

INDIRA GANDHI INSTITUTE OF TECHNOLOGY, SARANG

Course Structure for 2nd Year B.Tech COMPUTER SCIENCE & ENGINEERING
(Admission Batch: 2018-19 Onwards)

Third Semester				Fourth Semester			
Theory				Theory			
Course Code	Course Name	L-T-P (Periods/ Week)	Credits	Course Code	Course Name	L-T-P (Periods/ Week)	Credits
HSHM3203/ HSHM3204	Engineering Economics/ Organizational Behaviour	3-0-0	3	HSHM3204/ HSHM3203	Organizational Behaviour/ Engineering Economics	3-0-0	3
BSMA1208	Applied Mathematics	3-1-0	3		Programme Core Subject		
				PCCS4203	Object Oriented Programming using JAVA	3-0-0	3
ESEC2213	Analog Electronic Circuits	3-0-0	3	PCCS4204	Formal Language and Automata Theory	3-0-0	3
	Programme Core Subject			PCCS4205	Database Management System	3-0-0	3
PCCS4201	Data Structure Using C++	3-0-0	3	(Any One)	Open Elective I Refer List of Open Electives	3-0-0	3
PCCS4202	Digital Logic Design	3-0-0	3		Mandatory Course IV	2-0-0	0
	Mandatory Course III	2-0-0	0				
MCHM9203/ MCHM9204	Constitution of India/ Essence of Indian Traditional Knowledge			MCHM9204/ MCHM9203	Essence of Indian Traditional Knowledge/ Constitution of India		
	Total (Theory)	18	15		Total (Theory)	17	15
	Honours/ Minor	3-1-0	4		Honours/ Minor	3-1-0	4
HNCS0201	Software Engineering			HNCS0202	Software Testing and Methodology		
MNCS0201	OOPs using C++			MNCS0202	OOPs using JAVA		
	Practical/ Sessional				Practical/ Sessional		
PCCS7201	Data Structure Using C++ Lab	0-0-3	2	PCCS7203	Java Programming Lab	0-0-3	2
				PCCS7204	Database Management System Lab	0-0-3	2
					(Any One)		
PCCS7202	Digital Logic Design Lab	0-0-3	2	PECS7201/ PECS7202/ PECS7203	Python Programming/ C#/ Android programming	0-0-3	2
	Total (Practical/ Sessional)	6	4		Total (Practical/ Sessional)	9	6
	TOTAL	24	19		TOTAL	26	21
TOTAL SEMESTER CREDITS: 19				TOTAL SEMESTER CREDITS: 21			
TOTAL CUMULATIVE CREDITS: 62				TOTAL CUMULATIVE CREDITS: 83			

OPEN ELECTIVE SUBJECTS**OPEN ELECTIVE-I (OE-I) 4th Semester**

Sl. No.	Subject Code	Subject Name	Contact Hours	Credits	Departments to Teach the Subject	Students to whom Option is Open
1	OECH6201	Polymer Technology	3-0-0	3	Chemical Engg.	All branches
2	OECH6210	Basics of Autocad-Chemcad-Aspen Plus	3-0-0	3	Chemical Engg.	All branches
3	OECE6202	Sustainable Construction Method	3-0-0	3	Civil Engg.	All branches
4	OECS6203	OOPs Using C++	3-0-0	3	CSE	CE, EE, ME
5	OEEE6204	Signals and Systems	3-0-0	3	Electrical Engg.	All branches except ETC
6	OEEC6205	Python for Engineers	3-0-0	3	ETC Engg, CSE	All branches
7	OEME6206	Safety Engineering	3-0-0	3	Mech. Engg, Prod. Engg.	All branches
8	OEMA6207	Numerical Methods	3-0-0	3	Mathematics	CH, CS, EC, MM, PD
9	OEMA6208	Discrete Mathematics	3-0-0	3	Mathematics	CSE
10	OEMT6209	Composite Materials	3-0-0	3	MME, Prod. Engg	All branches

CE: Civil Engineering

CS, CSE: Computer Science and Engineering

EE: Electrical Engineering

EC, ETC: Electronics and Telecommunication Engineering

ME: Mechanical Engineering

MT, MME: Metallurgical and Materials Engineering

CH: Chemical Engineering

PD, Prod.: Production Engineering

HM: Humanities

MA: Mathematics

INDIRA GANDHI INSTITUTE OF TECHNOLOGY, SARANG
B.TECH SYLLABUS for COMPUTER SCIENCE & ENGINEERING
 (Admission Batch: 2018-19 Onwards)
3rd Semester

HSHM3203	ENGINEERING ECONOMICS	3-0-0	Credit-3
<p>Course objective:</p> <ol style="list-style-type: none"> 1. Prepare engineering students to analyze cost/revenue data and carryout make economic analyses in the decision making process to justify or reject alternatives/projects on an economic basis. 2. Prepare engineering students to function in the business side of professional engineering practice. 3. To enhance the decision making capacity of the engineering students by understanding the economics theories 			
<p>Module I (10 hours)</p> <p>Engineering Economics- Nature, Scope, Basic problems of an economy, Micro Economics and Macro Economics. Demand- Meaning of demand, Demand function, Law of Demand and its exceptions, Determinants of demand, Elasticity of demand & its measurement (Simple numerical problems to be solved), Supply-Meaning of supply, Law of supply and its exception, Determinants of supply, Elasticity of supply, Determination of market equilibrium(Simple numerical problems to be solved).National Income-Definition, Concepts of national income, Method of measuring national income.</p>			
<p>Module II (8 hours)</p> <p>Production-Production function, Laws of returns: Law of variable proportion, Law of returns to scale, Cost and revenue concepts, Banking -Commercial bank, Functions of commercial bank, Central bank, Functions of Central Bank, An overview of financial system of India.</p>			
<p>Module III (8 hours)</p> <p>Basic understanding of different market structures, Determination of equilibrium price under perfect competition (Simple numerical problems to be solved), Break Even Analysis-linear approach (Simple numerical problems to be solved).Inflation-Meaning of inflation, types, causes, measures to control inflation.</p>			
<p>Module IV (10hours)</p> <p>Time value of money- Interest - Simple and compound, nominal and effective rate of Interest, Cash flow diagrams, Principles of economic equivalence. Evaluation of engineering projects-Present worth method, Future worth method, Annual worth method, Internal rate of return method, Cost benefit analysis for public Projects, public goods, common property, free rider problem ,market failure and externalities .Depreciation- Depreciation of capital assert, Causes of depreciation, Methods of calculating depreciation (Straight line method, Declining balance method), After tax comparison of project.</p>			

Text Books

1. Riggs, Bedworth and Randhwa, “Engineering Economics”, McGraw Hill Education India
2. Principles of Economics, Deviga Vengedasalam; Karunakaran Madhavan, Oxford University Press.
3. Engineering Economy by William G. Sullivan, Elin M.Wicks, C. Patric Koelling, Pearson
4. R. Paneer Seelvan, “ Engineering Economics”, PHI
5. Ahuja, H.L., “Principles of Micro Economics” , S.Chand & Company Ltd
6. Jhingan, M.L., “Macro Economic Theory”
7. Macro Economics by S.P.Gupta, TMH

Course Outcome

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

1. Apply knowledge of mathematics, economics, and engineering principles to solve engineering problems.
2. Understand the major capabilities and limitations of cash flow analysis for evaluating proposed capital investments.
3. Recognize, formulate, analyze and solve cash flow models in practical situations. Understand the assumptions underlying these models, and the effects on the modeling process when these assumptions do not hold.
4. Develop the ability to account for time value of money using engineering economy factors and formulas, as well as the implications and importance of considering taxes, depreciation, and inflation.
5. Apply engineering economic techniques on solving engineering problems by using computer tools such as spreadsheets.

