupta, Engineering Physics, Dhanpat Rai publications, 8th edition, 2001.
3. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning India(P) Ltd., 2012
4. R. Murugesan and K. Sivaprasath, Modern Physics, S. Chand & Company, 13th edition, 2007.
5. A. Goswami, Thin Film Fundamentals, New Age International, 2007.
6. A.K. Bandopadhyay, Nano Materials, New Age International, 1st edition, 2007.
7. Engineering Physics by M. Armugam
8. Engineering Physics by K.J. Pratap, et. al.

Course code	Course Title						Core/Elective
U22ESN02CS	**Problem Solving using Python Programming**						**Core**
Prerequisite	Contact Hours per week				CIE	SEE	Credits
	L	T	D	P			
NIL	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives:

The objectives of this course is to impart knowledge of

- Enabling students to learn basic fundamentals of python
- To improve logical skills by working with control statements, mathematical functions
- To learn about modular programming through functions and recursive programs
- To handle logical, syntax errors and define custom errors as per real world problems
- Enabling students to learn python built-in modules

Course Outcomes:

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

- Implement basic syntax, semantics in python and improve logical skills
- Formulate mathematical computations, store data using strings, collection types
- Perform modular programming using functions and recursion
- Apply basic data structures of python to solve problems
- Handle and define multiple exceptions logically, syntactically and also able to access files

UNIT-I

Basics of Python Programming : Features of Python, Writing and Executing First Python Program, Literal Constants : Numbers Strings, Variables and Identifiers Data Types: Assigning or Initializing Values to Variables, Multiple Assignment, Multiple Statements on a Single Line, Boolean Input Operation, Comments, Reserved Words, Indentation, Operators: and Expressions Arithmetic Operators Comparison Operators Assignment and In-place or Shortcut Operators Unary Operators Bitwise Operators Shift Operators Logical Operators Membership Operators Identity Operators, Operators Precedence and Associativity, Expressions in Python, Operations on Strings, Concatenation, Multiplication (or String Repetition), Slice a String, Other Data Types :Tuples Lists, Dictionary, Type Conversion .

UNIT-II

Decision Control Statements: Introduction to Decision Control Statements, Selection/Conditional Branching Statements: if Statement, if-else Statement, Nested if Statements, if-elif-else Statement .Basic Loop Structures/ Iterative Statements :while loop, for Loop, Selecting an appropriate loop. Nested Loops, The break Statement, The continue Statement, The pass Statement, The else Statement used with Loops .

Strings: Introduction, Concatenating, Appending, and Multiplying Strings, Strings are Immutable, String Formatting Operator, Built-in String Methods and Functions, Slice Operation, Specifying Stride While Slicing Strings, () and chr() Functions, in and not in operators, Comparing Strings, Iterating String, The String Module, Regular Expressions, The match() Function, The search() Function, The sub() Function .

UNIT-III

Functions and Modules: Introduction, Need for Functions Function Definition, Function Call, Function Parameters, Variable Scope and Lifetime, Local and Global Variables, Using the Global Statement, Resolution of Names, The return statement, More on Defining Functions, Required Arguments, Keyword Arguments Default Arguments, Variable-length Arguments, Lambda Functions or Anonymous Functions, Recursive Functions, Greatest Common Divisor, Finding Exponents, The Fibonacci Series, Recursion vs Iteration.

Modules*:* The from…import statement, Name of Module, Making your own Modules, The dir() function, The Python Module, Modules and Namespaces, Packages in Python, Standard Library modules.

