Course Curriculum for B.Tech.
In
Computer Science and Engineering
Session 2022-23

Himachal Pradesh Technical University

Hamirpur, Distt. Hamirpur – 177001, Himachal Pradesh
(Established under Act No. 16 of 2010 of Himachal Pradesh Legislative Assembly)

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B. Tech. Computer Science and Engineering CSE)

(2022 -2023 Scheme)

SEMESTER-I

S. N.	SUBJECT CODE	SUBJECT TITLE	L	T	P	CR
1	PHY-101L	APPLIED PHYSICS	3	0	0	03
2	CS-101L	COMPUTER PROGRAMMING AND PROBLEM SOLVING	3	0	0	03
3	EE-101L	BASIC ELECTRICAL ENGINEERING	3	0	0	03
4	MA-101L	APPLIED MATHEMATICS-1	3	1	0	04
5	EVS-101L	ENERGY AND ENVIRONMENT	3	0	0	03
6	HS-111L	TECHNICAL COMMUNICATION SKILLS	2	0	2	03
7	PHY-101P	APPLIED PHYSICS LAB	0	0	2	01
8	CS-101P	COMPUTER PROGRAMMING LAB	0	0	2	01
9	EE-101P	ELECTRICAL ENGINEERING LAB	0	0	2	01
		TOTAL				22

SEMESTER-II

S. N.	SUBJECT CODE	SUBJECT TITLE	L	T	P	CR
1	CHM-201L	APPLIED CHEMISTRY	3	0	0	03
2	CS-201L	OBJECT ORIENTEDPROGRAMMING	3	0	0	03
3	EC-201L	BASICS OF ELECTRONICS ENGINEERING	3	0	0	03
4	MA-201L	APPLIED MATHEMATICS-II	3	1	0	04
5	HS-115L	Universal Human Values for Holistic, Value -based Education	2	1	0	03
6	HS-116L	HUMAN CONSCIOUSNESS & YOGA*	2	0	2	03
7	CHM-201P	APPLIED CHEMISTRY LAB	0	0	2	01
8	CS-201P	OBJECT ORIENTEDPROGRAMMING LAB	0	0	2	01
9	EC-201P	BASICS OF ELECTRONICS ENGINEERING LAB	0	0	2	01
		TOTAL				22

*Either of one can be selected

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B. Tech. Computer Science & Engineering (CSE)

(2022 - 2023 Scheme)

SEMESTER-I

S. N.	SUBJECT CODE	SUBJECT TITLE	L	T	P	CR
1	PHY-101L	APPLIED PHYSICS	3	0	0	03
2	CS-101L	COMPUTER PROGRAMMING AND PROBLEM SOLVING	3	0	0	03
3	EE-101L	BASIC ELECTRICAL ENGINEERING	3	0	0	03
4	MA-101L	APPLIED MATHEMATICS-1	3	1	0	04
5	EVS-101L	ENERGY AND ENVIRONMENT	3	0	0	03
6	HS-111L	TECHNICAL COMMUNICATION SKILLS	2	0	2	03
7	PHY-101P	APPLIED PHYSICS LAB	0	0	2	01
8	CS-101P	COMPUTER PROGRAMMING LAB	0	0	2	01
9	EE-101P	ELECTRICAL ENGINEERING LAB	0	0	2	01
		TOTAL				22

SEMESTER-II

S. N.	SUBJECT CODE	SUBJECT TITLE	L	T	P	CR
1	CHM-201L	APPLIED CHEMISTRY	3	0	0	03
2	CS-201L	OBJECT ORIENTEDPROGRAMMING	3	0	0	03
3	EC-201L	BASICS OF ELECTRONICS ENGINEERING	3	0	0	03
4	MA-201L	APPLIED MATHEMATICS-II	3	1	0	04
5	HS-115L	Universal Human Values for Holistic, Value -based Education	2	1	0	03
6	HS-116L	HUMAN CONSCIOUSNESS & YOGA*	2	0	2	03
7	CHM-201P	APPLIED CHEMISTRY LAB	0	0	2	01
8	CS-201P	OBJECT ORIENTEDPROGRAMMING LAB	0	0	2	01
9	EC-201P	BASICS OF ELECTRONICS ENGINEERING LAB	0	0	2	01
		TOTAL				22

*Either of one can be selected

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B. TECH. COMPUTER SCIENCE AND ENGINEERING

(Main Campus)

SEMESTER -I

APPLIED MATHEMATICS-I (MA -101L)

Course Code	**MA-101L**	**Credits – 04**	**L-3, T-1,P-0**
Name of Course	**APPLIED MATHEMATICS-I**		
Semester End Examination	**MM:60**	**Min. Marks :24**	**Time Allowed :3 Hrs.**
Internal Assessment	**MM:40**	**Min. Marks :16**	
Internal Assessment Structure – 15 (Quizzes, Seminars, Presentation, Class Performance) + 5 (Attendance) + 20 (Sessional/MSTs)			

INSTRUCTIONS:

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type. which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

Course Objectives: To provide students with skills and knowledge in sequence and series, advanced calculus and calculus of several variables which would enable them to devise solutions for given situations they may encounter in their engineering profession.

UNIT-I

Sequences and Series: Introduction to sequences and Infinite series, Tests for convergence/divergence, Limit comparison test, Ratio test, Root test, Cauchy integral test, Alternating series, Absolute convergence and conditional convergence.

Series Expansions: Power series, Taylor series, Convergence of Taylor series, Error estimates, Term by term differentiation and integration.

UNIT-II

Calculus: Mean value theorem, Rolle's theorem, Lagrange's Cauchy mean value theorem, Application of definite integral to evaluate areas of bounded region, Arc length of a plane curve, volume of solids, surface areas of a solid revolution (Cartesian coordinates), Improper integrals.

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UNIT-III

Partial Differentiation and applications: Functions of several variables, Limits and continuity, Chain rule, change of variables, Partial differentiation of implicit functions, Directional derivatives and its properties, Maxima and minima by using second order derivatives, Lagrange's method of multipliers.

UNIT-IV

Multiple Integrals and applications: Double integral (Cartesian), Change of order of integration in double integral, Polar coordinates, graphing of polar curves, Change of variables (Cartesian to polar), Applications of double integrals to areas and volumes, evaluation of triple integral (Cartesian).

Course Learning Outcomes (CLOs) :

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

1. Examine functions of several variables, define and compute partial derivatives, directional derivatives and their use in finding maxima and minima in some engineering problems.
2. Evaluate multiple integrals in Cartesian and Polar coordinates, and their applications to engineering problems.
3. Determine the convergence/divergence of infinite series, approximation of functions using power and Taylor's series expansion and error estimation.
4. Evaluate surface areas and volumes of revolution in some engineering problems.

