Pandit Deendayal Energy University

School of Technology

Department of Computer Science and Engineering

Under Graduate Curriculum Handbook (w. e. f. Academic Year 2024-28)

B. Tech.

(Computer Science and Business Systems)

w. e. f. July, 2024.

Vision

"To contribute to the society by imparting transformative education and producing globally competent professionals having multidisciplinary skills and core values to do futuristic research & innovations."

Mission

- To accord high quality education in the continually evolving domain of Computer Engineering by offering state-of-the-art undergraduate, postgraduate, doctoral programmes.
- To address the problems of societal importance by contributing through the talent we nurture and research we do:
- To collaborate with industry and academia around the world to strengthen the education and multidisciplinary research ecosystem.
- To develop human talent to its fullest extent so that intellectually competent and imaginatively exceptional leaders can emerge in a range of computer professions.

Program Educational Objectives (PEOs)

PEO-1. To prepare graduates who will be successful professionals in industry, government, academia, research, entrepreneurial pursuit and consulting firms

PEO-2. To prepare graduates who will make technical contribution to the design, development and production of computing systems

PEO-3. To prepare graduates who will get engage in lifelong learning with leadership qualities, professional ethics and soft skills to fulfill their goals

PEO-4. To prepare graduates who will adapt state of the art development in the field of computer engineering

Program Outcomes (POs)

PO-1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO-2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO-3. Design / development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO-4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO-5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO-6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO-7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO-8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO-9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO-10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO-11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

PSO-1. Develop computer engineering solutions for specific needs in different domains applying the knowledge in the areas of programming, algorithms, hardware-interface, system software, computer graphics, web design, networking and advanced computing.

PSO-2. Analyze and test computer software designed for diverse needs.

PSO-3. Pursue higher education, entrepreneurial ventures and research.

CSBS Course Outline

Semester	Course Code	Course Name	Theory	Tutorial	Practical	Hours	Credits
I	24CV101T	Environment Science	2	0	0	2	2
	24PH101T	Applied Physics	3	0	0	3	3
	24PH101P	Applied Physics Laboratory	0	0	2	2	1
	24CSB101T	Introductory Topics in Statistics, Probability and Calculus	3	1	0	4	4
	24CSB102T	Principles of Electrical Engineering	3	0	0	3	3
	24CSB102P	Principles of Electrical Engineering Laboratory	0	0	2	2	1
	24CSB103T	Business Communication & Value Science – I	2	0	0	2	2
	24CSB104T	Fundamentals of Computer Science	1	0	0	1	1
	24CSB104P	Fundamentals of Computer Science Laboratory	0	0	2	2	1
	24HS102T	Universal Human Values	1	0	0	1	1
	24HS103T	Indian Knowledge System	2	0	0	2	2
			17	**1**	**6**	**24**	**21**
II	24CSB105T	Linear Algebra	3	1	0	4	4
	24CSB106T	Statistical Methods	3	1	0	4	4
	24CSB107T	Principles of Electronics	3	0	0	3	3
	24CSB107P	Principles of Electronics Laboratory	0	0	2	2	1
	24CSB108T	Business Communication & Value Science – II	2	0	0	2	2
	24CSB109T	Fundamentals of Economics	2	0	0	2	2
	24CSB110T	Data Structures & Algorithms	3	0	0	3	3
	24CSB110P	Data Structures & Algorithms Laboratory	0	0	2	2	1
	24PH101T	Yoga, Health & Hygiene	0	0	2	2	1
	24PH102T	National Service Scheme(NSS)					
	24PH103T	National Cadet Corps (NCC)					
			16	**2**	**6**	**24**	**21**

1st Semester

24CV101T					ENVIRONMENTAL SCIENCE					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs./Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	--	--	100

COURSE OBJECTIVES

- To develop a comprehensive perspective of environment and sustainable development
- To understand the causes and effects of various types of pollution
- To develop an understanding of the various strategies for controlling the pollution
- To introduce the emerging environmental domains

UNIT I : INTRODUCTION TO ENVIRONMENT **05 Hrs.**

Sustainable Development; Sustainable Development Goals; Environmental Studies – Its importance and Multidisciplinary nature, Introduction to Environmental Parameters and their standards (air, water, soil, noise, etc.); Ecosystem and its types, Ideal ecosystem, Biodiversity : Its importance and conservation.

UNIT II : MULTI-SCALE ENVIRONMENTAL POLLUTION (GLOBAL, REGIONAL AND LOCAL) **06 Hrs.**

Pollution, Causes and Effects of different types of pollution : Air Pollution, Water Pollution, Soil Pollution, Solid Waste (organic and Inorganic) Pollution, Hazardous Waste Pollution, Marine Pollution, Noise Pollution, Thermal Pollution, Radioactive Pollution; Introduction to man-made disasters like floods, heat waves, landslides, etc., Introduction to the various instruments for measuring air pollution, water pollution, noise, etc.

UNIT III : ENVIRONMENTAL POLLUTION CONTROL STRATEGIES **09 Hrs.**

Multi-approaches for reducing various types of pollution: Introduction to Water and Wastewater treatment technologies, Air and Noise pollution control techniques, Introduction to different environmental management concepts like Swachh Bharat Mission, Mission LiFE (Lifestyle For Environment), etc. Indian Culture and Traditional Wisdom for managing environment

UNIT IV: EMERGING ENVIRONMENTAL MANAGEMENTS DOMAINS **08 Hrs.**

Concept of Zero Liquid Discharge (ZLD) and the reuse of the treated wastewater, Green Credit Rules - 2023, Clean Development Mechanisms (CDM) and Carbon Credits, Green Buildings, Carbon Footprint and Water Footprint, Green Business, International Environmental Laws, Environmental Auditing

TOTAL HOURS: 28 Hrs.

COURSE OUTCOMES:

On completion of the course, student will be able to:

CO-1: Demonstrate comprehension of sustainable development and environmental aspects.
CO-2: Recognize the interdisciplinary characteristics inherent in Environmental studies.
CO-3: Evaluate the impact of various pollutants on the environment.
CO-4: Assess the efficacy of different technologies for environmental pollution control.
CO-5: Analyze different environmental management policies and their implications.
CO-6: Synthesize knowledge about emerging environmental management paradigms.

TEXT-BOOK AND REFERENCE BOOKS:

1. Bharucha Erach, Textbook for Environmental Studies, UGC New Delhi.
2. Daniel B. Botkin & Edwards A. Keller, Environmental Science, Wiley India edition.
3. Miller T. G. Jr., 2006. Environmental Science, Clengage Learning.
4. R. Rajagopalan, Environmental Studies, Oxford University Press.
5. Gilbert Masters and Wendell P. Ela, Introduction to Environmental Engineering and Science, PHI.

24PH101T					Applied Physics					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs./Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	--	--	100

COURSE OBJECTIVES

- Understand Electric and Magnetic Fields, applying vector algebra.
- Apply Maxwell's equations to analyse electromagnetic waves and transmission.
- Analyse semiconductor behaviour and its applications in electronic devices
- Evaluate optical phenomena and their engineering applications in communications.

UNIT I: ELECTRICITY AND MAGNETISM **12 Hrs.**

Vector Algebra, Fundamental theorems of Gradient, Curls, and Divergence, Curvilinear co-ordinates, Continuous charge distribution, Divergence and Curl of Electrostatic Field, Electric potential and its applications, Work and Energy in Electrostatic, Bio-Savart's law, Divergence and curl of magnetic fields, Vector Potential, Ohm's law, EMF, Faraday's law of electromagnetic induction, Energy in Magnetic Fields, Maxwell's correction to ampere's law and Maxwell's equations, Poynting Vector.