HSHM3204	ORGANIZATIONAL BEHAVIOUR	3-0-0	Credit-3
Objectives: <ol style="list-style-type: none"> 1. To develop an understanding of the behavior of individuals and groups inside organizations 2. To enhance skills in understanding and appreciating individuals, inter personal, and group process for increased effectiveness both within and outside of organizations. 3. To develop theoretical and practical insights and problem-solving capabilities for effectively managing the organizational processes. 			
Module I (8 hours) <p>Fundamentals of OB: Definition, scope and importance of OB, Relationship between OB and the individual, Concept of Organizational Behaviour Role of Managers in OB- Interpersonal Roles-Informational Roles- Decisional Roles, Foundations or Approaches to Organizational Behavior, Challenges and Opportunities for OB, Limitations of OB.</p>			

Module II**(10 hours)**

Components of attitude, Relationship between behavior and attitude, Developing Emotional intelligence at the workplace, Job attitude, Barriers to changing attitudes. Personality and values: Definition and importance of Personality for performance, The Myers-Briggs Type Indicator and The Big Five personality model, Significant personality traits suitable to the workplace, Personality Tests and their practical applications. Perception: Meaning and concept of perception, Factors influencing perception, Selective perception, Attribution theory, Perceptual process, Social perception (stereotyping and halo effect). Motivation: Definition & Concept of Motive & Motivation, The Content Theories of Motivation (Maslow's Need Hierarchy & Herzberg's Two Factor model Theory), The Process Theories (Vroom's expectancy Theory & Porter Lawler model), Contemporary Theories – Equity Theory of Work Motivation.

Module III**(10 hours)**

Foundations of Group Behavior: The Meaning of Group & Group behavior & Group Dynamics, Types of Groups, The Five – Stage Model of Group Development. Managing Teams: Why Work Teams, Work Teams in Organization, Developing Work Teams, Team Effectiveness & Team Building. Leadership: Concept of Leadership, Styles of Leadership, Trait Approach Contingency Leadership Approach, Contemporary leadership, Meaning and significance of contemporary leadership, Concept of transformations leadership, Contemporary theories of leadership, Success stories of today's Global and Indian leaders.

Module IV**(12 hours)**

Organizational Culture : Meaning & Definition of Organizational Culture, creating & Sustaining Organizational Culture, Types of Culture (Strong vs. Weak Culture, Soft Vs. Hard Culture & Formal vs. Informal Culture), Creating Positive Organizational Culture, Concept of Workplace Spirituality. Organizational Change: Meaning, Definition & Nature of Organizational Change, Types of Organizational Change, Forces that acts as stimulants to change. Implementing Organizational Change: How to overcome the Resistance to Change, Approaches to managing Organizational Change Introduction to Human Resource Management-Selection, Orientation, Training and Development, Performance Appraisal.

Reference Books

1. Understanding Organizational Behaviour, Parek, Oxford
2. Organizational Behaviour, Robbins, Judge, Sanghi, Pearson.
3. Organizational Behaviour, K. Awathappa, HPH.
4. Organizational Behaviour, VSP Rao, Excel
5. Introduction to Organizational Behaviour, Moorhead, Griffin, Cengage.
6. Organizational Behaviour, Hitt, Miller, Colella, Wiley

Learning Outcomes

At the completion of this paper students should be able to:

1. Analyse the behaviour of individuals and groups in organisations in terms of the key factors that influence organizational behaviour.
2. Assess the potential effects of organizational-level factors (such as structure, culture and change) on

organizational behaviour.

3. Critically evaluate the potential effects of important developments in the external environment (such as globalization and advances in technology) on organisational behaviour.
4. Analyze organizational behavioral issues in the context of organizational behaviour theories, models and concepts.

BSMA1208	APPLIED MATHEMATICS	3-1-0	Credit-3
<p>MODULE-1: Laplace Transforms: (12 Hours) Laplace Transform, inverse Transform, Linearity, Shifting, Transforms of derivatives and integrals, Differential Equations, Unit step function, Second shifting theorem, Dirac's Delta Function, Differentiation and Integration of Transforms, Convolution, Integral Equations, Partial Fractions, Differential Equations, Systems of Differential Equations.</p> <p>MODULE-2: Fourier Series And Fourier Transform: (10 Hours) Periodic function, Trigonometric series, Fourier series, Functions of any period $p=2L$, Even and odd functions, half-range expansions, Fourier Integrals, Fourier cosine transform and sine transform, Fourier transform.</p> <p>MODULE-3: Partial Differential Equations – First order (6 hours) First order partial differential equations, solutions of first order linear and non-linear PDEs.</p> <p>MODULE-4: Partial Differential Equations – Higher order (6 hours) Solution to homogenous and non-homogenous linear partial differential equations second and higher order by complimentary function and particular integral method.</p> <p>MODULE-5: (8 hours) Wave equation, heat equation in one and two dimension, second-order linear equations and their classification, D'Alembert's solution of the wave equation, Separation of variables method to simple problems in Cartesian coordinates. The Laplacian in plane, cylindrical and spherical polar coordinates.</p> <p>Text Book:</p> <ol style="list-style-type: none"> 1. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons., Ch-5(5.1-5.7), Ch-10(10.1-10.4, 10.8-10.10), Ch-11(11.1-11.9, 11.11) 2. Raman B.V, "Higher Engineering Mathematics", 11th reprint, 2010, Ch-18.1-18.10. <p>References:</p> <ol style="list-style-type: none"> 1. Grewal B.S., <i>Higher Engineering Mathematics</i>, Khanna Publishers, 35th Edition, 2000. 2. Peter V.O'Neil, <i>Advanced Engineering Mathematics</i>, Thomson Publisher, India edition, 			

ESEC2213	ANALOG ELECTRONIC CIRCUITS	3-0-0	Credit-3
<p>Course Objectives: Students will be able:</p> <ol style="list-style-type: none"> 1. To get an overview of circuit realizations with diodes and transistors. 2. To get acquainted with signal analysis of BJTs and FETs and to have an overview of low and high frequency responses. 3. To understand the concept of feedback amplifier and oscillator. 4. To get an overview of power amplifier. 5. To learn operational amplifiers and its various applications. <p>MODULE-I (12 Hours)</p> <p>Small Signal Analysis of BJTs Small Signal Analysis of CE amplifiers. Effects of R_s and R_L on CE amplifier operation, Emitter Follower, Cascade amplifier, Darlington Connection and Current Mirror Circuits.</p> <p>Frequency Response of BJTs Low and High Frequency Response of BJTs, Frequency Response of CE Amplifier, Multistage Frequency Effects, Miller Effect Capacitance, Square Wave Testing.</p> <p>MODULE-II (10 Hours)</p> <p>Metal Oxide Semiconductor Field-Effect Transistor Principle and Operation of MOSFETs, p-Channel and n-Channel MOSFET, Complimentary MOSFET, MOSFET as an Amplifier and as a Switch.</p> <p>Small Signal Analysis of FETs Small-signal model and biasing circuits, Common source amplifier, small signal equivalent circuits- gain, input and output impedance, transconductance, Effects of R_s and R_L on CS Amplifier, Source Follower and Cascaded System.</p> <p>Frequency Response of FETs Low and High Frequency Response of FETs, Frequency Response of CS Amplifier, Multistage Frequency Effects.</p> <p>MODULE-III (10 Hours)</p> <p>Feedback amplifier and Oscillators Concepts of negative and positive feedback, Four Basic Feedback Topologies, Practical Feedback Circuits, Principle of Sinusoidal Oscillator, Wein-Bridge, Phase Shift and Crystal Oscillator Circuits.</p> <p>Power Amplifier</p>			

Classifications, Class-A, Class-B and Class-AB Amplifier Circuits, Transfer Characteristics, Power Dissipation and Conversion Efficiency of Power Amplifiers.