Textbooks:

1. Thomas, G.B. and Finney, R.L., Calculus and Analytic Geometry, Pearson Education (2007), 9th ed.
2. Stewart James, Essential Calculus; Thomson Publishers (2007), 6th ed.
3. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics (2003), 2nd ed.

Reference Books:

1. Wider David V, Advanced Calculus: Early Transcendentals, Cengage Learning (2007).
2. Apostol Tom M, Calculus, Vol I and II, John Wiley (2003).
3. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons (2011) 9th Edition.

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COMPUTER PROGRAMMING AND PROBLEM SOLVING(CS-101L)

Course Code	**CS-101L**	**Credits – 03**	**L - 3, T - 0, P - 0**
Name of Course	**COMPUTER PROGRAMMING AND PROBLEM SOLVING**		
Semester End Examination	**MM:60**	**Min. Marks :24**	**Time Allowed :3 Hrs.**
Internal Assessment	**MM:40**	**Min. Marks :16**	
Internal Assessment Structure – 15 (Quizzes, Seminars, Presentation, Class Performance) + 5 (Attendance) + 20 (Sessional/MSTs)			

INSTRUCTIONS:

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type. which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

Course Objectives: This course is designed to explore computing and to show students the art of computer programming. Students will learn some of the design principles for writing good programs.

UNIT-I

Computers Fundamentals: Binary Number System, Computer memory, Computer Software.
Algorithms and Programming Languages: Algorithm, Flowcharts, Generation of Programming Languages.

UNIT-II

C Language: Structure of C Program, Life Cycle of Program from Source code to Executable, Compiling and Executing C Code, Keywords, Identifiers, Primitive Data types in C, variables, constants, input/output statements in C, operators, type conversion and type casting. Conditional branching statements, iterative statements, nested loops, break and continue statements.
Functions: Declaration, Definition, Call and return, Call by value, Call by reference, showcase stack usage with help of debugger, Scope of variables, Storage classes, Recursive functions, Recursion vs. Iteration.

UNIT-III

Arrays, Strings and Pointers: One-dimensional, Two-dimensional and Multi-dimensional arrays, operations on array: traversal, insertion, deletion, merging and searching, Inter- function communication via arrays: passing a row, passing the entire array, matrices. Reading, writing and manipulating Strings, understanding computer memory, accessing via pointers, pointers to arrays, dynamic allocation, drawback of pointers.

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UNIT-IV

Structures and Union: Defining a Structure, declaring a structure variables, Accessing Structure Elements, and Union.

File Handling: Defining and Opening a File, closing a File, reading from a File, Writing into a File.

Course Learning Outcomes (CLOs):

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

1. Comprehend and analyze the concepts of number system, memory, compilation and debugging of the programs in C language.
2. Understanding of the fundamental data types, operators and console I/O functions as an aspect of programs.
3. Design and create programs involving control flow statements, arrays, strings and implement the concept of dynamics of memory allocations.
4. Evaluate and analyze the programming concepts based on user define data types and file handling using C language.

Textbooks:

1. Brian W. Kernighan Dennis M. Ritchie, C Programming Language, 2nd ed, 2012.
2. Balagurusamy G., Programming in ANSI C, 8th ed., 2019

Reference Books:

1. Kanetkar Y., Let Us C, 16th ed.,2017

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BASIC ELECTRICAL ENGINEERING (EE-101L)

Course Code	EE-101L	Credits – 03	L - 3, T - 0, P - 0
Name of Course	BASIC ELECTRICAL ENGINEERING		
Semester End Examination	MM:60	Min. Marks :24	Time Allowed :3 Hrs.
Internal Assessment	MM:40	Min. Marks :16	
Internal Assessment Structure – 15 (Quizzes, Seminars, Presentation, Class Performance) + 5 (Attendance) + 20 (Sessional/MSTs)			

INSTRUCTIONS:

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type. which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed

Course Objectives: To introduce concepts of DC and AC circuits and electromagnetism. To make the students understand the concepts and working of single-phase transformers, DC motor and generators.

UNIT-1

DC Circuits: Kirchhoff's voltage and current laws; power dissipation; Voltage source and current source; Mesh and Nodal analysis; Star-delta transformation; Superposition theorem. Thevenin's theorem; Norton's theorem; Maximum power transfer theorem; Millman's theorem and Reciprocity theorem; Transient response of series RL and RC circuits.

UNIT-II

Steady state analysis of DC Circuits: The ideal capacitor, permittivity; the multi-plate capacitor, variable capacitor; capacitor charging and discharging, current-voltage relationship, time-constant, rise-time, fall-time, inductor energisation and de-energisation, inductance current-voltage relationship, time-constant; Transient response of RL, RC and RLC Circuits.

UNIT-III

AC Circuits: Sinusoidal sources, RC, RL and RLC circuits, Concept of Phasors, Phasor representation of circuit elements, Complex notation representation, Single phase AC Series and parallel circuits, power dissipation in AC circuits, power factor correction, Resonance in series and parallel circuits, Balanced and unbalanced 3-phase circuit - voltage, current and power relations, 3-phase power measurement, Comparison of single phase and three phase supply systems.

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Electromagnetism: Electromagnetic induction, Dot convention, Equivalent inductance, Analysis of Magnetic circuits, AC excitation of magnetic circuit, Iron Losses, Fringing and stacking, applications: solenoids and relays.

UNIT-IV

Single Phase Transformers: Constructional features of transformer, operating principle and applications, equivalent circuit, phasor analysis and calculation of performance indices.

Motors and Generators: DC motor operating principle, construction, energy transfer, speed torque relationship, conversion efficiency, applications, DC generator operating principle, reversal of energy transfer, EMF and speed relationship, applications.

Course Learning Outcomes (CLOs):

After the completion of the course the students will be able to:

1. Apply networks laws and theorems to solve electric circuits.
2. Analyze transient and steady state response of DC circuits.
3. Signify AC quantities through phasor and compute AC system behaviour during steady state.
4. Explain and analyse the behaviour of transformer.
5. Elucidate the principle and characteristics of DC motor and DC generator.

Textbooks:

1. Hughes, E., Smith, I.M., Hiley, J. and Brown, K., Electrical and Electronic Technology, PHI (2008).
2. Nagrath, I.J. and Kothari, D.P., Basic Electrical Engineering, Tata McGraw Hill (2002).
3. Naidu, M.S. and Kamashaiah, S., Introduction to Electrical Engineering, Tata McGraw Hill (2007).