UNIT-IV

Data Structures in python: Sequence, Lists Access Values in Lists, Updating Values in Lists, Nested Lists, Cloning Lists, Basic List Operations , List Methods, List Comprehensions, Looping in Lists, Functional Programming :filter() Function, map() Function, reduce() Function

Tuple : Creating Tuple, Utility of Tuples, Accessing Values in a Tuple, Updating Tuple Deleting Elements in Tuple , Basic Tuple Operations, Tuple Assignment, Tuples for Returning Multiple Values, Nested Tuples , Checking the Index: index() method , Counting the Elements: count() Method , List Comprehension and Tuples , Variable-length Argument Tuples , The zip() Function , Advantages of Tuple over List

Sets : Creating a Set, Comparing Sets, Mathematical Set Operations, Mutable Set Operators and Methods, Set Comprehensions

Dictionaries: Creating a Dictionary, Accessing Values , Adding and Modifying an Item in a Dictionary, Modifying an Entry, Deleting Items, Sorting Items in a Dictionary, Looping over a Dictionary, Nested Dictionaries, Built-in Dictionary Functions and Methods

UNIT-V

File Handling : Introduction, File Path, Types of Files, Opening and Closing Files, Reading and Writing Files, File Positions, Renaming and Deleting Files, Directory Methods, Methods from the os Module

Error and Exception Handling:Introduction to Errors and Exceptions , Handling Exceptions, Multiple Except Blocks, Multiple Exceptions in a Single Block, Except Block Without Exception , The else Clause, Raising Exceptions , Instantiating Exceptions, Handling Exceptions in Invoked Functions, Built-in Exceptions, user-defined expections, re-raising exceptions, The finally Block, Assertions in Python

Text Book:

1. Reema Thareja, ”Python programming using problem solving approach “, Oxford university press.

References Books:

1. Mark Summerfield, "Programming in Python 3:A Complete Introduction to the Python Language", 2nd edition, Addison-Wesley
2. Martin C. Brown, ” PYTHON: The Complete Reference”, McGraw-Hill, 2001.
3. E Balagurusamy, "Introduction to Computing and Problem Solving Using Python", McGrawHill

Course Code	Course Title						Core/Elective
U21HSN02EG	**Effective Technical Communication in English**						**Core**
Prerequisite	Contact Hours Per Week				CIE	SEE	CREDITS
	L	T	D	P			
----	**2**	**-**	**-**	**-**	**30**	**70**	**2**

Course Objectives:

To facilitate the students to learn the:

- Features of Technical Communication.
- Types of Professional Correspondence.
- Techniques of Proposal and Report Writing.
- Basics of Manual Writing.
- Aspects of data interpretation with the help of visual aids.Course

Course Outcomes:

On successful completion of the course, the students will be able to:

- Handle technical communication effectively.
- Use different types of professional correspondence.
- Use various techniques of writing to generate proposals and reports.
- Acquire adequate skills of manual writing.
- Enhance their skills of information transfer using variety of visual aids.

UNIT-I

Introduction to Communication: General & Technical

- General Communication: Introduction, Process, Types,Flow/Channels of communication, Barriers to Communication
- Technical Communication: Introduction, Process, Types, Features – Accuracy, Precision, Brevity, Clarity, Format, Layout& Style, Use of Visual Aids
- Differences between General writing and Technical writing

UNIT-II

Technical Writing I- Information Transfer

- Information Transfer - Introduction & Types
- Verbal to Non – verbal
- Non-verbal to Verbal
- Visual Aids: Significance &Classification in Data Interpretation, Use of Graphic Organizers

UNIT-III

Technical Writing II -Official Correspondence

- Introduction of various types of correspondence: Format, Layout, Style & Etiquette
- Emails
- Inter Office Correspondence – Circulars, Agendas, Minutes of Meetings, Memos
- Business Letters – Sales Letters, Credit Letters, Cover letters/Job Applications, CV& Resume Writing

UNIT-IV

Technical Writing III-Report Writing

- Proposals
- Feasibility report
- Progress report
- Project report
- Drafting a Scientific Paper

UNIT-V

Technical Writing IV- Manual Writing

- Manuals – Introduction & Types
- User / Instruction manual / Owner's Guide
- Product manual

Textbooks:

1. Raman, Meenakshi & Sharma, Sangeeta. (2015). Technical Communication: Principles and Practice (3rd ed.). New Delhi, OUP.
2. Rizvi, Ashraf, M.(2017). Effective Technical Communication (2nd ed.). New Delhi, Tata McGraw Hill Education.
3. Sharma, R.C., & Mohan, Krishna. (2017.) Business Correspondence & Report Writing: A practical approach to business & technical Communication (4th ed.). New Delhi, Tata McGraw Hill Education.
4. Tyagi, Kavita & Misra, Padma. (2011). Advanced Technical Communication. New Delhi, PHI Leaning.
5. Jungk, Dale. (2004). Applied writing for technicians. New York, McGraw-Hill Higher Education.
6. Munter, Mary. (2011). Guide to Managerial Communication: Effective Business Writing and Speaking. New Delhi, Pearson.
7. Andrea J Rutherford (2006) Basic Communication Skills for Technology, 2nd edition,Chennai, Pearson Education.
8. Geraldine E. Hynes,(2010), Managerial Communications-Strategies and Applications. New York, McGraw Hill
9. Terry O' Brien (2012) Little Red Books- Modern Writing Skills, Hyderabad, Rupa Publications
10. Martin Cutts (2013) Oxford Guide To Plain English, New Delhi, OUP

Course Code	Course Title						Core/Elective
U21MCN01PO	**Indian Constitution**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**2**	**-**	**-**	**-**	**30**	**70**	**0**

Course Objectives

The objectives of this course is to impart knowledge to

- Generates the Consciousness in the students on Democratic values and Principles Articulated in the Constitution
- Acquire knowledge about structure of Union, State and local governments
- Aware the students about their Rights and Duties.
- Understand the nature and character of relations between union and state governments
- Divulge the students about the statutory institutions and policies.

Course Outcomes

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

- Comprehensive Knowledge about the constitution of India.
- Understand the basic provisions of the Union, State, local Governments
- Awareness about the Fundamental rights and Directive principles of State policy
- Capacity of the students enhanced to the level of analyzing the relations between Union and State governments.
- Basic ideas about the functioning of statutory bodies

UNIT - I

Evolution of the Indian Constitution: 1909 Act,1919 Act,1935 Govt of India Act,Constituent Assembly: Composition and Functions, Basic structure of Indian Constitution, Fundamental features of the Indian Constitution.

UNIT - II

Rights and Duties: Fundamental Rights, Directive principles of State Policy and Fundamental Duties, Public InterestLitigation (PIL).

UNIT - III

Union Government: Legislature, Executive-President, Prime Minister, Council of MinisterJudiciary, Judicial Review and activism
State Government: Executive: Governor, Chief Minister, Council of Minister
Local Government: Panchayat Raj Institutions, Urban Governance

UNIT - IV

Union-State relations-Administrative, Inter-state council,
Legislative & Financial, Finance Commission of India, NITI Aayog.

UNIT - V

Statutory Institutions: Elections-Election Commission of India, National Human Rights Commission, National Commission for Women.

Text Books:

1. Indian Polity by M. Laxmikanth, McGraw Hill Publications (6th Edition)
2. Introduction to Constitution of India by D. D. Basu, LexisNexis Publications (22nd Edition)
3. Politics and Ethics of the Indian Constitution by Rajeev Bhargava, Oxford Publications

Course Code	Course Title						Core/Elective
U21BSN81MT	**Computational Mathematics Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	**2**	**25**	**50**	**1**

Course Objectives

During the course the student is expected to

- To Know the history and features of Math tools like SCI LAB/MATLAB
- To Know the local environment of MATLAB/SCI LAB
- To study the concept of definite integrals, differential equations and system of equations using MATLAB/SCI LAB.
- To study the concept of Eigenvalues and Eigenvectors using MATLAB/SCI LAB.
- To study simple mathematical functions using 2D and 3D plots.