UNIT II: ELECTROMAGNETIC WAVES **10 Hrs.**

Waves equation, Reflection and Transmission of waves, Polarisation, Wave equation for E and B for monochromatic plane waves, Propagation in linear media, reflection and transmission in normal and oblique incidence, Electromagnetic waves in conductors, Frequency dependence of permittivity, Waveguides, TE waves in rectangular waveguide, The Coaxial transmission line.

UNIT III: PHYSICS OF SOLIDS **10 Hrs.**

Fermi electron gas, Fermi level and surface, Energy bands, Energy Gap, Energy and band structure of conductor, insulators and semiconductors, Intrinsic semiconductors at 0K and room temperature, Intrinsic conductivity, Types of semiconductors, doping impurities, Temperature variation of carrier concentration, Electrical conductivity in semiconductors, Hall Effect, and magnetic materials

UNIT IV: OPTICS **10 Hrs.**

Nature of light waves, Fermat's principle, Coherent Sources, Interference, Two source interference, Interference in thin films, Newton's ring, Fresnel and Fraunhofer diffraction, Diffraction from single slit and double slit, Lasers, optical fibres and Holography, Applied optics: engineering measurements.

TOTAL HOURS: 42 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to:

CO1 : Recall fundamental laws and principles of electromagnetism and optics.
CO2 : Explain concepts of waves, conductivity, and semiconductor properties.
CO3 : Utilize principles to solve problems in electricity, magnetism, and optics.
CO4 : Evaluate electromagnetic phenomena and semiconductor behaviour through experimentation.
CO5 : Assess the effectiveness of engineering design for electromagnetic and optical devices.
CO6 : Design solutions for engineering challenges involving electromagnetics and semiconductors.

TEXT/REFERENCE BOOKS

1. Griffith, D. J., Introduction to Electrodynamics, Prentice Hall.
2. M. N. Avadhanulu and P G Kshirsagar, A text book of Engineering Physics, S.Chand Publications.
3. Sears and Zemansky, University physics, Pearson publications.
4. Principles of Electromagnetics, Matthew N. O. Sadiku, Oxford publications.
5. Hecht, E., Optics, Pearson Education.
6. M. A. Wahab, Solid State Physics: Structure and Properties of Materials, Narosa Publishing House Pvt. Ltd.-New Delhi.

24PH101P					Applied Physics Laboratory					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE	
0	0	2	1	2	--	--	--	50	50	100

COURSE OBJECTIVES

- Understand principles of electromagnetism and their experimental applications.
- Analyse experimental setups and procedures related to electricity and magnetism.
- Apply concepts of electromagnetic phenomena and optics in practical experiments.
- Investigate semiconductor device electrical properties through experimentation.

LIST OF EXPERIMENTS

1 To determine e/m using Thomson's method.
2 To study Bio-Savart's Law.
3 To verify Faraday and Lenz's law.
4 To study the magnetic field along the axis of a coil
5 To determine the electrical conductivity of metals.
6 To study the characteristics of Si solar cells.
7 To study the phenomenon of photoconductivity using CdS photo-resistor.
8 To determine energy band gap of semiconductor using four probe method.
9 To study the hall effect and determine hall voltage, hall coefficient, type of majority charge carriers, carrier concentration and hall angle.
10 To study of the ferromagnetic hysteresis.
11 To determine the wavelength of monochromatic light (sodium light) using Newton's rings.
12 To measure the slit width of single, blade and double slits.
13 To understand fundamental of optical fibres and analogue optical fibre communication.

COURSE OUTCOMES

On completion of the course, student will be able to:

CO1 : Recognize electromagnetic principles and practical applications in experimental setup.
CO2 : Interpret experimental setups and procedures for electricity, magnetism, and optics.
CO3 : Demonstrate and implement the concepts of electromagnetic phenomena and optics.
CO4 : Investigate the electrical properties of semiconductor device.
CO5 : Examine the experimental data to identify trends and physical relationships.
CO6 : Design experiments to investigate electromagnetism and semiconductor properties.

TEXT/REFERENCE BOOKS

1. Griffith, D. J., Introduction to Electrodynamics, Prentice Hall.
2. M. N. Avadhanulu and P G Kshirsagar, A text book of Engineering Physics, S. Chand Publications.
3. Sears and Zemansky, University physics, Pearson publications.
4. Principles of Electromagnetics, Matthew N. O. Sadiku, Oxford publications.
5. Hecht, E., Optics, Pearson Education.
6. M. A. Wahab, Solid State Physics: Structure and Properties of Materials, Narosa Publishing House Pvt. Ltd.-New Delhi.

24CSB101T					Introductory Topics in Statistics, Probability and Calculus					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	25	50	25	-	-	100

COURSE OBJECTIVES

- Students will be able to apply basic concepts of differential and integral calculus in probability and statistics, including the use of double and triple integrals.
- Students will be able to apply conditional probability and Bayes Theorem in solving probability problems.

UNIT 1: Introduction to Statistics: Definition of Statistics. Basic objectives. Applications in various branches of science with examples. Collection of Data: Internal and external data, Primary and secondary Data. Population and sample, Representative sample.	**7 Hrs.**
UNIT 2: Descriptive Statistics: Classification and tabulation of univariate data, graphical representation, Frequency curves. Descriptive measures - central tendency and dispersion. Bivariate data. Summarization, marginal and conditional frequency distribution.	**7 Hrs.**
UNIT 3: Probability: Concept of experiments, sample space, event. Definition of Combinatorial Probability. Conditional Probability, Bayes Theorem. Probability distributions: discrete & continuous distributions, Binomial, Poisson and Geometric distributions, Uniform, Exponential, Normal, Chi-square, t, F distributions. Expected values and moments: mathematical expectation and its properties, Moments (including variance) and their properties, interpretation, Moment generating function.	**7 Hrs.**
UNIT 4: Calculus: Basic concepts of Differential and integral calculus, application of double and triple integral.	**7 Hrs.**
	28 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the basic concept of multivariable calculus.
CO2 - Explain the concept of statistical inference and its role.
CO3 - Apply Conditional Probability and Bayes Theorem to solve probability problems.
CO4 - Analyze bivariate data using summarization techniques.
CO5 - Analyze and interpret Probability distributions, including their properties and applications.
CO6 - Evaluate the appropriateness of different Probability distributions for specific scenarios.

TEXT BOOKS

1. Introduction of Probability Models, S. M. Ross, Academic Press, N.Y.
2. Fundamentals of Statistics, vol. I & II, A. Goon, M. Gupta and B. Dasgupta, World Press.
3. Higher Engineering Mathematics, B. S. Grewal, Khanna Publication, Delhi.

REFERENCE BOOKS

1. A first course in Probability, S. M. Ross, Prentice Hall.
2. Probability and Statistics for Engineers, (Fourth Edition), I. R. Miller, J.E. Freund and R. Johnson, PHI.
3. Introduction to the Theory of Statistics, A. M. Mood, F.A. Graybill and D.C. Boes, McGraw Hill Education.
4. Advanced Engineering Mathematics, (Seventh Edition), Peter V. O'Neil, Thomson Learning.
5. Advanced Engineering Mathematics, (Second Edition) M. D. Greenberg, , Pearson Education.
6. Applied Mathematics, Vol. I & II, P. N. Wartikar and J. N. Wartikar, Vidyarthi Prakashan.