MODULE-IV**(10 Hours)****Operational Amplifier**

Differential Amplifier, direct coupled multi-stage amplifier, internal structure of an Op-Amp. Non-idealities in Op-Amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product). Open-loop and Closed-loop Gains.

Linear Applications of Op-Amp

Instrumentation amplifier, buffer circuit, current-to-voltage converter, voltage-to-current converter, active filter, P, PI and PID controllers, lead/lag compensator using an Op-Amp. Analog to digital conversion.

Non Linear Applications of Op-Amp

Logarithmic amplifier, Precision rectifier, clipper and clamper circuit, Op-Amp as comparator circuit, Peak detector, zero crossing detector, Square, triangular wave generator circuits using Op-Amps, Concept of Schmitt triggers circuit and sample and hold circuit using operational amplifier, 555 Timer and its applications.

Text Books:

1. Adel Sedra and Kenneth C Smith, "Microelectronics Circuits", Oxford University Press, 7th Edition, 2014.
2. Ramakant A. Gayakwad, "Op-Amps and Linear Integrated Circuits", Pearson Education, 4th Edition, 2013.
3. J. Milliman, C. Halkias, S. Jit, "Electronics Devices and Circuit", Tata McGraw Hill Education, 2nd Edition, 2008.
4. R. L. Boylestad and L. Nashelsky, "Electronic Devices and Circuits Theory", Pearson Education, 10th Edition, 2013.

Reference Books:

1. P. Horowitz, W. Hill, "The art of Electronics", Cambridge University Press, 1989.
2. Donald A. Neamen, "Electronics Circuits Analysis and Design", Tata McGraw Hill, 3rd Edition, 2002.
3. J. Milliman, C. Halkias, "Integrated Electronics: Analog and Digital Circuits and Systems", Tata McGraw Hill, 2nd Edition, 2004.
4. David A. Bel, "Electronic device and circuits", Oxford University Press, 5th Edition, 2008.
5. Anil K. Main, "Electronics devices and circuits", Wiley India Pvt. Ltd, 3rd Edition, 2009

Course Outcomes:

1. To design and analyze small and large signal amplifier circuits.
2. To analyze the characteristics of cascaded amplifiers.
3. To design feedback amplifiers and oscillators.

4. To analyze the characteristics of operational amplifier in open and closed loop configurations.
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PCCS4201	Data Structures Using C++	3-0-0	Credit-3
<p>Module 1 (12hours)</p> <p><i>C++ Programming Concepts:</i> Introduction, Tokens, Data Types, Operators, Control Structures, Input and Output, Arrays and Pointers, Functions and Parameter Passing, Function Overloading, Friend Functions, Classes and Objects, Constructors and Destructors, Operator Overloading, Inheritance, Polymorphism, Exception Handling, Dynamic Memory Management, Templates.</p> <p>Module 2 (12 hours)</p> <p><i>Data Structures Fundamentals:</i> IntroductionData Structures, Classification, Algorithms Analysis, Asymptotic Notations, Abstract Data Types (ADTs).</p> <p><i>Arrays:</i> Storage Structures for Arrays, Sparse Matrixes.</p> <p><i>Linked Lists:</i> Single Linked Lists, Double Linked Lists and Circular Linked Lists - Implantation and Primitive Operations, Application of Linked Lists - Polynomial Representation.</p> <p><i>Stacks:</i> The Stack ADT, Array and Linked Implementations of Stack, Operations on Stack, Applications of Stack - Recursion, Conversion and Evaluation of Arithmetic Expressions.</p> <p><i>Queues:</i> The Queue ADT, Array and Linked Implementations of Queue, Operations on Queue, Circular Queue, Applications of Queue.</p> <p>Module 3 (8 hours)</p> <p><i>Trees:</i> Introduction, Terminology, Binary Trees - Representation, Traversal, Binary Search Trees, Operations in a Binary Search Tree - Searching, Insertion and Deletions, AVL Trees, Rotations, Heaps, M-way Search Trees, B-Trees, B+ Trees, Application of Trees - Expression Trees.</p> <p>Module 4 (8 hours)</p> <p><i>Graphs:</i> GraphTerminology, Representations, Graph Traversal, Shortest Path Problems.</p> <p><i>Searching:</i> Linear and Binary Searches.</p> <p><i>Sorting:</i> Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, Quick Sort, Heap Sort.</p> <p><i>Hashing:</i> Hash Functions and Hashing Techniques</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. Sartaj Sahni, “Data structures, Algorithms and Applications in C++”, 2nd Ed., Universities Press. 2. Adam Drozdek, “Data structures and Algorithms in C++”, 4th edition, Cengage learning. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, Third Edition, Pearson Education, 2006. 			

2. John R. Hubbard. "Data Structures with C++", Schum's Outline (TMH).

PCCS4202	Digital Logic Design	3-0-0	Credit-3
<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. To understand basic number systems, codes and logical gates. 2. To understand the concepts of Boolean algebra. 3. To understand the use of minimization logic to solve the Boolean logic expressions. 4. To understand the design of combinational and sequential circuits. 5. To understand the state reduction methods for Sequential circuits. 6. To understand the basics of various types of memories. <p>Course Outcomes:</p> <ol style="list-style-type: none"> 1. Able to understand number systems and codes. 2. Able to solve Boolean expressions using Minimization methods. 3. Able to design the sequential and combinational circuits. 4. Able to apply state reduction <p>UNIT - I Digital Systems, Binary Numbers, Number base conversions, Octal, Hexadecimal and other base numbers, complements, signed binary numbers, Floating point number representation, binary codes, Error detection and correction, binary storage and registers, binary logic, Boolean algebra and logic gates , Basic theorems and properties of Boolean Algebra, Boolean functions, canonical and standard forms, Digital Logic Gates.</p> <p>UNIT - II Gate-Level Minimization, The K-Map Method, Three-Variable Map, Four-Variable Map, Five-Variable Map , sum of products , product of sums simplification, Don't care conditions, NAND and NOR implementation and other two level implementations, Exclusive-OR function.</p> <p>UNIT - III Combinational Circuits (CC), Analysis procedure, Design Procedure, Combinational circuit for different code converters and other problems, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, Demultiplexers. Synchronous Sequential Circuits, Latches, Flip-flops, analysis of clocked sequential circuits, Registers, Shift registers, Ripple counters, Synchronous counters, other counters. Asynchronous Sequential Circuits -Introduction, Analysis procedure, Circuits with latches, Design procedure, Reduction of state and follow tables, Race- free state assignment, Hazards.</p>			

UNIT - IV

Memory: Introduction, Random-Access memory, Memory decoding, ROM, programmable Logic Array, Programmable Array Logic, Sequential programmable devices.