Course Outcomes

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

- Understand the main features of the MATLAB/SCI LAB program development environment to enable their usage in the higher learning..
- Evaluate definite integrals using MATLAB/SCI LAB.
- Solve linear differential equations with constant coefficients using MATLAB/SCI LAB.,
- Solve system of linear equations using MATLAB/SCI LAB.
- Find Eigenvalues and Eigenvectors using MATLAB/SCI LAB
- Interpret and visualize simple mathematical functions using 2D and 3D plots

List of programs:

1. Introduction to MATLAB and GUI
2. Basic operators of MATLAB/ SCI LAB
3. Finding roots of algebraic equation.
4. Determinant of matrices.
5. Rank of a matrix
6. Solving system of linear equations using matrices.
7. Eigenvalues.
8. Eigenvectors.
9. Solution of first order linear differential equations.
10. Solution of second order linear homogeneous differential equation with constant coefficients.
11. Evaluating definite integrals
12. Data plotting for 2D and 3D

Course Code	Course Title						Core/Elective
U21BSN81PH	**Physics Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	**4**	**25**	**50**	**2**

Course Objectives

During the course the student is expected to

- To analyze a Semiconducting device and determine its temperature Coefficient of Resistance, Energy Gap, Electrical Conductivity, Mobility, concentration of charge carriers and its efficiency.
- To determine the wavelength of given laser source, Sodium vapour lamp by using diffraction grating.
- To explain the principle of Optical Fiber and determine its Numerical Aperture, Acceptance Angle and losses.
- To demonstrate Torsional Pendulum, LCR Series and Parallel Circuit and calculate Rigidity Modulus of a given wire and frequency of LCR Series and Parallel Circuit.
- To examine the nature of Ferro Magnetic Materials, Dielelctric Materials and Calculate their related parameter
- To explain Seebeck Effect and Determine Seebeck Coefficient of thermoelectric device.

Course Outcomes

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

- Analyze a Semiconducting device and determine its temperature Coefficient of Resistance, Energy Gap, Electrical Conductivity, Mobility, Concentration of charge carriers and efficiency.
- Determine the Wavelength of Laser source, Sodium Vapour lamp using diffraction grating.
- Explain the principle of Optical Fiber and determine its Numerical Aperture, Acceptance angle and losses.
- Demonstrate Torsional Pendulum, LCR series and Parallel circuit and calculate the Rigidity Modulus of given metallic wire, resonant frequency of LCR Series & Parallel circuit.
- Examine the nature of ferromagnetic materials, dielectric materials and calculate their related parameter
- Explain Seebeck Effect and determine Seebeck Coefficient of thermoelectric device

List of experiments:

1. To Determine the Numerical aperture (NA), Acceptance Angle of the Optical Fiber, and To study the various lossesof that occur in optical fiber.
2. To determine the wave length (□) of the given Laser source.
3. To determine V-I characteristics of the given LED.
4. To draw the V-I characteristics of a Solar Cell and calculate the Fill Factor and Series Resistance.
5. To draw the I - V Characteristics of P-N Junction diode and to evaluate the resistance for forward bias and reversebias.
6. To determine the constants of A, B and α using Thermistor characteristics.
7. To find the values of Electrical conductivity and energy gap of Ge crystal.
8. To determine the wave length of radiation emitted by Sodium vapour lamp using Diffraction Grating.
9. To study the behavior of Series LCR Resonant circuit and to estimate the resonant frequency and Q factor.
10. To study the variation in currant and voltage in parallel LCR Circuit and to find the resonant frequency of parallel LCR Circuit.
11. Determination of rigidity of modulus of Torsional pendulum.
12. To determine the Dielectric constant ofthe given Dielectric samples.
13. To draw the curve between the magnetizing field and the intensity of magnetization of the specimen (soft iron rod)and to find out i) Coercivity ii) Retentivity and iii) Hysteresis loss.
14. To calculate Seebeck Coefficient of the given sample.
15. To determine the Hall coefficient, Carrier concentration and mobility of charge carriers of semi conducting material.
16. To determine the velocity of the Ultrasonic Waves

Course code	Course Title						Core/Elective
U22ESN82CS	**Problem Solving using Python Programming Lab**						**Core**
Prerequisite	Contact Hours per week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	**2**	**25**	**50**	**1**

Course Objectives:

The objectives of this course is to impart knowledge of

- Enabling students to learn basic fundamentals of python
- To improve logical skills by working with control statements, mathematical functions
- To learn about modular programming through functions and recursive programs
- To handle logical, syntax errors and define custom errors as per real world problems
- Enabling students to learn python built-in modules

Course Outcomes:

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

- Implement basic syntax, semantics in python and improve logical skills
- Formulate mathematical computations, store data using strings, collection types
- Perform modular programming using functions and recursion
- Handle and define multiple exceptions logically, syntactically and also able to access files
- Implement built-in modules in various domains like big data, machine learning

List of Experiments

1. Demonstrate the following Operators in Python with suitable examples. i) Arithmetic Operators ii) Relational Operators iii) Assignment Operator iv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operators viii) Identity Operators
2. Company decides to give bonus to all its employees on Diwali. a 5% bonus on salary is given to the male workers and 10% bonus on salary to the female workers. Write a program to enter the salary and gender of the employee. If the salary of the employee is less than Rs..10000, then the employee gets an extra 2% bonus on salary. Calculate the bonus that has to be given to the employee and display the salary that the employee will get.
3. Write a program to calculate roots of quadratic equation.
4. Write a program to enter a decimal number. Calculate and display the binary equivalent of this number.
5. Read x, y and print all prime numbers between x and y where x<=y.
6. Write a program to check whether the given number is an “amicable” numbers/ Armstrong number/Strong number.
7. Write a program using for loop to calculate the value of an investment. Input an initial value of investment and annual interest, and calculate the value of investment over time.
8. a) Demonstrate the different ways of creating list objects with suitable example programs.

   b) Demonstrate the following functions/methods which operates on lists in Python with suitable examples: i) list( ) ii) len( ) iii) count( ) iv) index ( ) v) append( ) vi) insert( ) vii) extend() viii) remove( ) ix) pop( ) x) reverse( ) xi) sort ( ) xii) copy( ) xiii) clear( )

   c) Demonstrate the following with suitable example programs: List slicing
9. a) Demonstrate the different ways of creating tuple objects with suitable example programs.

b) Demonstrate the following functions/methods which operates on tuples in Python with suitable examples: i) len( ) ii) count( ) iii) index( ) iv) sorted( ) v) min ( ) vi) max( ) vii) cmp( ) viii) reversed( )

10. a) Demonstrate the different ways of creating set objects with suitable example programs.
    b) Demonstrate the following functions/methods which operates on sets in Python with suitable examples: i) add( ) ii) update( ) iii) copy( ) iv) pop( ) v) remove( ) vi) discard( ) vii) clear( ) viii) union() ix) intersection( ) x) difference( )
11. a) Demonstrate the different ways of creating dictionary objects with suitable example programs.
    b) Demonstrate the following functions/methods which operates on dictionary in Python with suitable examples: i) dict( ) ii) len( ) iii) clear( ) iv) get( ) v) pop( ) vi)popitem( ) vii) keys( ) viii) values() ix) items( ) x) copy( ) xi) update( )
12. a) Write a Python program to demonstrate various ways of accessing the string. i) By using Indexing (Both Positive and Negative) ii) By using Slice Operator
    b) Demonstrate the following functions/methods which operates on strings in Python with suitable examples: i) len( ) ii) strip( ) iii) rstrip( ) iv) lstrip( ) v) find( ) vi) rfind( ) vii) index( ) viii) rindex() ix) count( ) x) replace( ) xi) split( ) xii) join( ) xiii) upper( ) xiv) lower( ) xv) swapcase( ) xvi) title( ) xvii) capitalize( ) xviii) startswith() xix) endswith()
13. Write a program that counts the occurrences of a character in a string. Do not use built-in count functions.
14. Write a program that creates a list of 10 random integers. Then create two lists – Odd List and Even List that has all odd and even values in the list respectively.
15. Write a program that generates a set of prime numbers and another set of odd numbers. Demonstrate the result of union, intersection, difference, and symmetric difference operations on these sets.
16. Write a program that creates a dictionary of radius of a circle and its circumference
17. Compute a Polynomial Equation given that the Coefficients of the Polynomial are stored in a List.
18. Search the Number of Times a Particular Number Occurs in a List.
19. Read a List of Words and Return the Length of the Longest One.
20. Remove the ith Occurrence of the Given Word in a List where Words can repeat .
21. Count the number of alphabets, consonants, vowels, digits, special characters in a sentence .
22. Store some elements in the dictionary and remove a given key from the dictionary.
23. To display which Letters are in the First String but not in the Second.
24. Write a function to compute gcd, factorial, Fibonacci series.
25. Write a recursive function to compute gcd, factorial, and Fibonacci series.
26. Demonstrate on predefined multiple exceptions.
27. Demonstrate on custom exceptions.
28. Read the Contents of a File in Reverse Order.
29. Read .csv file to print the statistical summary of each attribute and visualize the data.
30. Write a Numpy program to compute sum of all elements, sum of each column and sum of each row of a given array.