24CSB102T					Principles of Electrical Engineering					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	-	-	100

COURSE OBJECTIVES

- Explore electrical wiring types and accessories.
- Explore illumination systems and basic layout of the distribution system.
- Explore types of earthing, safety devices & systems, and battery principles and types.

UNIT 1: Basic network: Fundamental linear passive and active elements to their functional current-voltage relation, voltage source and current sources, ideal and practical sources, Kirchhoff-s laws and applications to network solutions using mesh and nodal analysis, Concept of work, power, energy, and conversion of energy. Current-voltage relations of the electric network by mathematical equations to analyze the network (Thevenin's theorem, Norton's Theorem, Maximum Power Transfer theorem) Simplifications of networks using series-parallel, Star/Delta transformation. Superposition theorem.	**10 Hrs.**
UNIT 2: Concept of AC AC waveform definitions, form factor, peak factor, phasor representation in polar and rectangular form, concept of impedance, admittance, complex power, power factor, single phase and three phase concepts, Study of R-L, R-C, RLC series circuit, R-L-C parallel circuit.	**10 Hrs.**
UNIT 3: Electrostatics and Electro-Magnetism Electrostatic field, electric field strength, concept of permittivity in dielectrics, energy stored in capacitors, charging and discharging of capacitors. Electromagnetism, magnetic field and Faraday's law. Magnetic materials and B-H curve. Self and mutual inductance, Ampere's law, Electromechanical energy conversion.	**10 Hrs.**
UNIT 4: Measurements and Sensors Measuring devices/sensors and transducers (Piezoelectric and thermo-couple) related to electrical signals, Elementary methods for the measurement of electrical quantities in DC and AC systems (Current & Single-phase power). Concept of indicating and integrating instruments. Practical considerations: Electrical Wiring types and accessories, Illumination system, Basic layout of the distribution system, Types of earthing, Safety devices & systems. Battery principles and types.	**12 Hrs.**
	42 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand Kirchhoff's laws and their applications to network solutions.
CO2 - Apply Thevenin's theorem, Norton's theorem, and the Maximum Power Transfer theorem to analyze networks.
CO3 - Apply series-parallel, Star/Delta transformation, and Superposition theorem for network simplification.
CO4 – Apply principle of electrostatic and electro magnetics for electric circuit.
CO5 - Analyze impedance, admittance, complex power, and power factor in AC circuits.
CO6 - Examine elementary methods for the measurement of electrical quantities in DC and AC systems.

TEXT BOOKS

1. Electric Machinery,(Sixth Edition) A.E. Fitzgerald, Kingsely Jr Charles, D. Umans Stephen, Tata McGraw Hill.
2. A Textbook of Electrical Technology,(vol. I),B. L. Theraja, Chand and Company Ltd., New Delhi.
3. Basic Electrical Engineering, V. K. Mehta, S. Chand and Company Ltd., New Delhi.
4. Theory and problems of Basic Electrical Engineering, (SecondEdition), J. Nagrath and Kothari, Prentice Hall of India Pvt. Ltd.

REFERENCE BOOKS

1. Basic of Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press.
2. T. K. Nagsarkar and M. S. Sukhija, Basic of Electrical Engineering, Oxford University Press, 2011.
3. Introduction to Electrodynamics, D. J. Griffiths, (Fourth Edition), Cambridge University Press.
4. Engineering Circuit Analysis, William H. Hayt & Jack E. Kemmerly, McGraw-Hill Book Company Inc.
5. Fundamentals of Electrical and Electronics Engineering, Smarjith Ghosh, Prentice Hall (India) Pvt. Ltd.

24CSB102P					Principles of Electrical Engineering Laboratory					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	-	-	-	25	25	50

COURSE OBJECTIVES

- To understand the basic concepts of C programming
- To understand design and implementation issues involved with variable allocation and binding, control flow, types, subroutines, parameter passing
- To develop understanding of Compilation process.

LIST OF EXPERIMENT

1.	Familiarization of electrical circuits: sources, measuring devices and transducers
2.	Determination of resistance temperature coefficient
3.	Verification of Network Theorem (Superposition, Thevenin, Norton, Maximum Power Transfer theorem)
4.	Simulation of R-L-C series circuits for XL>XC , XL< XC
5.	Simulation of Time response of RC circuit
6.	Demonstration of measurement of electrical quantities in DC and AC systems.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Identify different types of sources, measuring devices, and transducers used in electrical circuits.
CO2 - Calculate the resistance temperature coefficient for different materials.
CO3 - Apply Superposition, Thevenin, Norton, and Maximum Power Transfer theorems to analyze and solve electrical circuits.
CO4 - Verify the theorems through practical circuit simulations and measurements.
CO5 - Demonstrate the measurement of electrical quantities such as current, voltage, and power in DC systems.
CO6 - Demonstrate the measurement of electrical quantities in AC systems, including the use of phasor diagrams and power factor calculations.

TEXT BOOKS

1. Electric Machinery,(Sixth Edition) A.E. Fitzgerald, Kingsely Jr Charles, D. Umans Stephen, Tata McGraw Hill.
2. A Textbook of Electrical Technology,(vol. I),B. L. Theraja, Chand and Company Ltd., New Delhi.
3. Basic Electrical Engineering, V. K. Mehta, S. Chand and Company Ltd., New Delhi.
4. Theory and problems of Basic Electrical Engineering, (SecondEdition), J. Nagrath and Kothari, Prentice Hall of India Pvt. Ltd.

REFERENCE BOOKS

1. Basic of Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press.
2. T. K. Nagsarkar and M. S. Sukhija, Basic of Electrical Engineering, Oxford University Press, 2011.
3. Introduction to Electrodynamics, D. J. Griffiths, (Fourth Edition), Cambridge University Press.
4. Engineering Circuit Analysis, William H. Hayt & Jack E. Kemmerly, McGraw-Hill Book Company Inc.
5. Fundamentals of Electrical and Electronics Engineering, Smarjith Ghosh, Prentice Hall (India) Pvt. Ltd.

24CSB103T					Business Communication & Value Science – I					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	-	-	100

COURSE OBJECTIVES:

- Understand what life skills are and their importance in leading a happy and well-adjusted life
- Motivate students to look within and create a better version of self
- Introduce them to key concepts of values, life skills and business communication

UNIT 1: Essential Grammar – I Refresher on Parts of Speech – Listen to an audio clip and note down the different parts of speech followed by discussion, Tenses: Applications of tenses in Functional Grammar – Take a quiz and then discuss.	**7 Hrs.**
UNIT 2: Sentence Formation and Activity Sentence formation (general & Technical), Common errors, Voices. Show sequence from film where a character uses wrong sentence structure., Communication Skills: Overview of Communication Skills, Barriers of communication, Effective communication, Types of communication- verbal and non – verbal – Role-play based learning, Importance of Questioning, Summary writing, story writing, Email and Article Writing, Listening Skills: Law of nature- Importance of listening skills, Difference between listening and hearing, Types of listening. Expressing self, connecting with emotions, visualizing and experiencing purpose.	**7 Hrs.**
UNIT 3: Written Communication Skills Email writing: Formal and informal emails, activity; Verbal communication: Pronunciation, clarity of speech; Vocabulary Enrichment: Exposure to words from General Service List (GSL) by West, Academic word list (AWL) technical specific terms related to the field of technology, phrases, idioms, significant abbreviations formal business vocabulary – Read Economic Times, Reader's Digest, National Geographic and take part in a GD, using the words you learnt/liked from the articles. ; Group discussion using words learnt; Practice: Toastmaster style Table Topics speech with Evaluation; Written Communication: Summary writing, story writing; Build your CV – start writing your comprehensive CV including every achievement in your life, no format, no page limit.	**7 Hrs.**
UNIT 4: Realities of Facing Life Understanding Life Skills: Movie based learning – Pursuit of Happiness. What are the skills and values you can identify, what can you relate to? ; Introduction to life skills ;What are the critical life skills ; Multiple Intelligences ; Embracing diversity – Activity on appreciation of diversity ; Life skill: Community service – work with an NGO and make a presentation ;Life skill: Join a trek – Values to be learned: Leadership, teamwork, dealing with ambiguity, managing stress, motivating people, creativity, result orientation	**7 Hrs.**
	28 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1- Recognize the need for life skills and values