Reference Books:

1. Chakraborti, A., Basic Electrical Engineering, Tata McGraw–Hill (2008).
2. Del Toro, V., Electrical Engineering Fundamentals, Prentice–Hall of India Private Limited (2004)

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APPLIED PHYSICS(PHY-101L)

Course Code	**PHY-101L**	**Credits – 03**	**L - 3, T - 0, P - 0**
Name of Course	**APPLIED PHYSICS**		
Semester End Examination	**MM:60**	**Min. Marks :24**	**Time Allowed :3 Hrs.**
Internal Assessment	**MM:40**	**Min. Marks :16**	
Internal Assessment Structure – 15 (Quizzes, Seminars, Presentation, Class Performance) + 5 (Attendance) + 20 (Sessional/MSTs)			

INSTRUCTIONS:

3. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type. which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

4. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed

Course Objectives: To introduce the students, basic physical laws of oscillations, acoustics of buildings, ultrasonics, electromagnetic waves, optics, quantum mechanics and demonstrate their technological applications. To explore the ideas for the measurement, principles, and their applications to investigate physical phenomena.

Unit-I

Oscillations and Waves: Oscillatory motion and damping, Applications - Electromagnetic damping – eddy current; ***Acoustics***: Reverberation time, absorption coefficient, Sabine's and Eyring's formulae (Qualitative idea), Applications - Designing of hall for speech, concert, and opera; ***Ultrasonics***: Production and Detection of Ultrasonic waves, Applications - green energy, sound signaling, dispersion of fog, remote sensing, Car's airbag sensor.

Unit-II

Electromagnetic Waves: Scalar and vector fields; Gradient, divergence, and curl; Stokes' and Green's theorems; Concept of Displacement current; Maxwell's equations; Electromagnetic wave equations in free space and conducting media, Application - skin depth.

Unit-III

Optics: ***Interference***: Parallel and wedge-shape thin films, Newton rings, Applications as Non-reflecting coatings, Measurement of wavelength and refractive index. ***Diffraction***: Single and Double slit diffraction, and Diffraction grating, Applications - Dispersive and Resolving Powers. ***Polarization***: Production, detection, Applications – Anti-glare automobile headlights, Adjustable tint windows.

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Unit-IV

Quantum Mechanics: Introduction to quantum physics, Black body radiation, Planck's law, Photoelectric effect, Compton effect, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Schrodinger's wave equation, Particle in one dimensional box.

Course Learning Outcomes (CLOs):

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

- Understand the knowledge of fundamentals of oscillation and waves, electromagnetic waves, optics and quantum mechanics enable the students to apply to various systems as per their applications.
- help the students to prepare new objectives and materials for various engineering applications.
- help the students to be exposed to different physical phenomena.

Text Books:

1. R. N. Chaudhuri, Waves and Oscillations, New Age International-Publisher.
2. Ajay Ghatak, Optics, McGraw-Hill-Publisher.
3. B.K. Pandey, S. Chaturvedi, Engineering Physics, Cengage Learning-Publisher.
4. A. Beiser, Concept of Modern Physics, Tata McGraw Hill-Publisher
5. D.J. Griffiths, Introduction to Electrodynamics, Prentice Hall of India-Publisher

Reference Books:

1. M.R. Wehr, J.A. Richards, T.W. Adair, Physics of the Atom, Narosa Publishing House.
2. N.K. Verma, Physics for Engineers, Prentice Hall.
3. Pedrotti, Frank L., Pedrotti, Leno S., and Pedrotti, Leno M., Introduction to Optics, Pearson Prentice Hall.

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TECHNICAL COMMUNICATION SKILLS (HS-111 L)

Course Code	**HS-111L**	**Credits – 03**	**L - 2, T - 0, P - 2**
Name of Course	**TECHNICAL COMMUNICATION SKILLS**		
Semester End Examination	**MM:60**	**Min. Marks :24**	**Time Allowed :3 Hrs.**
Internal Assessment	**MM:40**	**Min. Marks :16**	
Internal Assessment Structure – 15 (Quizzes, Seminars, Presentation, Class Performance) + 5 (Attendance) + 20 (Sessional/MSTs)			

INSTRUCTIONS:

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type. which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed

Course Objective: The primary objective of the course is to develop in the under-graduate students of engineering, a level of competence in English required for independent and effective communication for academic and social needs.

Unit-I

Communication Fundamentals: Analysing Communication; Technical Communication: Objectives and Definitions; Information and Communication Technology (ICT) in Organizations; Levels of Communication, Barriers to Communication, Communication in Professional Context, and Importance of Effective Communication.

Unit-II

Listening Skills: Kinds of Listening, Hearing and Listening, Barriers in Listening, Enhancing Listening Skills.

Speaking Skills: Art of Speaking, Stages of Speaking, Speech Style and Techniques, Types - Extempore, Impromptu, Debate.

Reading Skills: Introduction of Different Kinds of Reading Material: Technical and Non-Technical; Reading Comprehension: Effective Reading Skills, Reading Strategies, Textual Reading of Essays - (i) CEM Joad's "A Dialogue on Civilization," (ii) A G Gardiner's "On Saying Please."

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Writing Skills: Effective Writing Practice; Brevity and Clarity in Writing – Cohesion and Coherence in Writing; Report Writing, Proposals, Writing Minutes, Professional Correspondences - Letter Writing, Job Application Letter, Résumé and CV.

Unit-III

Speech Mechanism: Focus on Organs of Speech, Sound and Speech, Vowels and Consonants, Diphthongs, Speech Process,

Phonetics; Phonology, Phonemes, Stress, Rhythm, Intonation, Morphemes, Register, Style, Cluster, Variety in English; Places and Manners of Articulations.

Developing Speaking Skills: Instructions, Face to Face Communication, Meetings, Public Speaking, Group Discussion, Team Talk, Presentations, Seminars, Conferences, Interviews' Techniques, and Mock Interviews, Conversation - Practice Based on Audio and Visual Aids, Dialogue Delivery, Speech and Debate, Speaking on a Given Topic, Extempore, Words Exercise and Words Games to enhance Self-Expression, and Pronunciation Practices.

Verbal Ability: Verbal Ability focalizes on three levels of Language Viz. World Level, Sentence Level and Paragraph Level.