Register Transfer and Microoperations - Register Transfer Language, Register Transfer, Bus and Memory Transfers,

Arithmetic Microoperations, Logic Microoperations, Shift Microoperations, Arithmetic Logic Shift Unit.

TEXT BOOKS:

1. Digital Design, M. Morris Mano, M.D. Ciletti, 5th edition, Pearson.(Units I, II, III, IV, Part of Unit V)
2. Computer System Architecture, M. Morris Mano, 3rd edition, Pearson.(Part of Unit V)

REFERENCE BOOKS:

1. Switching and Finite Automata Theory, Z. Kohavi, Tata McGraw Hill.
2. Fundamentals of Logic Design, C. H. Roth, L. L. Kinney, 7th edition, Cengage Learning.
3. Fundamentals of Digital Logic & Micro Computer Design, 5TH Edition, M. Rafiquzzaman, John Wiley.

MANDATAORY COURSE

MCHM9203	CONSTITUTION OF INDIA	2-0-0	Credit-0
<p>OBJECTIVES OF THE STUDY</p> <ol style="list-style-type: none"> 1. To create awareness about the constitutional values and objectives written in the Indian Constitution. 2. To ascertain the views of student teachers regarding the achievement made in respect of each of the values /objectives in the present context in India. <p>Course content</p> <p>Module 1</p> <p>Meaning of the constitution law and constitutionalism, Historical perspective of the Constitution of India, Salient features and characteristics of the Constitution of India, Scheme of the fundamental rights The scheme of the Fundamental Duties and its legal status</p> <p>Module 2</p> <p>The Directive Principles of State Policy – Its importance and implementation, Federal structure and distribution of legislative and financial powers between the Union and the States</p> <p>Module 3</p> <p>Parliamentary Form of Government in India – The constitution powers and status of the President of India Amendment of the Constitutional Powers and Procedure, The historical perspectives of the constitutional amendments in India</p>			

Module 4

Emergency Provisions: National Emergency, President Rule, Financial Emergency

Local Self Government – Constitutional Scheme in India

Module 5

Scheme of the Fundamental Right to Equality Scheme of the Fundamental Right to certain Freedom under Article 19 , Scope of the Right to Life and Personal Liberty under Article 21

REFERENCES

1. Austin, Granville (1996), ³ 'The Indian Constitution: Cornerstone of a Nation', Oxford: Clarendon Press, p. 308.
2. Nehru, Jawaharlal (1949), ³ 'Independence and after', New Delhi: Publication Division, Govt. of India, p.375
3. Wheare, K.C.(1964), ³'Modern Constitutions', London: Oxford University Press,p.98.
4. Frankfurter, Felix (1961), ³Mr. Justice Holmes and the Supreme Court', Cambridge: The Belknap press of Harvard University Press, P.59.
5. Kashyap, S.C.(1995), ³'Our Constitution', New Delhi: National Book Trust, India,p.51.
6. Basu, D.D.(1991), ³ Introduction to the Constitution of India', New Delhi

Course Outcomes:

After study of the course, the students are able to-

1. Have general knowledge and legal literacy and thereby take up competitive examinations
2. Understand state and central policies, fundamental duties
3. Understand Electoral Process, special provisions
4. Understand powers and functions of Municipalities, Panchayats and Co-operative Societies, and
5. Understand Engineering ethics and responsibilities of Engineers.
6. Have an awareness about basic human rights in India

MANDATORY COURSE

MCHM9204	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	2-0-0	Credit-0
Course Objectives: <ol style="list-style-type: none"> 1. The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature. 2. Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions 			

3. The course focuses on introduction to Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system.

Course content :

□ Basic Structure of Indian Knowledge System (i) वेद, (ii) उन्नवेद (आयुर्वेद, धनुर्वेद, गन्धर्ववेद, स्थानत्यआदद) (iii) वेदांग (शिक्षा, कल्न, नरुत, व्याकरण, ज्योनतषछांद), (iv) उनाइग (धर्मस, र्ीर्ासा, नुराण, तकमिस)

I.VEDA II. UPAVEDA (AYURVEDA, DHANURVEDA, GANDHARVA VEDA, STHAPATYA Etc) iii. VEDANGA (SIKHYA, KALPA, NIRUTA, BYAKARANA, JYOTISYA CHHANDA) IV. UPANGA (DHARMA SASTRA, MIMANSA, TARKA SASTRA, PURANA)

- Modern Science and Indian Knowledge System
- Yoga and Holistic Health care
- Case Studies.

Course Outcomes:

Ability to understand, connect up and explain basics of Indian Traditional knowledge modern scientific perspective.

Suggested Text/Reference Books

1. V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2. Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan
3. Fritzof Capra, Tao of Physics
4. Fritzof Capra, The wave of Life
5. V N Jha (Eng. Trans.), Tarkasangraha of Annam Bhatta, International Chinmay Foundation, Velliarnad, Amaku,am
6. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkatta
7. GN Jha (Eng. Trans.) Ed. R N Jha, Yoga-darshanam with Vyasa Bhashya, Vidyanidhi Prakasham, Delhi, 2016
8. RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, Vidyanidhi Prakasham, Delhi, 2016 9.
9. P R Sharma (English translation), Shodashang Hridayam

HONOURS

HNCS0201	Software Engineering	3-1-0	Credit-4
<p>Module I (10 Hours)</p> <p>Software Process Models: Software Product, Software crisis, Handling complexity through Abstraction and Decomposition, Overview of software development activities, Process Models, Classical waterfall model, iterative waterfall model, prototyping mode, evolutionary model, spiral model, RAD model, Agile models: Extreme Programming, RAD model.</p> <p>Module II (10 Hours)</p> <p>Requirement analysis and specification, Requirement Gathering and Analysis, Requirement specification, Software Requirement Specification (SRS), Functional Requirements, functional r Non-functional requirements and goal of Implementation, IEEE 830 guidelines, Decision tables and trees.</p> <p>Module III (10 Hours)</p> <p>Structured Analysis & Design: Overview of design process: High-level and detailed design, Cohesion and coupling, Modularity and layering, Function-Oriented software design: Structured Analysis using DFD Structured Design using Structure Chart, Basic concepts of Object Oriented Analysis & Design. User interface design, Command language, menu and iconic interfaces. Coding and Software Testing Techniques: Code Review, Testing: - Unit testing, Black-box Testing, White-box testing, Cyclomatic complexity measure, coverage analysis, mutation testing, Debugging techniques, Integration testing, System testing, Regression testing.</p> <p>Module 4 (10 Hours)</p> <p>Software Reliability and Software Maintenance: Basic concepts in software reliability, reliability measures, reliability growth modeling, Quality SEI CMM, Characteristics of software maintenance, software reverse engineering, software reengineering, software reuse.</p> <p>Outcomes At the end of the course, the student will able to</p> <ol style="list-style-type: none"> 1. Understand the advantages of various SDLC models. 2. Gain knowledge on project management approaches as well as cost and schedule estimation strategies. 3. Perform formal analysis on specification. 4. Use UML diagram for analysis and design. 5. Architect and design using architectural style and design patterns <p>Text Books:</p> <ol style="list-style-type: none"> 1. Fundamentals of Software Engineering, Rajib Mall, PHI, 2014. 			