CO2- Recognize own strengths and opportunities

CO3- Apply the life skills to different situations

CO4-Understand the basic tenets of communication

CO5-Apply the basic communication practices in different types of communication

CO6- Apply correct grammar rules effectively in written communication.

TEXT/REFERENCE BOOKS

1. English vocabulary in use – Alan Mc'carthy and O'dell
2. APAART: Speak Well 1 (English language and communication)
3. APAART: Speak Well 2 (Soft Skills)
4. Business Communication – Dr. Saroj Hiremath

WEB REFERENCES

1. Train your mind to perform under pressure- Simon sinek , https://curiosity.com/videos/simon-sinek-on-training-your-mind-to-perform-under-pressure-capture-your-flag/
2. Brilliant way one CEO rallied his team in the middle of layoffs, https://www.inc.com/video/simon-sinek-explains-why-you-should-put-people-before-numbers.html

24CSB104T					Fundamentals of Computer Science					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
1	0	0	1	1	25	50	25	-	-	100

COURSE OBJECTIVES

- To understand the usage of operators and data types.
- To apply different types of Conditional and looping statement.
- To create different types of data collections.
- To implement user defined function.
- To perform different operations upon files.

UNIT 1: Basics of Programming Introduction to Computer Programming, Features of C language, Structure of C program, program execution flow, C Tokens, variables, Data types, Operators, Decision control statements-if, switch, go to statement. Loop control structures- while, do-while, for loop, Break statement, Continue statement, Command line arguments	**3 Hrs.**
UNIT 2: Derived Data types Array: one dimensional and multidimensional array, Declaration, initialization, Array Manipulations. Matrix operations, String-Basic Concepts, Inbuilt String manipulation Functions, Pointer, Pointer arithmetic, Pointer to pointer, Array of Pointers	**4 Hrs.**
UNIT 3: Function and Structure Introduction to user defined functions, Types of Functions, Call by value-call by reference, recursion, pointers to functions, Structures, Array of Structure, Union	**4 Hrs.**
UNIT 4: Files Handling File handling in C, Different types of files, Operations on Files such as File creation, File deletion, File access modes such as read, write, append, File concatenation, File handling using seek function. • Input and Output: Standard I/O, Formatted Output – printf, Formated Input – scanf, Variable length argument list, file access including FILE structure, fopen, stdin, sdtout and stderr, Error Handling including exit, perror and error.h, Line I/O, related miscellaneous functions. Unix system Interface: File Descriptor, Low level I/O – read and write, open, create, close and unlink, Random access – lseek, Discussions on Listing Directory, Storage allocator.	**3 Hrs.**
	14 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1: Understand basics of programming.
CO2: Identify different programming constructs for a problem.
CO3: Apply appropriate derived data type for data storage.
CO4: Prepare a user defined data type based on data attributes.
CO5: Construct user defined functions for problem solving.
CO6: Analyse different data structure based on application requirement.

TEXT BOOKS

1. Kernighan & Ritchie, C Programming Language", PHI
2. K. N. King , "C Programming: A Modern Approach" , W.W. Nortorn
3. David Griffiths and Dawn Griffiths, "Head First C: A Brain-Friendly Guide", O'Reilly
4. E.Balaguruswamy, Programming in ANSI C, McGraw-Hill
5. Y.P. Kanetkar ,"Let us C", BPB Publication
6. Y.P. Kanetkar , "Pointers in C", BPB Publications

REFERENCE BOOKS

1. The C Programming Language, (Second Edition) B. W. Kernighan and D. M. Ritchi, PHI.
2. Programming in C, (Second Edition) B. Gottfried, Schaum Outline Series.

24CSB104P					Fundamentals of Computer Science Laboratory					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	--	--	--	50	50	100

COURSE OBJECTIVES

- To implement basic programming concepts.
- To create different types of data collections.
- To implement user defined function.
- To perform different file handling operations.

List of Experiments:

1. **Introduction to Computer Programming**:
   Understanding compilation process through a simple C program, program execution flow, C Tokens, variables and keywords and identifiers, types of C constants and variables. Debugging, Macro, User Defined Header, User Defined Library Function, makefile utility.

2. **Simple and formatted Input Output Operations:**
   Data types, Operators, Input /output statements in C, Formatted I/O, format specifiers, escaper sequences

3. **Decision making and branching:**
   if, if-else, if-else ladder, switch, go to statement, conditional operator statement

4. **Looping control structures:**
   while, do-while, for loop, Break statement, Continue statement

5. **Derived Data Type: Array and Strings:**
   One dimensional and multidimensional array, Declaration, initialization, Array Manipulations. Matrix operations, Basic Concepts, Inbuilt String manipulation with and without using inbuilt functions.

6. **Derived Data Type: Structure and Union:**
   structure, arrays and structures, structures and functions, pointer to structure, typedef, unions

7. **Functions:**
   Introduction to user defined functions, Types of Functions, Call by value-call by reference, header file creation, recursion, pointers to functions, arrays and functions

8. **Pointers:**
   Pointer's basics, use of &, * operator in context to pointers, Pointer arithmetic, Array and String processing using pointer, pointer to pointer, Array of Pointers

9. **File Handling in C:**
   File handling in C, Different types of files, Operations on Files, File handling functions.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1: Identify the use of appropriate naming conventions and programming style including appropriate comment density.
CO2: Implement a basic C program using appropriate control structure.
CO3: Apply appropriate derived data types based on data attributes.
CO4: Develop solutions with pointers and utilize them to access strings and structures.
CO5: Design user defined functions for problem solving and reuse them across different programs.
CO6: Apply suitable file handling functions and operations.

TEXT/REFERENCE BOOKS

1. Kernighan & Ritchie, C Programming Language", PHI
2. K. N. King , "C Programming: A Modern Approach", W.W. Norton
3. E. Balaguruswamy, Programming in ANSI C, McGraw-Hill
4. Y.P. Kanetkar,"Let us C", BPB Publication
3. Y.P. Kanetkar, "Pointers in C", BPB Publication
4. The C Programming Language, (Second Edition) B. W. Kernighan and D. M. Ritchi, PHI.
5. Programming in C, (Second Edition) B. Gottfried, Schaum Outline Series.

Pandit Deendayal Energy University School of Technology

24HS102T					Universal Human Values					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs./Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
1	0	0	1	1	25	50	25	--	--	100

COURSE OBJECTIVES

- To understand the need of nurturing human values through the process in value-based education system.
- To understand and develop a holistic perspective on self-exploration and being in harmony with family, society and nature.
- To facilitate the students in understanding harmony at all the levels and applying in their profession and work place to lead an ethical life.