Non Violent Communication (NVC): Nonviolent Communication (NVC) is an approach to communication based on principles of nonviolence. Nonviolent Communication was developed by clinical psychologist Marshall Rosenberg beginning in the 1960s and 1970s, his book *Nonviolent Communication: A Language of Life* is an authoritative text. The objective is interpersonal harmony and obtaining knowledge for future cooperation. The concepts include rejection of coercive forms of discourse, gathering facts through observing without evaluating, genuinely and concretely expressing feelings and needs, and formulating effective and empathetic requests. Nonviolent communication is used both as a clinical psychotherapy modality and as a self-help technique, particularly to seek harmony in relationships and at workplaces. Nonviolent communication holds that most conflicts between individuals or groups arise from miscommunication about their human needs, due to coercive or manipulative language that aims to induce fear, guilt, shame, etc. These "violent" modes of communication, when used during a conflict, divert the attention of the participants away from clarifying their needs, their feelings, their perceptions, and their requests, thus perpetuating the conflict.

Components: There are four components to practice nonviolent communication: Observation, Feelings, Needs and Requests.

Modes: There are three primary modes of application of NVC: Self Empathy, Receiving Empathically and Expressing Honestly.

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Unit-IV

Remedial Grammar: Parts of Speech, Determiners, Modals, Tenses -Verb Agreement, Active and Passive Voice, Direct and Indirect Speech, Transformation of Sentences, Sentence Structure, Finding Common Errors.

Vocabulary Building: Synonyms, Antonyms, One Word Substitution, Word Formation, Idioms and Phrases, Homophones, Prefix, Suffix and Vocabulary Usage.

Textbooks:

Bansal, R. K. and J B Harrison. Spoken English: A Manual of Speech and Phonetics. Orient BlackSwan, 2013.

Green, David. Contemporary English Grammar Structures and Composition. Macmillan Publishers India Limited, 2013.

Sharma, Sangeeta and Binod Mishra. Communication Skills for Engineers and Scientists. Prentice-Hall of India Pvt.Ltd, 2009, Sixth Reprint 2015.

Kumar, Sanjay & Pushp Lata. Communication Skills. New Delhi: OUP, 2016.

Additional Books:

Allen, W. S. Living English Speech. Orient Longman, 1984.

Wallace, H. R. and Masters, L. A. Personality Development for Work. South-Western Educational Publication, 1996.

Carnegie, D. and Napoleon Hill. Public Speaking & Pleasing Personality. BN Publishing, 2006.

Balasubramanian, T. A Textbook of English *Phonetics* for Indian Students. MacMillan, 2000.

Mohan, Krishna and Meera Banerji. Developing Communication Skills. MacMillan, 2013.

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ENERGY AND ENVIRONMENT SCIENCE (EVS-101L)

Course Code	EVS-101L	Credits – 03	L - 3, T - 0, P - 0
Name of Course	ENERGY AND ENVIRONMENT SCIENCE		
Semester End Examination	MM:60	Min. Marks :24	Time Allowed :3 Hrs.
Internal Assessment	MM:40	Min. Marks :16	
Internal Assessment Structure – 15 (Quizzes, Seminars, Presentation, Class Performance) + 5 (Attendance) + 20 (Sessional/MSTs)			

INSTRUCTIONS:

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type. which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed

Course Objectives: The exposure to this course would facilitate the students inunderstanding the terms, definitions and scope of environmental and energy issues pertaining to current global scenario; understanding the value of regional and global natural and energy resources; and emphasize on need for conservation of energy and environment.

UNIT-I

Introduction: Natural Resources & amp; its types, Concept of sustainability and sustainable use of natural resources, Pollution based environmental issues and case-studies.

Conventions on Climate Change: Origin of Conference of Parties (COPs), United Nations Framework Convention on Climate Change (UNFCCC) and Intergovernmental Panel on Climate Change (IPCC); Kyoto Protocol, instruments of protocol – CDM, JI and IET; Montreal Action Plan; Paris Agreement and post-Paris scenario.

UNIT-II

Air Pollution: Origin, Sources and effects of air pollution; Primary and secondary meteorological parameters; Wind roses; Atmospheric Stability; Inversion; Plume behavior; Management of air pollution: Source reduction and Air Pollution Control Devices for particulates and gaseous pollutants in stationary and mobile sources.

Water Pollution: Origin, Sources of water pollution, Category of water pollutants, Physico-Chemical characteristics, Components of wastewater treatment systems, Advanced treatment technologies.

Solid Waste Management: Introduction to solid waste management, Sources, characteristicsof municipal and industrial solid waste, Solid waste management (Chemicals

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and Biological Methods): Incineration, composting, Biomethanation, landfill, E-waste management, Movements of Hazardous Waste management (Basal convention).

UNIT-III

Energy Resources: Classification of Energy Resources; Conventional energy, resources-Coal, petroleum and natural gas, nuclear energy, hydroelectric power; Non-conventional energy resources – Biomass energy, Thermo-chemical conversion and biochemical conversion route; Generation of Biogas and biodiesel as fuels; Solar energy-active and passive solar energy absorption systems; Type of collectors; Thermal and photo conversion applications; Wind energy, Electric Vehicles System (Introduction and Revolution of Batteries), Introduction to Hydrogen Economy.

UNIT-IV

Facilitated through Online Platforms:

Ecology and Environment: Concept of an ecosystem; structural and functional units of an ecosystem; Food Chain, Food Web, Trophic Structures and Pyramids; Energy flow; Ecological Succession; Types, Characteristics, Biodiversity, Biopiracy.

Human population & Their Environment : Population Growth , Variation Among nations ,: Population Explosion : Family welfare Programmes , Environment & human Health

Human Rights; Value Education; Women and Child Welfare; Role of Information Technology in Environment and Human Health, Environmental Ethics.

Course Learning Outcomes :

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

Comprehend the interdisciplinary context with reference to the environmental issues and case studies.

Assess the impact of anthropogenic activities on the various elements of environment and apply suitable techniques to mitigate their impact.

Conceptualize and explain the structural and functional features of ecological systems.

Correlate environmental concerns with the conventional energy sources associated and assess the uses and limitations of non-conventional energy technologies.

Recommended Books:

Moaveni, S., Energy, Environment and Sustainability, Cengage (2018)

Down to Earth, Environment Reader for Universities, CSE Publication (2018)

Chapman, J.L. and Reiss, M.J., Ecology - Principles and Application, Cambridge University Press (LPE) (1999).

Eastop, T.P. and Croft, D.R., Energy Efficiency for Engineers and Technologists, Longman and Harow (2006).

O'Callagan, P.W., Energy Management, McGraw Hill Book Co. Ltd. (1993).