2. Software Engineering, A Practitioner's Approach, Roger S. Pressman, TMG Hill.

Reference Books:

1. Software Engineering, I. Somerville, 9th Ed. , Pearson Education.

MINOR

MNCS0201	OOPs using C++	3-1-0	Credit-4
<p>Course Objective:</p> <p>This course is aimed at mastering object oriented programming technique in software development and demonstrates these techniques in solution to different types of problems.</p> <p>Course Outcomes: Students will be able to -</p> <ol style="list-style-type: none"> 1. Familiar with issues with software design. 2. Be familiar to key concepts of object oriented programming. 3. Have knowledge about C++ concepts related to good modular design. 4. Implement patterns involving realization of abstract interfaces and polymorphism. 5. Learn how to utilize Exceptions and standard template library. <p>Module –I</p> <p>Introduction to OOP, OOP Concepts, Overview of C++, C++ fundamentals, Classes, Objects, Inline functions, function Overloading, Scope Resolution Operator, Constructors ,Destructors, Static Members, Passing objects to functions, Function returning objects.</p> <p>Module – II</p> <p>Arrays, Pointers, this pointer, References, Dynamic memory Allocation, functions Overloading, Default arguments, Overloading Constructors, copy constructors, Pointers to Functions, Ambiguity in function overloading.</p> <p>Module –III</p> <p>Operator Overloading, Overloading of some special operators, Inheritance, Types of Inheritance, Protected members, Polymorphism, Virtual base Class, Virtual functions, Pure virtual functions, Abstract classes.</p> <p>Module – IV</p> <p>Class template, Generic classes, Function template, generic functions, Exception Handling, Exception handling options, Streams, Formatted I/O, C++ File I/O, Array based I/O, Standard Template Library (STL).</p>			

Text Books

1. H. Schildt - C++ The Complete Reference, 4th Edition, Tata McGraw-Hill, New Delhi.
Chapter 11 -21

Reference Books

1. A. N Kanthane, Object Oriented Programming with ANSI & Turbo C++ , Pearson Education, New Delhi.
2. Object Oriented Programming with C++, E. Balagurusamy, Mcgraw Hill Education
3. Object Oriented Programming in C Robert Lafore – SAMS Publishing.

PRACTICAL / SESSIONAL

PCCS7201	Data Structure Using C++ Lab	0-0-3	Credit-02
<ol style="list-style-type: none">1. Implementing various control structures & loops.2. Implementing classes and creation of objects.3. Implementing operator overloading & friend's functions.4. Implementing multiple & hybrid inheritance.5. Implementing polymorphism concepts.6. Exception handling mechanisms.7. Working with new & delete, object copying.8. Implementing class & function templates.9. Program for sparse matrix operations.10. Program for single, double and circular linked list operations - create, traverse, insert, delete, search.11. Program for stack operations using arrays.12. Program for implementing infix, prefix and postfix notations using stacks.13. Program for queue operations using arrays.14. Program for stack and queue implementation using linked lists.15. Program for binary search tree operations.16. Program for heap & AVL tree implementations.17. Program for matrix and list representations of graph.18. Program for linear & binary searches.19. Program for implementing sorting techniques - bubble sort, insertion sort, selection sort, merge sort, quick sort, heap sort.20. Program to implement hashing.			

PCCS7202	Digital Logic Design Lab	0-0-3	Credit-2
<p style="text-align: center;">List of Experiments</p> <ol style="list-style-type: none">1. Arithmetic Circuit- construction and testing using 74xxICs<ol style="list-style-type: none">a. Half adder and Full adder.b. Half subtractor and Full subtractor.2. Combinational logic circuit design using 74xxICs.3. Encoders and Decoders.4. Multiplexer and De-multiplexer.5. Study of Arithmetic Logic Unit(ALU) using IC 74181.6. Construction of 1- bit comparator using 74xxICs and study of 4-bit comparator IC 7485.7. code converters – Binary to gray and Gray to binary.8. Verification of basic flip flops using 74xxICs and master- slave JK flip-flop using IC 74769. Asynchronous counter design and Mod-n counter.10. 3-Bit synchronous counter design11. Shift register- SIPO/SISO & PISO/PIPO.12. Study of RAM.			

INDIRA GANDHI INSTITUTE OF TECHNOLOGY, SARANG**B.TECH SYLLABUS for COMPUTER SCIENCE &ENGINEERING****(Admission Batch: 2018-19 Onwards)****4th Semester**

HSBM3203	ENGINEERING ECONOMICS	3-0-0	Credit-3
<p>Course objective:</p> <ol style="list-style-type: none"> 1. Prepare engineering students to analyze cost/revenue data and carry out make economic analyses in the decision making process to justify or reject alternatives/projects on an economic basis. 2. Prepare engineering students to function in the business side of professional engineering practice. 3. To enhance the decision making capacity of the engineering students by understanding the economics theories <p>Module-I (10 hours) Engineering Economics- Nature, Scope, Basic problems of an economy, Micro Economics and Macro Economics. Demand- Meaning of demand, Demand function, Law of Demand and its exceptions, Determinants of demand, Elasticity of demand & its measurement (Simple numerical problems to be solved), Supply-Meaning of supply, Law of supply and its exception, Determinants of supply, Elasticity of supply, Determination of market equilibrium(Simple numerical problems to be solved).National Income-Definition, Concepts of national income, Method of measuring national income.</p> <p>Module-II (8 hours) Production-Production function, Laws of returns: Law of variable proportion, Law of returns to scale, Cost and revenue concepts, Banking -Commercial bank, Functions of commercial bank, Central bank, Functions of Central Bank, An overview of financial system of India.</p> <p>Module-III (8 hours) Basic understanding of different market structures, Determination of equilibrium price under perfect competition (Simple numerical problems to be solved), Break Even Analysis-linear approach (Simple numerical problems to be solved).Inflation-Meaning of inflation, types, causes, measures to control inflation.</p> <p>Module-IV (10hours) Time value of money- Interest - Simple and compound, nominal and effective rate of Interest, Cash flow diagrams, Principles of economic equivalence. Evaluation of engineering projects-Present worth method, Future worth method, Annual worth method, Internal rate of return method, Cost benefit analysis for public Projects, public goods, common property, free rider problem ,market failure and externalities .Depreciation- Depreciation of capital asset, Causes of depreciation, Methods of calculating depreciation (Straight line method, Declining balance method), After tax comparison of project.</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. Riggs, Bedworth and Randhwa, “Engineering Economics”, McGraw Hill Education India 2. Principles of Economics, Deviga Vengedasalam; Karunagaran Madhavan, Oxford University Press. 			

3. Engineering Economy by William G.Sullivan, Elin M.Wicks, C. Patric Koelling, Pearson
4. R.Paneer Seelvan, “ Engineering Economics”, PHI
5. Ahuja, H.L., “Principles of Micro Economics” , S.Chand & Company Ltd
6. Jhingan, M.L., “Macro Economic Theory”
7. Macro Economics by S.P. Gupta, TMH

COURSE OUTCOME

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

1. Apply knowledge of mathematics, economics, and engineering principles to solve engineering problems.
2. Understand the major capabilities and limitations of cash flow analysis for evaluating proposed capital investments.
3. Recognize, formulate, analyze and solve cash flow models in practical situations. Understand the assumptions underlying these models, and the effects on the modeling process when these assumptions do not hold.
4. Develop the ability to account for time value of money using engineering economy factors and formulas, as well as the implications and importance of considering taxes, depreciation, and inflation.
5. Apply engineering economic techniques on solving engineering problems by using computer tools such as spreadsheets.