UNIT I: HUMAN VALUES AND PROCESS OF VALUE EDUCATION 04 Hrs.

Human values, human aspirations and the ultimate goal, understanding happiness and prosperity, appraise the meaning of satisfaction and happiness in current scenario, harmony and compatibility, values imbibed education system and process

UNIT II: KNOWING SELF - HARMONY WITH SELF 04 Hrs.

Understanding self, capabilities and challenges, understanding material (physical facilities) and spiritual needs - need of mind and body, understanding body as an instrument, harmony between mind and body, synchronizing physical health and mental health, practicing healthy habits for healthier me

UNIT III: HARMONY IN RELATIONSHIP – FAMILY, SOCIETY AND NATURE 03 Hrs.

Harmony in relationships, values for harmony in any human-human interaction, harmony in family, and society, trust and respect for others, self-esteem and ego, equality, equity, inclusion and liberation, concept of '*Vasudhaiva Kutumbakam',* understanding co-existence and sync with nature

UNIT IV: HARMONY IN PROFESSION AND ETHICAL BEHAVIOR 03 Hrs.

Ethical human conduct, acceptance and respect, appraising the qualities of others, professional competence for enabling harmony in system and enabling universal human order, scope of eco-friendly systems, strategies to reach the harmonious ecosystem to reach Universal Human Order '*Sarvabhauma Vyavastha'*

TOTAL HOURS: 14 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to:

CO1 - Understand the significance of human values, its need, and process of value education.

CO2 - Appraise the meaning of happiness and prosperity as short- and long-term goal of life. Understand them and in context of the current scenario

CO3 - Distinguish between the mind and body, physical and spiritual wellbeing for harmony within self

CO4 - relationships to build harmonious society

CO5 - Understand the importance of harmony with nature and appreciate co-existence for harmonious ecosystem.

CO6 - Create the perfect professional place and work environment following the ethical practices and strategize to uphold the human values at all the levels and interactions.

TEXT/REFERENCE BOOKS

1. R. R. Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and Professional Ethics, Excel books.
2. A. Nagraj, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
3. A. N. Tripathi, Human Values, New Age Intl. Publishers.
4. M. K. Gandhi. The Story of My Experiments with Truth, Fingerprint Publishing.
5. Ivan Illich, Energy & Equity, The Trinity Press, Worcester, and Harper Collins.
6. E. F. Schumacher, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
7. Sussan George, How the Other Half Dies, Penguin Press.

2nd Semester

24CSB105T					Linear Algebra					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	25	50	25	-	-	100

COURSE OBJECTIVES

- To understand and apply matrix principles for problem-solving.
- To analyze matrix properties for solving complex equations.
- To utilize advanced techniques like LU decomposition and eigenvalue analysis.
- To implement user defined function.
- To apply mathematical concepts and tools, including matrix operations and solution methods, to analyze and solve real-world problems in fields such as image processing, machine learning, and optimization.

UNIT 1: Introduction to Matrices Introduction to Matrices and Determinants, Solution of Linear Equations, Cramer's rule, Inverse of a Matrix.	**8 Hrs.**
UNIT 2: Vector Calculus Vectors and linear combinations, Rank of a matrix, Gaussian elimination, LU Decomposition, Solving Systems of Linear Equations using the tools of Matrices. Vector space, Dimension, Basis, Orthogonality, Projections, Gram-Schmidt orthogonalization and QR decomposition.	**10 Hrs.**
UNIT 3: Linear Transformation and Eigen Values Eigenvalues and Eigenvectors, Positive definite matrices, Linear transformations, Hermitian and unitary matrices.	**10 Hrs.**
UNIT 4: Singular Vector Decomposition Singular value decomposition and Principal component analysis, Introduction to their applications in Image Processing and Machine Learning.	**14 Hrs.**
	42 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 –Identify the role of linear algebra in solving engineering problems effectively.
CO2 –Understand the concept of matrices to solve complex systems of equations.
CO3 -Apply advanced techniques like LU decomposition and eigenvalue analysis for efficient problem-solving.
CO4 -Evaluate the significance of eigenvalues, eigenvectors, and SVD in various mathematical contexts.
CO5 -Apply SVD and PCA for data analysis and dimensionality reduction.
CO6 -Synthesize knowledge to tackle advanced problems in interdisciplinary fields, demonstrating critical thinking and creativity.

TEXT/REFERENCE BOOKS

1. Introduction to linear algebra, (Fifth Edition), Gilbert Strang, Wellesley-Cambridge Press.
2. Algebra,(Second Edition), Michael Artin, Pearson Education.
3. Introduction to linear algebra, (Second Edition), Serge Lang, Springer.
4. Matrix Analysis, (Second Edition), Horn & Johnson, Cambridge University Press.
5. Applied Mathematics (Vol. I & II), P. N. Wartikar & J. N. Wartikar, Pune Vidyarthi Griha Prakashan.
6. https://machinelearningmastery.com/introduction-matrices-machine-learning/

24CSB106T					Statistical Methods					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	25	50	25	-	-	100

COURSE OBJECTIVES

- To learn sampling techniques for data collection.
- To understand linear statistical models for analysis and prediction.
- To apply hypothesis testing and non-parametric inference methods.
- To analyze data and interpret results using ARIMA models.
- To utilize results from hypothesis and non-parametric tests to offer insights and recommendations for decision-making.

UNIT 1: Introduction to Sampling Techniques Sampling Techniques: Random sampling. Sampling from finite and infinite populations. Estimates and standard error (sampling with replacement and sampling without replacement), Sampling distribution of sample mean, stratified random sampling	**8 Hrs.**
UNIT 2: Linear Statistical Models Scatter diagram. Linear regression and correlation. Least squares method. Rank correlation. Standard multiple regression models with emphasis on detection of collinearity, outliers, non-normality and autocorrelation, Validation of model assumptions. Multiple correlation, Analysis of variance (one way, two way with as well as without interaction) Estimation: Point estimation, criteria for good estimates (un-biasedness, consistency), Methods of estimation including maximum likelihood estimation.	**10 Hrs.**
UNIT 3: Hypothesis Testing Concept & formulation, Type I and Type II errors, Neyman Pearson lemma, Procedures of testing Non-parametric Inference: Comparison with parametric inference, Use of order statistics. Sign test, Wilcoxon signed rank test, Mann-Whitney test, Run test, Kolmogorov-Smirnov test. Spearman's and Kendall's test.	**10 Hrs.**
UNIT 4: Basics of Time Series Analysis & Forecasting Stationary, ARIMA Models: Identification, Estimation and Forecasting.	**14 Hrs.**
	42 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1- Identify the role of statistical tools in all the domains.
CO2-Understand the need of sampling, regression and hypothesis.
CO3- Apply various statistical techniques to models of engineering interest.
CO4- Analyze the outcomes of hypothesis testing and statistical models.
CO5- Formulate models using linear statistical tools, addressing complexities.
CO6- Construct the model of interest to address any problem and analyze it using appropriate statistical tools/ techniques.

TEXT/REFERENCE BOOKS

1. Probability and Statistics, E. Rukmangadachari, E. Keshava Reddy, Pearson Education India.
2. Fundamentals of Mathematical Statistics, V.K. Gupta, S.C. Kapoor, S. Chand & Sons.
3. Time Series Analysis: Forecasting and Control, George E. P. Box, Gwilym M. Jenkins, Wiley Publications.