Peavy H.S. and Rowe D.R. Environmental Engineering, McGraw Hill (2013).

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Applied Physics Lab (PHY-101P)

Course Code	PHY-101P	Credits – 01	L - 0, T - 0, P - 2
Name of Course	Applied Physics Lab		
Practical Internal Assessment	MM:30	Min. Marks :12	Total: 50 Marks
Practical External Assessment	MM:20	Min. Marks :8	

Course Objectives: To introduce the students, basic physical laws of oscillations, acoustics of buildings, ultrasonics, electromagnetic waves, optics, quantum mechanics and demonstrate their technological applications. To explore the ideas for the measurement, principles, and their applications to investigate physical phenomena.

Laboratory Work:

1. Characteristics of P-N junction diode.
2. Characteristics of solar cell.
3. Characteristics of light emitting diode.
4. Hall co-efficient of a given Semiconductor.
5. Wavelength of He-Ne laser using transmission diffraction grating.
6. Wavelength of sodium light using spectrometer/diffraction grating.
7. Planck's constant using photocell/stopping potential
8. Study of B-H Curve
9. Ionization potential of Mercury.
10. Study of Malus' Law in polarization.

Note: Students are required to perform at least Eight experiments. Other experiments may also be included at Institutional/Departmental level if equipment's are available.

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Computer Programming Lab (CS-101P)

Course Code	CS-101P	Credits – 01	L - 0, T - 0, P - 2
Name of Course	Computer Programming Lab		
Practical Internal Assessment	MM:30	Min. Marks :12	Total: 50 Marks
Practical External Assessment	MM:20	Min. Marks :8	

Course Objectives: This course is designed to explore computing and to show students the art of computer programming. Students will learn some of the design principles for writing good programs.

Laboratory/ Practical's:
To implement Programs for various kinds of programming constructs in C Language.

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Electrical Engineering Lab (EE-101P)

Course Code	EE-101P	Credits – 01	L - 0, T - 0, P - 2
Name of Course	Electrical Engineering Lab		
Practical Internal Assessment	MM:30	Min. Marks :12	Total: 50 Marks
Practical External Assessment	MM:20	Min. Marks :8	

Course Objectives: To introduce concepts of DC and AC circuits and electromagnetism. To make the students understand the concepts and working of single-phase transformers, DC motor and generators.

Laboratory Works:

1. To verify KVL and KCL
2. Verification of Superposition and Thevenin Theorem
3. Verification of Maximum Power and Norton Theorem
4. Transient analysis of RL an RC series circuits
5. To study LCR series circuit.
6. To study LCR parallel circuit.
7. Power Consumption of a Fluorescent Lamp
8. Measurement of efficiency of a single-phase transformer by load test.
9. Study of a single-phase energy meter.

Note: Students are required to perform at least Eight experiments. Other experiments may also be included at Institutional/Departmental level if equipment's are available.

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B.Tech. COMPUTER SCIENCE & ENGINEERING

SEMESTER-II

APPLIED MATHEMATICS-II (MA-201L)

Course Code	**MA-201L**	**Credits – 04**	**L - 3, T - 1, P - 0**
Name of Course	**APPLIED MATHEMATICS-II**		
Semester End Examination	**MM:60**	**Min. Marks :24**	**Time Allowed :3 Hrs.**
Internal Assessment	**MM:40**	**Min. Marks :16**	
Internal Assessment Structure – 15 (Quizzes, Seminars, Presentation, Class Performance) + 5 (Attendance) + 20 (Sessional/MSTs)			

INSTRUCTIONS:

3. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type. which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

4. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed

Course Objectives: To introduce students the theory and concepts of differential equations, linear algebra, Laplace transformations and Fourier series which will equip them with adequate knowledge of mathematics to formulate and solve problems analytically.

UNIT-I

Linear Algebra: Row reduced echelon form, Solution of system of linear equations, Matrix inversion, Linear spaces, Subspaces, Basis and dimension, Linear transformation and its matrix representation, Eigenvalues, Eigenvectors and Diagonalisation, Inner product spaces and Gram-Schmidt orthogonalization process.

UNIT-II

Ordinary Differential Equations: Review of first order differential equations, Exact differential equations, Second and higher order differential equations, Solution techniques using one known solution, Cauchy - Euler equation, Method of undetermined coefficients, Variation of parameters method, Engineering applications of differential equations.

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UNIT-III

Laplace Transform: Definition and existence of Laplace transforms and its inverse, Properties of the Laplace transforms, Unit step function, Impulse function, Applications to solve initial and boundary value problems.

UNIT-IV

Fourier Series: Introduction, Fourier series on arbitrary intervals, Half range expansions, Complex Fourier series, Harmonic analysis.

Course learning outcome (CLO) :

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

1. Solve the differential equations of first and second order and basic application problems described by these equations.
2. Find the Laplace transformations and inverse Laplace transformations for various functions. Using the concept of Laplace transform students will be able to solve the initial value and boundary value problems.
3. Solve systems of linear equations by using elementary row operations.
4. Identify the vector spaces/subspaces and to compute their bases / orthonormal bases. Further, students will be able to express linear transformation in terms of matrix and find the Eigen values and Eigen vectors.

Textbooks:

1. Simmons, G.F., Differential Equations (With Applications and Historical Notes), Tata McGraw Hill (2009).
2. Krishnamurthy, V.K., Mainra, V.P. and Arora, J.L., An introduction to Linear Algebra, Affiliated East West Press (1976).
3. Seymour Lipschutz, Marc Lipson, Schaum's Outline of Linear Algebra, 3rd ed.

Reference Books:

1. Kreyszig Erwin, Advanced Engineering Mathematics, John Wiley (2006), 8th ed.
2. Jain, R.K. and Iyenger, S.R.K., Advanced Engineering Mathematics, Narosa

Publishing House (2011), 11th ed

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APPLIED CHEMISTRY(CHM-201L)

Course Code	**CHM-201L**	**Credits – 03**	**L - 3, T - 0, P - 0**
Name of Course	**APPLIED CHEMISTRY**		
Semester End Examination	**MM:60**	**Min. Marks :24**	**Time Allowed :3 Hrs.**
Internal Assessment	**MM:40**	**Min. Marks :16**	
Internal Assessment Structure – 15 (Quizzes, Seminars, Presentation, Class Performance) + 5 (Attendance) + 20 (Sessional/MSTs)			

INSTRUCTIONS:

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type. which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed

Course Objectives: The course aims at elucidating principles of applied chemistry in industrial systems, water treatment, engineering materials and analytical techniques.