HSBM3204	ORGANIZATIONAL BEHAVIOUR	3-0-0	Credit-3
<p>Objectives:</p> <ol style="list-style-type: none"> 1. To develop an understanding of the behavior of individuals and groups inside organizations 2. To enhance skills in understanding and appreciating individuals, interpersonal, and group process for increased effectiveness both within and outside of organizations. 3. To develop theoretical and practical insights and problem-solving capabilities for effectively managing the organizational processes. <p>Module I (8 hours) Fundamentals of OB: Definition, scope and importance of OB, Relationship between OB and the individual, Concept of Organizational Behaviour Role of Managers in OB- Interpersonal Roles-Informational Roles-Decisional Roles, Foundations or Approaches to Organizational Behavior, Challenges and Opportunities for OB, Limitations of OB.</p> <p>Module II (10 hours) Components of attitude, Relationship between behavior and attitude, Developing Emotional intelligence at the workplace, Job attitude, Barriers to changing attitudes. Personality and values: Definition and importance of Personality for performance, The Myers-Briggs Type Indicator and The Big Five personality model, Significant personality traits suitable to the workplace, Personality Tests and their practical applications. Perception: Meaning and concept of perception, Factors influencing, perception, Selective perception, Attribution theory, Perceptual process, Social perception (stereotyping and halo effect).Motivation: Definition & Concept of Motive & Motivation, The Content Theories of Motivation (Maslow’s Need Hierarchy & Herzberg’s Two Factor model Theory), The Process Theories (Vroom’s expectancy Theory & Porter Lawler model), Contemporary Theories – Equity Theory of Work Motivation.</p>			

Module III**(10 hours)**

Foundations of Group Behavior: The Meaning of Group & Group behavior & Group Dynamics, Types of Groups, The Five – Stage Model of Group Development. Managing Teams: Why Work Teams, Work Teams in Organization, Developing Work Teams, Team Effectiveness & Team Building. Leadership: Concept of Leadership, Styles of Leadership, Trait Approach Contingency Leadership Approach, Contemporary leadership, Meaning and significance of contemporary leadership, Concept of transformations leadership, Contemporary theories of leadership, Success stories of today's Global and Indian leaders.

Module IV**(12 hours)**

Organizational Culture : Meaning & Definition of Organizational Culture, creating & Sustaining Organizational Culture, Types of Culture (Strong vs. Weak Culture, Soft Vs. Hard Culture & Formal vs. Informal Culture), Creating Positive Organizational Culture, Concept of Workplace Spirituality. Organizational Change: Meaning, Definition & Nature of Organizational Change, Types of Organizational Change, Forces that acts as stimulants to change. Implementing Organizational Change : How to overcome the Resistance to Change, Approaches to managing Organizational Change Introduction to Human Resource Management-Selection, Orientation, Training and Development, Performance Appraisal.

Reference Books

1. Understanding Organizational Behaviour, Parek, Oxford
2. Organizational Behaviour, Robbins, Judge, Sanghi, Pearson.
3. Organizational Behaviour, K. Awathappa, HPH.
4. Organizational Behaviour, VSP Rao, Excel
5. Introduction to Organizational Behaviour, Moorhead, Griffin, Cengage.
6. Organizational Behaviour, Hitt, Miller, Colella, Wiley

Learning Outcomes

At the completion of this paper students should be able to:

1. Analyze the behaviour of individuals and groups in organizations in terms of the key factors that influence organizational behaviour.
2. Assess the potential effects of organizational-level factors (such as structure, culture and change) on organizational behaviour.
3. Critically evaluate the potential effects of important developments in the external environment (such as globalization and advances in technology) on organizational behaviour.
4. Analyze organizational behavioral issues in the context of organizational behaviour theories, models and concepts.

PCCS4203	Object Oriented Programming Using JAVA	3-0-0	Credit-3
Course Objectives <ol style="list-style-type: none"> 1. Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc. 2. Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc ,exception handling mechanisms, inheritance, packages and interfaces 			

3. Understand the principles of multithreading, Applet etc.
4. Develop java based software application using awt, swing, event driven interfaces and jdbc.

Course Outcomes

1. knowledge of the structure and model of the Java programming language, (knowledge)
2. use the Java programming language for various programming technologies (understanding)
3. develop software in the Java programming language, (application)
4. evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
5. propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)
6. choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)

Module – I

10Hrs

Introduction:- Object oriented programming, Features, Pillars and Advantages of OOP ,java, Features of java, advantages of java over C and C++,JDK, JRE, JVM, Byte code

Fundamentals of Programming:- Data Types, variable, Modifiers, Typecasting,

Operators and their precedence, Decision making and looping, one dimension arrays and its application in searching and sorting process, multi dimension arrays and matrix operations, Receive input using Scanner class, Buffer Reader, Command line arguments..

Objects and classes:- class, object, methods, parameter passing, Constructor, object passing, constructor overloading, nested classes, static, final, this keyword

Module - II

08 Hrs

Inheritance:- simple and multilevel inheritance, Using Super to Call Super class constructor, Method overriding, Dynamic method Dispatch, Using Abstract Classes, Using final with inheritance.

Packages & Interfaces: Packages, Access Protection, Importing package, Interface, Implementing Interfaces, variables in Interfaces, Interfaces can be extended.

Exception Handling: Exception and its types, Error, Exception handling, Using try& catch, Multiple catch, throw, throws, finally, Java's Built in exceptions, user defined exception.

Module - III

10 Hrs

Multithreading: Java Thread Model, Thread Priorities, Creating a thread, Creating Multiple threads, Using is Alive () and join (), wait () & notify (), Deadlock, Synchronization

String Handling: String constructors, String length, Character Extraction, String Comparison, Modifying a string.

Applets: Basics, Architecture, Skeleton, The HTML APPLET Tag, Passing parameters to Applets, Applet context and show documents ().

Module – IV**12 Hrs**

AWT: AWT Classes window fundamentals, component, container, panel, Window, Frame, Canvas, Creating a frame window in an Applet, working with Graphics, Control Fundamentals, Layout managers, Handling Events by Extending AWT components. Core java API package, reflection, Remote method Invocation (RMI)

Swing: J applet, Icons & Labels, Text fields, Buttons, Combo boxes, Tabbed panes, Scroll panes, Trees, Tables.