24CSB107T					Principles of Electronics					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	0	0	100

COURSE OBJECTIVES

- To understand rectification through p-n junction diode and applications of diode
- To learn different configurations and static characteristics of bipolar junction transistor and MOSFET
- To illustrate the OPAMP application in different real life circuits
- To introduce basic concepts of digital electronics

UNIT 1: DIODES AND RECTIFIERS **10 Hrs.**

Review of p-n junction diode, energy band diagram, and built-in-potential, forward and reverse biased P-N junction, formation of depletion zone, Formation of PNP / NPN junctions, 1-phase half wave, full wave and bridge rectifier using diode. Calculation of average & rms value, PIV, efficiency, transformer utilization factor and ripple for different diode rectifier circuit. Use of Capacitor Filter for ripple reduction, voltage multipliers, Zener diode in load and line regulation, Light Emitting Diode, Photo diode.

UNIT 2: BJT, FET AND MOSFET **07 Hrs.**

Transistor mechanism and principle of transistors, Working of a BJT, transistor biasing, different transient circuit configuration (CB, CE and CC), static characteristic for BJT (modes of operations), transistor as switch, amplifier, Use of feedback in amplifier and oscillator. Classification and static characteristics of FET, and MOSFET, MOSFET Structure and characteristics, depletion and enhancement type; CS, CG, CD configurations; Introduction to CMOS.

UNIT 3: OPAMP **07Hrs.**

Introduction to integrated circuits, operational amplifier and its terminal properties: Block Diagram and Characteristics of Ideal Op-Amp, Parameters of an Op-Amp, Virtual Ground, Inverting and Non- Inverting Amplifier, source follower, Integrator and Differentiator, Adder, Subtractor, Comparator.

UNIT 4: DIGITAL ELECTRONICS **18Hrs.**

Number system, Binary arithmetic, Basic idea of switching circuit, Realization of Logic gates and combinational logic, Boolean algebra, DeMorgan's Theorems, Logic minimization and Karnaugh maps, decoder, encoder, codes, full adder, multiplexer, and De-multiplexer, Flip Flops, Introductory Sequential Logic, Counters, Registers, Introduction to PLA, PAL, and FPGA, design of finite state machine.

Total 42 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1 –Demonstrate application of different diode in circuits.
CO2 – Evaluate zener diode as voltage regulator.
CO3-- Apply BJT, FET and MOSFET in different circuits.
CO4–Understand static characteristics OPAMP.
CO5–Illustrate basic concepts and theorem of digital systems.
CO6–Build digital circuits using logic gates and flip flops.

TEXT/REFERENCE BOOKS

1. Boylestad and Nashlesky, "Electronic Devices and Circuit Theory", PHI
2. N.N. Bhargava, S.C. Gupta, and D.C. Kulshreshtha, "Basic Electronics And Linear Circuits", McGraw Hill Education (India)
3. R. A. Gaikwad, "Operational Amplfier and Linear Integrated Circuits", PHI
4. Morris Mano, "Digital Design", PHI
5. J. Millman, C. Halkias and C. Parikh, "Integrated Electronics", Tata McGraw Hill.

24CSB107P					Principles of Electronics Laboratory					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	0	0	0	25	25	50

COURSE OBJECTIVES

- To understand the characteristics of PN junction diodes and their applications
- To Observe properties of BJT, FET and MOSFET
- To illustrate the OPAMP application in different real life circuits
- To introduce basic concepts of digital electronics

List of Experiment: The experiments covering but not limited to following list:

1. To study the simulation tool and its features for analog circuit simulation
2. To study the VI characteristic of silicon and germanium diodes.
3. To study reverse characteristics of zener diode.
4. To study half wave, full wave and bridge rectifiers
5. To study BJT as switch
6. To study common emitter amplifier
7. To study different biasing circuits of BJT
8. To study transfer and drain characteristic of FET and MOSFET
9. To study OPAMP and its properties
10. To study the simulation of digital circuits
11. To study and verify logic gates
12. To implement X-OR and X-NOR gates using basic gates
13. To study and design adder and subtracter circuits
14. To study and design flip flops
15. To study and design of FSM frog oven problem
16. Design of mini project in a group of 4-5 students

COURSE OUTCOMES

On completion of the course, student will be able to

CO1: Study the fundamentals of electronic components

CO2: Understand the working principle of semiconductor devices

CO3: Apply the analog and digital concept in building real time circuits

CO4: Analyze the behaviour of semiconductor devices, OPAMP, ADC and DAC

CO5: Evaluate different circuit for different device parameters

CO6: Build analog and digital sub-system

TEXT/REFERENCE BOOKS

1. Boylestad and Nashlesky, “Electronic Devices and Circuit Theory”, PHI
2. N.N. Bhargava, S.C. Gupta, and D.C. Kulshreshtha, “Basic Electronics And Linear Circuits”, McGraw Hill Education
3. R. A. Gaikwad, “Operational Amplfier and Linear Integrated Circuits”, PHI
4. Morris Mano, “Digital Design”, PHI
5. J. Millman, C. Halkias and C. Parikh, “Integrated Electronics”, Tata McGraw Hill.

24CSB108T					Business Communication & Value Science – II					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	-	-	100

COURSE OBJECTIVES:

- Develop effective writing, reading, presentation and group discussion skills.
- Help students identify personality traits and evolve as a better team player.
- Introduce them to key concepts of
  a. Morality
  b. Behavior and beliefs
  c. Diversity & Inclusion

UNIT 1: Communication Skills Participate in 'Join Hands Movement'. Individual identification of social issues. Theory to introduce the participant Slam book to be used for capturing individual learning points and observations. Research on the social cause each group will work for. Good and Bad Writing, Common errors, punctuation rules, use of words.	**7 Hrs.**
UNIT 2: Presentation Skills Develop materials to create an identity for an organization dedicated to a social cause, Understand the basics of presentation, and Apply effective techniques to make presentations, Assess presentation based on given criteria, tools for speed reading, skimming and scanning, Create communication material.	**7 Hrs.**
UNIT 3: Reading Skills Develop materials to create an identity for an organization dedicated to a social cause each group will form an NGO. Design skit, Create Vision, Mission, Value statement, tagline and Design a logo, Create communication material to share concepts and ideas, Use electronic/social media to share concepts and ideas, Identify individual personality types and role in a team, Recognize the concepts of outward behavior and internal behaviour.	**7 Hrs.**
UNIT 4: Team Dynamics and Diversity Understand the basic concepts of Morality and Diversity, Articulate opinions on a topic with the objective of influencing others	**7 Hrs.**
	28 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1- Understand tools of structured written communication and basics of presentation.
CO2 - Develop materials to create an identity for an organization dedicated to a social cause
CO3 - Apply effective techniques to make presentations.
CO4 - Create communication material to share concepts and ideas.
CO5- Create an event to generate awareness and get support for a cause
CO6- Demonstrate a clear understanding of the fundamental concepts of morality and diversity and their significance in team dynamics.