UNIT-I

Electrochemistry: Specific, equivalent and molar conductivity of electrolytic solutions, migration of ions, transference number and its determination by Hittorf's method, conductometric titrations, types of electrodes, concentration cells, liquid junction potential. **Fuels:** Classification of fuels, calorific value, cetane and octane number, fuel quality, comparison of solid liquid and gaseous fuels, properties of fuel, alternative fuels: biofuels, power alcohol, synthetic petrol.

UNIT-II

Water Treatment and Environment: Hardness and alkalinity of water, units and determination, external and internal methods of softening of water, domestic water treatment, Waste water and its treatment, BOD and COD, Greenhouse effect and global warming, Carbon credit.

UNIT-III – Engineering Materials

Nano Materials: Introduction, Preparation, Properties of nanomaterials, Graphene, Graphite, Fullerenes, Carbonnano-tubes, nano-wires, nano-cones, Application of nano-materials, **Polymers:** Introduction to polymers, types of polymerization, molecular weight determination, tacticity of polymers, catalysis in polymerization, conducting, biodegradable and inorganic polymers.

UNIT-IV- Spectroscopy Techniques:

Introduction to spectroscopy, atomic and molecular spectroscopy, Beer-Lambert`s Law, UV-Visible, IR and NMR spectroscopic techniques - Principle, instrumentation and applications.

Course Learning Outcomes (CLOs) :

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The students will be able to reflect on:

1. Concepts of electrodes in electrochemical cells, migration of ions, liquid junction potential and conductometric titrations.
2. Atomic and molecular spectroscopy fundamentals – Beer's Law and its application, Basic principle, instrumentation, and application of UV – Vis, IR and NMR technique.
3. Water treatment methods specifically in domestic and industrial applications and environment.
4. Laboratory techniques like pH metry, potentiometry, colourimetry, conductometry and volumetry.

Textbooks:

1. Ramesh, S. and Vairam S. Engineering Chemistry, Wiley India (2012) 1st Ed.
2. Puri, B.R, Sharma, l.R, and Pathania, M.S. Principles of physical Chemistry, Vishal Publishing Co. (2008)
3. Agarwal's. Engineering Chemistry : Fundamentals and applications, Cambridge University press(2015).

Reference Books:

1. Brown, H, Chemistry for Engineering students, Thompson,1st ed.
2. Sivasankar, B., Engineering Chemistry, Tata McGraw-HillPub. Co. Ltd, New Delhi(2008)
3. Shulz, M.J. Engineering Chemistry, Cengage Learning (2007) 1st ed.

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BASIC ELECTRONICS ENGINEERING (EC-201L)

Course Code	**EC-201L**	**Credits – 03**	**L - 3, T - 0, P - 0**
Name of Course	**BASIC ELECTRONICS ENGINEERING**		
Semester End Examination	**MM:60**	**Min. Marks :24**	**Time Allowed :3 Hrs.**
Internal Assessment	**MM:40**	**Min. Marks :16**	
Internal Assessment Structure – 15 (Quizzes, Seminars, Presentation, Class Performance) + 5 (Attendance) + 20 (Sessional/MSTs)			

INSTRUCTIONS:

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type. which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed

Course Objectives: To enhance comprehension capabilities of students through understanding of electronic devices, various logic gates, SOP, POS, and their minimization techniques, various logic families and information on different IC's and working of combinational circuits and their applications.

UNIT-1

Semiconductor Devices: p-n junction diode: Ideal diode, V-I characteristics of diode, Diode small signal model, Diode switching characteristics, Zener diode.

UNIT-2

Electronics Devices and Circuits: PN Diode as a rectifier, Clipper and clamper, Operation of Bipolar Junction Transistor and Transistor Biasing, CB, CE, CC (Relationship between α, β, γ) circuit configuration Input-output characteristics, Transistor as a switch, as an Amplifier and its frequency Response, Introduction to Field Effect Transistor and its characteristics, N and P channel MOS transistors, CMOS inverter, NAND and NOR gates, General CMOS Logic, TTL and CMOS logic families.

UNIT-3

Operational Amplifier Circuits: The ideal operational amplifier, The inverting, noninverting amplifiers, Op-Amp Characteristics, Applications of Op-amp.

Combinational and Sequential Logic: Code converters, multiplexors, decoders, Addition circuits and priority encoder, Master-slave and edge-triggered flip-flops, Synchronous and Asynchronous counters, Registers, IEEE Representation of Digital ICs.

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UNIT-4

Digital Systems and Binary Numbers: Introduction to Digital signals and systems, Number systems, Positive and negative representation of numbers, Binary arithmetic, Definitions and basic theorems of Boolean Algebra, Algebraic simplification, Sum of products and product of sums formulations (SOP and POS), Gate primitives, AND, OR, NOT and Universal Gate, Minimization of logic functions, Karnaugh Maps.

Course Learning Outcomes (CLOs) / Course Objectives (COs):

The student will be able to:

1. Demonstrate the use of semiconductor diodes in various applications.
2. Discuss and explain the working of transistors and operational Amplifiers, their configurations and applications.
3. Recognize and apply the number systems and Boolean algebra.
4. Reduce Boolean expressions and implement them with Logic Gates.
5. Analyze, design and implement combinational and sequential circuits.

Textbooks:

1. Boylestad, R. L. and Nashelsky, L., Electronic Devices & Circuit Theory, Pearson (2009).
2. M. M. Mano and M. D. Ciletti, Digital Design, Pearson, Prentice Hall, 2013.

Reference Books:

1. Milliman, J. and Halkias, C. C., Electronic Devices and Circuits, Tata McGraw Hill, 2007.
2. Donald D Givone, Digital Principles and Design, McGraw-Hill, 2003.
3. John F Wakerly, Digital Design: Principles and Practices, Pearson, (2000).
4. N Storey, Electronics: A Systems Approach, Pearson, Prentice Hall, (2009).

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Holistic Health & Yoga (HS-116L)

Course Code	HS-116L	Credits – 03	L - 2, T - 0, P - 2
Name of Course	Holistic Health & Yoga		
Semester End Examination	MM:60	Min. Marks :24	Time Allowed :3 Hrs.
Internal Assessment	MM:40	Min. Marks :16	
Internal Assessment Structure – 15 (Quizzes, Seminars, Presentation, Class Performance) + 5 (Attendance) + 20 (Sessional/MSTs)			

INSTRUCTIONS:

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type. which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed

Course Objectives:

1. To promote health in it's all aspects physical, mental, emotional, spiritual, social through yoga.
2. To inculcate moral values in students.
3. To bring awareness about health in society
4. To educate students about different practices of yoga and their techniques in systematic manner.