Event Handling and JDBC: Delegation Event model, Event Listener Interfaces, jdbc

JavaFX: Graphics, User Interface Components, Effects, Animation, and Media, Application Logic, Interoperability, JavaFX Scene Builder 2

Text Books:

1. Programming in Java. Second Edition. OXFORD HIGHER EDUCATION. (SACHIN MALHOTRA/SAURAV CHOUDHARY)
2. CORE JAVA for Beginners. (Rashmi Kanta Das), Vikas Publication

Reference Books:

1. JAVA the Complete Reference (9th Edition) Herbalt Schelidt.
2. Programming with Java: Bhav & Patekar, Pearson Education.
3. Big Java: Horstman, Willey India

PCCS4204	Formal Language and Automata Theory	3-0-0	Credit-3
<p>Module 1 (10 Hours)</p> <p>Alphabet, languages and grammars. Production rules and derivation of languages. Chomsky's hierarchy of languages and Grammars. Regular grammars, regular expressions and finite automata (deterministic and nondeterministic). Closure and decision properties of regular sets. Pumping lemma of regular sets. Minimization of finite automata. Left and right linear grammars. DFA/NFA to regular expression and vice versa using Arden's Formula.</p> <p>Module 2 (10 Hours)</p> <p>Context free grammars and pushdown automata. Chomsky and Griebach normal forms. Parse trees, Cook, Younger, Kasami, and Early's parsing algorithms. Ambiguity and properties of context free languages. Pumping lemma, Ogden's lemma, Parikh's theorem. Deterministic pushdown automata, closure properties of deterministic context free languages.</p>			

Module 3**(10 Hours)**

Turing machines and variation of Turing machine model, Turing computability, Type 0 languages. Linear bounded automata and context sensitive languages. Primitive recursive functions. Cantor and Gödel numbering. Ackermann's function, μ -recursive functions, recursiveness of Ackermann and Turing computable functions.

Module 4**(10 Hours)**

Church Turing hypothesis. Recursive and recursively enumerable sets. Universal Turing machine and undecidable problems. Undecidability of Post correspondence problem. Valid and invalid computations of Turing machines and some undecidable properties of context free language problems. Time complexity class P, class NP, NP completeness.

Text Books:

1. Introduction to Automata Theory, Languages and Computation: J.E. Hopcroft and J.D. Ullman, Pearson Education, 3rd Edition.
2. Introduction to the theory of computation: Michael Sipser, Cengage Learning

Reference Books:

1. Automata Theory: Nasir and Srimani, Cambridge University Press.
2. Introduction to Computer Theory: Daniel I.A. Cohen, Wiley India, 2nd Edition.

PCCS4205	Database Management System	3-0-0	Credit-3
<p>Module I: (10 Hours) Introduction to database Systems, advantages of database system over traditional file system, Basic concepts & Definitions, Database users, Database Language, Database System Architecture, Schemas, Sub Schemas, & Instances, database constraints, 3-level database architecture, Data Abstraction, Data Independence, Mappings, Structure, Components & functions of DBMS, Data models.</p> <p>Module II: (10 Hours) Entity relationship model, Components of ER model, Mapping E-R model to Relational Schema. Storage Strategies: Detailed Storage Architecture, Storing Data, Magnetic Disk, RAID, Other Disks, Magnetic Tape, Storage Access, File & Record Organization, File Organizations & Indexes, Order Indices, B+ Tree Index Files, Hashing, Data Dictionary.</p> <p>Module III: (10 Hours) Relational Algebra (RA), Tuple Relational Calculus (TRC) and Domain Relational Calculus (DRC), Relational Query Languages: SQL and QBE. Database Design: Database development life cycle (DDL),</p>			

Automated design tools, Functional dependency and Decomposition, Join strategies, Dependency Preservation & lossless Design, Normalization, Normal forms: 1NF, 2NF, 3NF, and BCNF, Multi-valued Dependencies, 4NF & 5NF. Query processing and optimization: Evaluation of Relational Algebra Expressions, Query optimization, Query cost estimation.

Module IV:**(10 Hours)**

Transaction processing and concurrency control: Transaction concepts, properties of transaction, concurrency control, locking and Timestamp methods for concurrency control schemes. Database Recovery System: Types of Data Base failure & Types of Database Recovery, Recovery techniques. Fundamental concepts on Object-Oriented Database, Object relational database, distributed database, Parallel Database, Data warehousing & Data Mining, Big Data and NoSQL.

Text Books:

1. Database System Concepts by Sudarshan and Korth, 6th edition, McGraw-Hill Education.
2. Fundamentals of Database System by Elmasari & Navathe, Pearson Education.
3. Fundamentals of Database Management System by Gillenson, Wiley India.

References Books:

1. Database Management Systems by Ramakrishnan, McGraw-Hill Education.
2. Database management system by leon & leon, Vikas publishing House.
3. Database System: Concept, Design & Application by S.K. Singh, Pearson Education.
4. An introduction to Database System – Bipin Desai, Galgotia Publication

MANDATAORY COURSE

MCHM9203	CONSTITUTION OF INDIA	2-0-0	Credit-0
<p>OBJECTIVES OF THE STUDY</p> <ol style="list-style-type: none"> 1. To create awareness about the constitutional values and objectives written in the Indian Constitution. 2. To ascertain the views of student teachers regarding the achievement made in respect of each of the values /objectives in the present context in India. <p>Course content</p> <p>Module 1</p> <p>Meaning of the constitution law and constitutionalism, Historical perspective of the Constitution of India, Salient features and characteristics of the Constitution of India, Scheme of the fundamental rights The scheme of the Fundamental Duties and its legal status</p> <p>Module 2</p> <p>The Directive Principles of State Policy – Its importance and implementation, Federal structure and</p>			

distribution of legislative and financial powers between the Union and the States

Module 3

Parliamentary Form of Government in India – The constitution powers and status of the President of India
Amendment of the Constitutional Powers and Procedure,
The historical perspectives of the constitutional amendments in India

Module 4

Emergency Provisions: National Emergency, President Rule, Financial Emergency
Local Self Government – Constitutional Scheme in India

Module 5

Scheme of the Fundamental Right to Equality Scheme of the Fundamental Right to certain Freedom under Article 19 , Scope of the Right to Life and Personal Liberty under Article 21

REFERENCES

1. Austin, Granville (1996), ³ 'The Indian Constitution: Cornerstone of a Nation', Oxford: Clarendon Press, p. 308.
2. Nehru, Jawaharlal (1949), ³ 'Independence and after', New Delhi: Publication Division, Govt. of India, p.375
3. Wheare, K.C.(1964), ³'Modern Constitutions', London: Oxford University Press,p.98.
4. Frankfurter, Felix (1961), ³'Mr. Justice Holmes and the Supreme Court', Cambridge: The Belknap press of Harvard University Press, P.59.
5. Kashyap, S.C.(1995), ³'Our Constitution', New Delhi: National Book Trust, India,p.51.
6. Basu, D.D.(1991), ³ 'Introduction to the Constitution of India', New Delhi

Course Outcomes:

After study of the course, the students are able to-

1. Have general knowledge and legal literacy and thereby take up competitive examinations
2. Understand state and central policies, fundamental duties
3. Understand Electoral Process, special provisions
4. Understand powers and functions of Municipalities, Panchayats and Co-operative Societies, and
5. Understand Engineering ethics and responsibilities of Engineers.
6. Have an awareness about basic human rights in India