TEXT/REFERENCE BOOKS

1. Guiding Souls : Dialogues on the purpose of life; Dr. A.P.J Abdul Kalam, Co-author--Arun Tiwari
2. The Family and the Nation; Dr. A.P.J Abdul Kalam; Co-author: Acharya Mahapragya
3. The Scientific India: A twenty First Century Guide to the World around Us; Dr. A.P.J Abdul Kalam; Co-author- Y.S.Rajan
4. Forge Your Future: Candid, Forthright, Inspiring ; Dr. A.P.J Abdul Kalam;
5. Abundance: The Future is Better Than You Think; Peter H. Diamandis and Steven Kotler; Publisher: Free Press
6. Start With Why: How Great Leaders Inspire Everyone to Take Action; Simon Sinek, Publisher: Penguin.
7. Advertising & IMC: Principles and Practice; Sandra Moriarty, Nancy D. Mitchell, William D. Wells; Publisher: Pearson Education India.

WEB REFERENCES

ETHICS FUNDAMENTALS AND APPROACHES TO ETHICS
https://www.eolss.net/Sample-Chapters/C14/E1-37-01-00.pdf

A Framework for Making Ethical Decisions
https://www.brown.edu/academics/science-and-technology-studies/framework-making-ethical-decisions

Five Basic Approaches to Ethical Decision- http://faculty.winthrop.edu/meelerd/docs/rolos/5_Ethical_Approaches.pdf

24CSB109T					Fundamentals of Economics					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	-	-	100

Course Objectives:

- To understand the fundamental principles of demand and supply and their role in market equilibrium.
- To analyze the behavior of firms and households in response to changes in prices and other economic variables.
- To explore the concepts of elasticity of demand and supply and their applications.
- To comprehend consumer behavior theories and their implications for market outcomes.

UNIT 1: Microeconomics: Principles of Demand and Supply - Supply Curves of Firms - Elasticity of Supply; Demand Curves of Households - Elasticity of Demand; Equilibrium and Comparative Statics (Shift of a Curve and Movement along the Curve); Welfare Analysis - Consumers' and Producers' Surplus - Price Ceilings and Price Floors.	**5 Hrs.**
UNIT 2: Consumer Behaviour - Axioms of Choice - Budget Constraints and Indifference Curves; Consumer's Equilibrium - Effects of a Price Change, Income and Substitution Effects -Derivation of a Demand Curve; Applications - Tax and Subsidies - Intertemporal Consumption - Suppliers' Income Effect; Theory of Production - Production Function and Iso-quants - Cost Minimization; Cost Curves - Total, Average and Marginal Costs - Long Run and Short Run Costs; Equilibrium of a Firm Under Perfect Competition; Monopoly and Monopolistic Competition.	**9 Hrs.**
UNIT 3: Macroeconomics: National Income and its Components - GNP, NNP, GDP, NDP; Consumption Function; Investment; Simple Keynesian Model of Income Determination and the Keynesian Multiplier; Government Sector - Taxes and Subsidies.	**6 Hrs.**
UNIT 4: External Sector: Exports and Imports; Money - Definitions; Demand for Money -Transactionary and Speculative Demand; Supply of Money - Bank's Credit Creation Multiplier; Integrating Money and Commodity Markets - IS, LM Model; Business Cycles and Stabilization - Monetary and Fiscal Policy - Central Bank and the Government; The Classical Paradigm - Price and Wage Rigidities - Voluntary and Involuntary Unemployment.	**8 Hrs.**
	28 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1- To explain the determinants of demand and supply and how changes in these factors affect market equilibrium.

CO2 - Understand the concepts of elasticity of demand and supply and be able to calculate and interpret elasticity measures.

CO3 -To analyze consumer behavior using indifference curves and budget constraints to determine consumer equilibrium.

CO4 -To comprehend the production function, isoquants, and cost curves, and analyze firms' behavior in different market structures.

CO5- To apply economic theory to analyze real-world issues such as taxation, subsidies, intertemporal consumption, and market regulation.

CO6- To analyse business cycles and the roles of monetary and fiscal policy in stabilization, with a focus on the functions of the central bank and government interventions.

TEXT/REFERENCE BOOKS

1. Microeconomics, Pindyck, Robert S., and Daniel L. Rubinfeld.
2. Macroeconomics, Dornbusch, Fischer and Startz.
3. Economics, Paul Anthony Samuelson, William D. Nordhaus.
4. Intermediate Microeconomics: A Modern Approach, Hal R, Varian.
5. Principles of Macroeconomics, N. Gregory Mankiw.

24CSB110T					Data Structures and Algorithms					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	--	--	100

COURSE OBJECTIVES

- To learn fundamental concepts of data and file structures.
- To implement various data structures and algorithms.
- To understand function of linear and non-linear data structures.
- To use suitable data structure and algorithm in variety of applications.

UNIT 1: Introduction Algorithm specification, Recursion, Performance analysis, Asymptotic Notation - The Big-O, Omega and Theta notation, Programming Style, Refinement of Coding - Time-Space Trade Off, Testing, Data Abstraction	**08 Hrs.**
UNIT 2: Linear Data Structures Array, Stack, Queue, Linked-list and its types, Various Representations, Operations & Applications of Linear Data Structures	**12 Hrs.**
UNIT 3: Non-Linear Data Structures **Trees**: Trees (Binary Tree, Threaded Binary Tree, Binary Search Tree, B & B+ Tree, AVL Tree, Splay Tree) and **Graphs** (Directed, Undirected), Various Representations, Operations & Applications of Non-Linear Data Structures, Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.	**14 Hrs.**
UNIT 4: Sorting and Searching Sequential Search, Binary Search, Comparison Trees, Breadth First Search, Depth First Search Insertion Sort, Selection Sort, Shell Sort, Divide and Conquer Sort, Merge Sort, Quick Sort, Heapsort, Introduction to Hashing. **File:** Organisation (Sequential, Direct, Indexed Sequential, Hashed) and various types of accessing schemes.	**08 Hrs.**
	42 Hrs.

COURSE OUTCOMES

On completion of the course, students will be able to

CO1 - Recall the differences between primitive and non-primitive datatypes.
CO2 - Understand the concepts of linear and non-linear data structures.
CO3 - Apply search, insert and delete operation on data structures.
CO4 - Analyse the time and space complexity of algorithms.
CO5 - Evaluate trade-offs between linear and non-linear data structures.
CO6 - Develop strategies for implementing hash tables and resolving collisions.

TEXT/REFERENCE BOOKS

1. Fundamentals of Data Structures, E. Horowitz, S. Sahni, S. A-Freed, Universities Press.
2. Data Structures and Algorithms, A. V. Aho, J. E. Hopperoft, J. D. UIlman, Pearson.
3. The Art of Computer Programming: Volume 1: Fundamental Algorithms, Donald E. Knuth.
4. Introduction to Algorithms, Thomas, H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, The MIT Press.
5. Open Data Structures: An Introduction (Open Paths to Enriched Learning), (Thirty First Edition), Pat Morin, UBC Press.
6. Tanenbaum, "Data Structures using C & C++", Prentice-Hall International
7. Jean-Paul Tremblay & Paul G. Sorenson, "An Introduction to Data Structures with Applications", Tata McGraw Hill
8. Sartaj Sahani, "Fundamentals of Data Structures in C++", Galgotia.Publishers

24CSB110P					Data Structures and Algorithms Laboratory					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	--	--	--	50	50	100

PREREQUISITES: Fundamentals of Computer Science

COURSE OBJECTIVES

- To learn fundamental concepts of Data and File Structures.
- To implement various data Structures and Algorithms.
- To understand function of linear and non-linear data structures.
- To use suitable data structure and algorithm in variety of applications.

LIST OF EXPERIMENTS:

Arrays, Pointers and structures:

- Implementation of searching and sorting algorithms on arrays.
- Implementation of pointers and structures.
- Implementation of various operations using strings.