Course Outcomes:

The Successful completion of this course shall enable the student to :

CO1: Understand the Ancient Indian Yogic concept and meaning of Yoga.
CO2: Learn various yogic techniques.
CO3: Attain physical, mental, and spiritual fitness.
CO4: Enhance concentration, mental peace, and realization of inner self.
CO5: Inculcate human values through yoga.

Course Introduction:

Theory: Introduction of Yoga, Different Definitions of Yoga. General Guidelines for Yogic Practices.
Traditional Schools of Yoga: (Bhakti yoga, karma yoga, Gyana yoga, Hatha yoga, Mantra yoga, Laya yoga, Raja yoga)
Ashtanga Yoga of Sage Patanjali.
Concept of Shatkriyas: Dhauti, Basti, Neti, Nauli, Trataka and Kapalbhati.
Concept of Surya namaskar: Introduction, Technique, benefit, precaution. (As per Syllabus)
Concept of Asanas: Introduction, Types, Technique, benefit, precaution. (As per Syllabus)
Concept of Pranayama: Introduction, Types, Technique, benefit, precaution.(As per Syllabus)
Meditation: Concept, technique, benefit, and precaution.

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Practical:
Practical: Shatkriyas (Cleansing Process): Jala neti, Sutra neti. Kunjala, Vastra Dhauti, Danda Dhauti, kapalbhati, Surya namaskar.
Asanas:
1. Standing Poses: Tadasana, Kati chakrasana, tiryak tadasana, vrikshasana, veer bhadrasana, garudasana, trikonsana,
2. **Sitting Poses:** Padmasana, Swastikasana, Vajrasana, Bhadrasana, Gomukhasana, Mandukasana, Singhasana.

Lying Down Poses:
Spine Position: uttanpadasana, Pawan muktasana, Naukasana, markatasana, halasana, sarvangasana, matsyasana, setubandhasana, chakarasana and shavasana.
Prone Position: Bhujangasana, Shalabhasana, Dhanurasana, Vipreet naukasana
Dhyana: Sthoola Dhyana, Jyoti Dhyana, Sukshama Dhyana, (According to Gheranda Samhita).
Mantra Chanting- Omkar (Pranav Jaap), Gayatri Mantra, Maha Mrityunjaya Mantra, Shanti Mantra.

Readings:

- BKS Iyengar (2012), Light on Yoga
- I.V Basvaraddi & S.P.Pathak (2016), Yogic Suksham Vyayam Evem Sthula Vyayam
- Swami Satyananda Saraswati (2012), Asana Pranayama Mudra Bandha

able to make out how these courses can be made appropriate and holistic.

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OBJECT ORIENTED PROGRAMMING(CS-201L)

Course Code	**CS-201L**	**Credits – 03**	**L - 3, T - 0, P - 0**
Name of Course	**OBJECT ORIENTED PROGRAMMING**		
Semester End Examination	**MM:60**	**Min. Marks :24**	**Time Allowed :3 Hrs.**
Internal Assessment	**MM:40**	**Min. Marks :16**	
Internal Assessment Structure – 15 (Quizzes, Seminars, Presentation, Class Performance) + 5 (Attendance) + 20 (Sessional/MSTs)			

INSTRUCTIONS:

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type. which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed

Course Objectives: To become familiar with object-oriented programming concepts and be able to apply these concepts in solving diverse range of applications.

UNIT-I

Objects and Classes: Structure in C and C++, Class specification, Objects, Data hiding, Encapsulation and abstraction, namespaces, Array of objects, Passing objects as arguments, Returning object from a function, inline functions, Static data member and member function, 'const' member function.

Constructor and Destructor: Constructors, Parameterized Constructors, Constructor Overloading, Constructors in array of objects, Constructors with default arguments, Dynamic Initialization, Pointer to objects, this pointer, Dynamic memory allocation, Array of pointer to objects, Copy Constructor, Static objects, Friend function, and Friend classes.

UNIT-II

Operator Overloading and Type Conversion: Syntax of operator overloading, Overloading Unary operator and Binary operator, Overloading arithmetic operator, relational operator, Overloading Unary operator and Binary operator using friend function, Data conversion, Overloading some special operators like (), [].

UNIT-III

Inheritance: Derived Class declaration, Public, Private and Protected Inheritance, friend function and Inheritance, Overriding member function, Forms of inheritance, virtual base class, Abstract class, Constructor and Inheritance, Destructor and Inheritance, Advantage and disadvantage of Inheritance.

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Polymorphism: Classification of Polymorphism, Compile time and Run time Polymorphism, Pointers to derived class object, Virtual functions, Pure virtual functions.
File handling: Formatted I/O, Hierarchy of file stream classes, Opening and closing a file, Working with multiple files, file modes, file pointers, Text vs. Binary Files.

UNIT-IV
Templates: Need of template, Function templates, Function template with non-type parameter, Overloading function templates, Class templates, Class template with non-type parameter.
Exception Handling: Exception handling mechanism, Multiple Catch Blocks, Catch All exceptions, Throw an exception, Exception Specification.
Standard Template Library: Fundamental idea about string, iterators, hashes and other types, The String and Vector classes vs. C-style pointers.

Course Learning Outcomes (CLOs) / Course Objectives (COs):
On completion of this course, the students will be able to:
1. Understand the basic concept of Classes, objects and Object Orientation, with basic layout of an object-oriented program.
2. Comprehend the concept of constructors and destructors.
3. Demonstrate the prime concepts viz. overloading, polymorphism, abstraction and Inheritance of an object-oriented paradigm.
4. Grasp the File handling concepts and be able to use files.
5. Use template and Exception handling in an object-oriented programming.

Textbooks:
1. Schildt H., C++: The Complete Reference, Tata McGraw Hill (2003) 4th ed.
2. Lippman B. S., Lajoie J., and Moo E. B., C++ Primer, Addison-Wesley Professional (2013) 5th ed.
Reference books:
1. Lafore R., Object-Oriented Programming in C++, Pearson Education (2002) 4th ed.
2. E. Balagurusamy, Object Oriented Programming with C++ (2017) 7th ed.
3. Stroustrup B., The C++ programming language, Pearson Education India (2013) 4th ed.