Text Book:

1. Reema Thareja, ”Python programming using problem solving approach “, Oxford university press.

Reference Books:

1. Mark Summerfield, "Programming in Python 3:A Complete Introduction to the Python Language",2nd edition, Addison-Wesley
2. Martin C. Brown,” PYTHON: The Complete Reference”, McGraw-Hill, 2001.
3. E Balagurusamy,"Introduction to Computing and Problem Solving Using Python", McGrawHill

Course Code	Course Title						Core/Elective
U21ESN82CE	**Engineering Drawing Practice**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	**2**	-	**25**	**50**	**1**

Course Objectives

The objectives of this course is to impart knowledge

- To make students communicate effectively through a common drawing language and understand any engineering drawing
- To prepare the students to use techniques, skills and modern engineering tools necessary for engineering practice
- To prepare students to design a system, component and any desired requirement through computer drafting
- To enhance the imaginative skills of a student and thereby making them creative

Course Outcomes

After completing this course, students will be able to:

- Understand engineering drawing and its place in society
- Expose virtual aspects of engineering drawing practice
- Recognize modern technical tools of engineering drawing like AUTOCAD and apply in different fields of engineering
- Think creatively in getting alternative options to practical problems to engineering
- Communicate technical aspects through engineering drawing

Sheet No	Description of the Topic	Contact Hours Drawing
1	**Introduction to Engineering Drawing** - Principles of Engineering Drawing andtheir Significance ***Introduction to AutoCAD*** **-** Basic commands and simple drawings	**2**
2	**Construction of Scales -** Types of scales and Construction of plain scale	2
3	***Conic Sections*** **-** Construction of ellipse, parabola and hyperbola by general methodand any special method	**2+2**
4	**Concept of Quadrant System -** Understand the quadrant system with the help ofpoints and lines	**2+2**
5	**Projection of Planes -** Simple positions and plane inclined to single plane	**2+2**
6	**Projection of Solids -** Simple positions and plane inclined to single plane	**2+2**
7	**Isometric Drawing -** Simple planes and solids in isometric views (Combination ofSolids)	**2+2**
8	**Orthographic Projections -** Conversion of geometric figures and drawings fromisometric view to orthographic view	**2+2**

Text Books:

1. N.D. Bhatt, V. M Panchal & P. R. Ingle , "Engineering Drawing", Charotar Publishing House,2014
2. M. B. Shah, & B. C. Rana , "Engineering Drawing and Computer Graphics", Pearson Education, 2008
3. S. N. Lal, "Engineering Drawing with Introduction to Auto CAD", Cengage Learning India Pvt Lid, New Delhi, 2018.
4. B. Agrawal & C. M. Agrawal, "Engineering Graphics", TMH Publication, 2012
5. K. L. Narayana, & P Kannaiah, "Text book on Engineering Drawing", Scitech Publishers, 2008
6. (Corresponding set of) CAD Software Theory and User Manuals

NOTE:

1. At least 6 sheets must be drawn.
2. Sheet number 1 to 3 (Graph sheets / drawing sheets)
3. Sheet number 4 to 8 (AutoCAD drawings)