Linear Data structures:

- Implementation of Stack data structure and its applications.
- Implementation of various types of Queue data structure and their applications.
- Implementation of various types of Linked list data structure and their applications.

Non-linear Data structures:

- Implementation of binary tree and its traversals.
- Implementation of Binary search tree.
- Implementation of balanced trees.
- Implementation of various graph traversals: DFS & BFS.

Hashing:

- Implementation of Hash functions and tables.
- Implementation of collision resolution techniques.

COURSE OUTCOMES

On completion of the course, students will be able to

CO1 - Recall the differences between primitive and non-primitive datatypes.
CO2 - Apply searching and sorting algorithms on linear data structures.
CO3 - Implement search, insert, and delete operations on data structures.
CO4 - Implement hash tables and collision resolution techniques.
CO5 - Evaluate the complexity of algorithms.
CO6 - Design application using linear and non-linear data structures.

TEXT/REFERENCE BOOKS

1. Tanenbaum, “Data Structures using C & C++”, Prentice-Hall International
2. Jean-Paul Tremblay & Paul G. Sorenson, “An Introduction to Data Structures with Applications”, Tata McGraw Hill
3. Sartaj Sahani, “Fundamentals of Data Structures in C++”, Galgotia.Publishers.

24PH101T					Yoga, Health & Hygiene					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs./Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	--	--	--	50	50	100

COURSE OBJECTIVES

- To impart the students with the basic concepts of physical education, sports, and yoga for health and wellness.
- To familiarize the students with health-related exercises, sports, and yoga for overall growth and development.
- To create a foundation for professionals in physical education, sports, and yoga.
- To impart the basic knowledge and skills to teach physical education, sports, and yoga activities.

ACTIVITY I: KINESIOLOGY AND CARDIO FITNESS TEST

Introduction to Kinesiology and the Physiological Basis of Conditioning, Sports Psychology, and the Cooer Cardio Fitness Test 12-Minutes Run/Walk: How to Start Walking/Runing: Get expert tips, tools, and training.

ACTIVITY II: YOGA

Introduction to Yogasana and Yoga Therapy: A Rehabilitation Tool and the Effect of Yoga on Exercise Endurance as Assessed by Cardiorespiratory Efficiency Tests: Studt on yogic practices that promote and improve respiratory and cardiovascular function and enhance physical fitness.

ACTIVITY III:GAMES AND SPORTS LEAGUE

Practice sessions for outdoor and indoor games, event-wise practice, and team games organized on the sport, game-wise practice as per the student's interest: Football, Chess, Cricket, Tennis, Basketball, Volleyball, Athletics (Relay), Pickleball.

COURSE OUTCOMES

On completion of the course, student will be able to:

CO1 : Discover the balance of health and happiness through the basic principles and practices of physical education, sports, and yoga.
CO2 : Understand that the students will be able to be instructed on physical activities, sports, yoga practices, theories, and rules of various games for healthy living.
CO3 : Analyze emerging trends and issues in world sports and develop leadership qualities among students to conduct, organize, and officiate physical education, sports, and yoga events at schools, colleges, and the community.
CO4 : Practice on the field and in the indoor yoga hall.
CO5 : Develop a spirit of teamwork and fair play.
CO6 : Demonstrate understanding by participating in games and sports leagues.

TEXT/REFERENCE BOOKS

1. Athletic Track and Court Marking Handbook of Games And Sports – Rajesh Agola.
2. Asana, Pranayama, and Kriyas - Swami Satyanand Swami.Munger.
3. Sports Games and Rule, Regulation - Pankaj Vinayak Pathak
4. Yogic Prakriyanche Margdarshan – Dr.M.L.Gharote - (The Lonavala Yoga Research Institute,Lonavala)

24PH102T					National Service Scheme (NSS)					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs./Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	--	--	--	50	50	100

COURSE OBJECTIVES

- To develop a sense of civic and social responcibility.
- To identify the needs and problems of the community and involve them in problem-solving.
- To engage in creative and constructive social action.
- To develop social character and leadership through NSS.

ACTIVITY I: ENVIRONMENT AND SUSTAINABILITY -WATER - WAST MANAGEMENT

Volunteering work for Environment & Sustainability (water and waste management) and Tree Plantation.

ACTIVITY II: NSS 7 DAYS SPECIAL CAMP

Volunteering for tree planting, agriculture compost, tree guard,Gujarat Skill Development Mission, and social activities in the village as per the government NSS manual.

ACTIVITY III: FIT INDIA MISSION

Volunteering for Cardio Fitness, Yoga, Running, Mission Olympics, Self-Defense, and Agneepath Mission.

COURSE OUTCOMES

On completion of the course, student will be able to:

CO1 : Identify the needs and problems of the community.
CO2 : Understand the importance of his / her responsibilities towards society.
CO3 : Analyze the environmental and societal problems/issues.
CO4 : Evaluate the existing system and propose practical solutions for the sustainable development.
CO5 : Develop a government or self-driven projects effectively in the field.
CO6 : Understand the government or self-driven projects effectively in the society.

TEXT/REFERENCE BOOKS

1. NSS Course Manual, Published by NSS Unit,PDEU (https://www.pdpu.ac.in/nssreport.html)
2. Government of Gujarat NSS Cell (https://nss.gov.in/gujarat-1)
3. Government of India NSS Cell, Activities reports and manual (https://nss.gov.in/)

24PH103T					National Cadet Corps (NCC)					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs./Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	--	--	--	50	50	100

COURSE OBJECTIVES

- To develop discipline, character, brotherhood, the spirit of adventure and ideals of selfless service amongst young students
- To develop youth leadership qualities in the students.
- To induce social consciousness among students through various NCC camps

ACTIVITY I: INTRODUCTION TO NCC

Introduction to NCC, aims and objectives, structure and organization of NCC, cardinals of NCC, NCC Flag, oath of NCC, NCC Song, incentives of NCC

ACTIVITY II: NATIONAL INTEGRATION

Importance of national integration and awareness, necessity, national interests, objectives, threats and opportunities, unity in diversity

ACTIVITY III: NCC CAMPS, SOCIAL SERVICE, AWARENESS AND COMMUNITY DEVELOPMENT ACTIVITIES

Social awareness & community development, health & hygiene, environment awareness and conservation, cadets will participate in various activities e.g., blood donation camp, swachhata abhiyan, constitution day, etc., participation into NCC camps like ATC, CATC, NIC, COC, TSC, RDC, leadership camps, etc.

ACTIVITY IV: DRILL, WEAPON TRAINING AND ADVENTURE ACTIVITIES

Types of drill, foot drill, general and words of command, saluting, weapon training, map reading, field craft & battle craft, Introduction to infantry weapons & equipment, obstacle and weapon training (during camps), adventure training, participation into Republic and Independence day ceremonial parades at university.

COURSE OUTCOMES

On completion of the course, student will be able to:

CO1 : Know about the history of NCC, its organization, and incentives of NCC for their career prospects.
CO2 : Understand the importance of Nation building and individual contribution to the same
CO3 : Maintain discipline and team spirit
CO4 : Build the character and leadership qualities
CO5 : Understand that drill as the foundation for discipline and to command a group for common goal.
CO6 : Develop the sense of self-less social service for better social & community life.

TEXT/REFERENCE BOOKS

1. Cadet's Handbook SD/SW- Common Subjects, all wings by DG NCC, New Delhi