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Universal Human Values for Holistic, Value -based Education (HS-115L)

Course Code	**HS-115L**	**Credits – 03**	**L - 2, T - 1, P - 0**
Name of Course	**Universal Human Values for Holistic, Value -based Education**		
Semester End Examination	**MM:60**	**Min. Marks :24**	**Time Allowed :3 Hrs.**
Internal Assessment	**MM:40**	**Min. Marks :16**	
Internal Assessment Structure – 15 (Quizzes, Seminars, Presentation, Class Performance) + 5 (Attendance) + 20 (Sessional/MSTs)			

INSTRUCTIONS:

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type. which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed

COURSES ON HUMAN VALUES

During the Induction Program, students would get an initial exposure to human values through Universal Human Values for Holistic, Value -based Education. This exposure is to be augmented by this compulsory full semester foundation course.

Objectives of UHV-II Course

This introductory course input is intended:

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value- based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Thus, this course is intended to provide a much-needed orientational input in value education to the young enquiring minds.

Salient Features of the Course

The salient features of this course are:

1. It presents a universal approach to value education by developing the right understanding of reality (i.e. a worldview of the reality "as it is") through the process of self-exploration.
2. The whole course is presented in the form of a dialogue whereby a set of proposals about various aspects of the reality are presented and the students are encouraged to self-explore the proposals by verifying them on the basis of their natural acceptance within oneself and validate experientially in living.

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3. The prime focus throughout the course is toward affecting a qualitative transformation in the life of the student rather than just a transfer of information.
4. While introducing the holistic worldview and its implications, a critical appraisal of the prevailing notions is also made to enable the students discern the difference on their own right.

UNIT-1 – Introduction to Value Education (6 lectures and 3 tutorials for practice session)

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Lecture 2: Understanding Value Education
Tutorial 1: Practice Session PS1 Sharing about Oneself
Lecture 3: Self-exploration as the Process for Value Education
Lecture 4: Continuous Happiness and Prosperity – the Basic Human Aspirations
Tutorial 2: Practice Session PS2 Exploring Human Consciousness
Lecture 5: Happiness and Prosperity – Current Scenario Lecture 6: Method to Fulfil the Basic **Human Aspirations Tutorial 3:** Practice Session PS3 Exploring Natural Acceptance

UNIT-2 – Harmony in the Human Being (6 lectures and 3 tutorials for practice session)
Lecture 7: Understanding Human being as the Co-existence of the Self and the Body
Lecture 8: Distinguishing between the Needs of the Self and the Body
Tutorial 4: Practice Session PS4 Exploring the difference of Needs of Self and Body
Lecture 9: The Body as an Instrument of the Self
Lecture 10: Understanding Harmony in the Self
Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the Self
Lecture 11: Harmony of the Self with the Body
Lecture 12: Programme to ensure self-regulation and Health
Tutorial 6: Practice Session PS6 Exploring Harmony of Self with the Body

UNIT-3 – Harmony in the Family and Society (6 lectures and 3 tutorials for practice session)
Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction
Lecture 14: 'Trust' – the Foundational Value in Relationship Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust Lecture 15: 'Respect' – as the Right Evaluation
Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect Lecture 16: Other Feelings, Justice in Human-to-Human Relationship Lecture 17: Understanding Harmony in the Society
Lecture 18: Vision for the Universal Human Order
Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

UNIT-4 – Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)
Lecture 19: Understanding Harmony in the Nature
Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature
Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature
Lecture 21: Realizing Existence as Co-existence at All Levels
Lecture 22: The Holistic Perception of Harmony in Existence
Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence

Reference Books :
1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).

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4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – Pandit Sunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

OUTCOME OF THE COURSE:

By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Therefore, the course and further follow up is expected to positively impact common graduate attributes like:

1. Holistic vision of life
2. Socially responsible behaviour
3. Environmentally responsible work
4. Ethical human conduct
5. Having Competence and Capabilities for Maintaining Health and Hygiene
6. Appreciation and aspiration for excellence (merit) and gratitude for all

This is only an introductory foundational input. It would be desirable to follow it up by

a) Faculty-student or mentor-mentee programs throughout their time with the institution

b) Higher level courses on human values in every aspect of living.

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Applied Chemistry Lab (CHM-201P)

Course Code	CHM-201P	Credits – 01	L - 0, T - 0, P - 2
Name of Course	Applied Chemistry Lab		
Practical Internal Assessment	MM:30	Min. Marks :12	Total: 50 Marks
Practical External Assessment	MM:20	Min. Marks :8	

Course Objectives: The course aims at elucidating principles of applied chemistry in industrial systems, water treatment, engineering materials and analytical techniques.

Laboratory Work:

- Electrochemical measurements: Experiments involving use of pH meter, conductivity meter.
- Water Chemistry: Determination of hardness, alkalinity, DO, free chlorine, Chlorides, chromium, iron and copper in aqueous medium
- Properties of Liquids: Determination of Viscosity, Surface Tension
- Spectrophotometry: UV-Vis spectrophotometer related experiments
- Fuel's: Proximate Analysis of Coal
- Polymers: Preparation of Phenol/Urea-formaldehyde resins/ Biodegradable and conducting polymer
- Nanomaterials: Synthesis of nanoparticles of Au/Ag/NiO/ZnO/Iron Oxide.

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Object Oriented Programming Lab (CS-201P)

Course Code	**CHM-201P**	**Credits – 01**	**L - 0, T - 0, P - 2**
Name of Course	**Object Oriented Programming Lab**		
Practical Internal Assessment	**MM:30**	**Min. Marks :12**	**Total: 50 Marks**
Practical External Assessment	**MM:20**	**Min. Marks :8**	

Course Objectives: To become familiar with object-oriented programming concepts and be able to apply these concepts in solving diverse range of applications.

Laboratory work:
To implement Programs for various kinds of programming constructs in C++ Language.

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Basic of Electronic Engineering Lab (EC-201P)

Course Code	**EC-201P**	**Credits – 01**	**L - 0, T - 0, P - 2**
Name of Course	**Basic of Electronic Engineering Lab**		
Practical Internal Assessment	**MM:30**	**Min. Marks :12**	**Total: 50 Marks**
Practical External Assessment	**MM:20**	**Min. Marks :8**	

Course Objectives: To enhance comprehension capabilities of students through understanding of electronic devices, various logic gates, SOP, POS, and their minimization techniques, various logic families and information on different IC's and working of combinational circuits and their applications.

Laboratory Work:
Familiarization with CRO, DSO and Electronic Components, Diodes characteristics - Input-Output and Switching, BJT and MOSFET Characteristics, Zener diode as voltage regulator, Rectifiers, Clippers and Clampers, adder circuit implementation, Multiplexer & its application, Latches/Flip-flops, up/down counters.

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