MANDATAORY COURSE

MCHM9204	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	2-0-0	Credit-0
<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature. 2. Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions 3. The course focuses on introduction to Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system. <p>Course content :</p> <p>□ Basic Structure of Indian Knowledge System (i) वेद, (ii) उन्नवेद (आयुर्वेद, धनुर्वेद, गन्धर्वेद, स्थानत्यआदद) (iii) वेदांग (शिक्षा, कल्ल, नरुत, व्याकरण, ज्योनतषछांद), (iv) उनाइंग (धर्मस, र्ीर्ासा, नुराण, तकमिस)</p> <p>I. VEDA II. UPAVEDA (AYURVEDA, DHANURVEDA, GANDHARVA VEDA, STHAPATYA Etc) iii. VEDANGA (SIKHYA, KALPA, NIRUTA, BYAKARANA, JYOTISYA CHHANDA) IV. UPANGA (DHARMA SASTRA, MIMANSA, TARKA SASTRA, PURANA)</p> <ul style="list-style-type: none"> • Modern Science and Indian Knowledge System • Yoga and Holistic Health care • Case Studies. <p>Course Outcomes:</p> <p>Ability to understand, connect up and explain basics of Indian Traditional knowledge modern scientific perspective.</p> <p>Suggested Text/Reference Books</p> <ol style="list-style-type: none"> 1. V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014 2. Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan 3. Fritzof Capra, Tao of Physics 4. Fritzof Capra, The wave of Life 			

5. V N Jha (Eng. Trans.), Tarkasangraha of Annam Bhatta, International Chinmay Foundation, Velliarnad, Amaku,am
6. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkatta
7. GN Jha (Eng. Trans.) Ed. R N Jha, Yoga-darshanam with Vyasa Bhashya, Vidyanidhi Prakasham, Delhi, 2016
8. RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, Vidyanidhi Prakasham, Delhi, 2016 9.
9. P R Sharma (English translation), Shodashang Hridayam

HONOURS

HNCS0202	Software Testing and Methodology	3-1-0	Credit-4
<p>Course objectives To understand the software testing methodologies such as flow graphs and path testing, transaction flows testing, data flow testing, domain testing and logic base testing.</p> <p>Module – I [10 hours] Introduction:- Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs. Flow graphs and Path testing:- Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitising, path instrumentation, application of path testing. Transaction Flow Testing:- transaction flows, transaction flow testing techniques. Dataflow Testing:- Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.</p> <p>Module – II [8 hours] Domain Testing:- domains and paths, Nice & ugly domains, domain testing. domains and interfaces testing, domain and interface testing, domains and test ability.</p> <p>Module-III [8 hours] Paths, Path products and Regular expressions:- path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection. Logic Based Testing:- overview, decision tables, path expressions, kv charts, specifications.</p> <p>Module – IV [10 hours] State, State Graphs and Transition testing:- state graphs, good & bad state graphs, state testing, Testabilitytips.Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools.</p>			

Books

1. Software Testing techniques — Boris Beizer, Dreamtech, second edition.
2. Software Testing Tools — Dr. K.V.K.K. Prasad, Dreamtech.

References:

1. The craft of software testing – Brian Marick, Pearson Education.
2. Software Testing, 3rd edition, P.C. Jorgensen, Aurbach publications (Dist. by SPD).
3. Software Testing, N. Chauhan, Oxford University press.

MINOR

MNCS0202	OOPs Using JAVA	3-1-0	Credit-4
<p>Module – I 10Hrs</p> <p>Introduction: -Object oriented programming, Features, Pillars and Advantages of OOP, java, Features of java, advantages of java over C and C++, JDK, JRE, JVM, Bytecode</p> <p>Fundamentals of Programming: - Data Types, variable, Modifiers, Typecasting, Operators and their precedence, Decision making and looping, one dimension arrays and its application in searching and sorting process, multi dimension arrays and matrix operations, Receive input using Scanner class, Buffer Reader, Command line arguments..</p> <p>Objects and classes: -class, object, methods, parameter passing, Constructor, object passing, constructor overloading, nested classes, static, final, this keyword</p> <p>Module - II 08 Hrs</p> <p>Inheritance: - simple and multilevel inheritance, Using Super to Call Super class constructor, Method overriding, Dynamic method Dispatch, Using Abstract Classes, Using final with inheritance.</p> <p>Packages & Interfaces: Packages, Access Protection, Importing package, Interface, Implementing Interfaces, variables in Interfaces, Interfaces can be extended.</p> <p>Exception Handling: Exception and its types, Error, Exception handling, Using try & catch, Multiple catch, throw, throws, finally, Java's Built in exceptions, user defined exception.</p> <p>Module - III 10 Hrs</p> <p>Multi Threading: Java Thread Model, Thread Priorities, Creating a thread, Creating Multiple threads, Using is Alive () and join (), wait () & notify (), Deadlock, Synchronization</p> <p>String Handling: String constructors, String length, Character Extraction, String Comparison Modifying a string.</p> <p>Applets: Basics, Architecture, Skeleton, The HTML APPLET Tag, Passing parameters to Applets, Applet context and show documents ().</p>			

Module – IV**12 Hrs**

AWT: AWT Classes window fundamentals, component, container, panel, Window, Frame , Canvas, Creating a frame window in an Applet , working with Graphics ,Control Fundamentals , Layout managers, Handling Events by Extending AWT components. Core java API package, reflection, Remote method Invocation (RMI)

Swing: J applet, Icons & Labels, Text fields, Buttons, Combo boxes, Tabbed panes, Scroll panes, Trees, Tables.

Event Handling and JDBC: Delegation Event model, Event Listener Interfaces, jdbc

JavaFX: Graphics, User Interface Components, Effects, Animation, and Media, Application Logic, Interoperability, JavaFX Scene Builder 2

Text Books:

1. Programming in Java. Second Edition. OXFORD HIGHER EDUCATION. (SACHIN MALHOTRA/SAURAV CHOUDHARY)
2. CORE JAVA for Beginners. (Rashmi Kanta Das), Vikas Publication

Reference Books:

1. JAVA the Complete Reference (9th Edition) Herbalt Schelidt.
2. Programming with Java: Bhav & Patekar, Pearson Education.
3. Big Java: Horstman, Willey India

PRACTICAL / SESSIONAL

PCCS7203	Java Programming Lab	0-0-3	CREDIT-2
<ol style="list-style-type: none"> 1. Introduction, Compiling & executing a java program, Data types & variables, decision control structures: if, nested if etc. 2. Loop control structures: do, while, for etc and arrays. 3. Classes and objects. 4. Data abstraction & data hiding, inheritance, polymorphism. 5. Interfaces and inner classes, packages 6. Threads, exception handlings 7. Design GUI Applications using Swing, AWT 8. Develop java based software using Swing, event models and JDBC 9. Draw different types of diagram, scrolling, blinking text etc using Applet 			

PCCS7204	Database Management System Lab	0-0-3	CREDIT-2
<ol style="list-style-type: none"> 1. Use of SQL syntax: creation, insertion, and SQL queries with where clause. (1 class) 2. Use of SQL syntax: deletion, updating, and SQL queries using where clause. (1 class) 3. Use of SQL syntax: join statements and SQL queries including where clause. (1 class) 4. PL/SQL on procedures and functions. (1 class) 5. PL/SQL on functions. (1 class) 6. PL/SQL on database triggers. (1 class) 7. PL/SQL on packages. (1 class) 8. PL/SQL on data recovery using check point technique. (1 class) 9. Concurrency control problem using lock operations. (1 class) 10. Programs on ODBC using either VB or VC++.(1 class) 			

PECS7201	Python Programming Lab	0-0-3	CREDIT-2
<p>Introduction to Python. An introduction to the Python programming language. Covers details of how to start and stop the interpreter and write programs. Introduces Python's basic data types, files, functions, and error handling.</p> <p>Working with Data. A detailed tour of how to represent and work with data in Python. Covers tuples, lists, dictionaries, and sets. Students will also learn how to effectively use Python's very powerful list processing primitives such as list comprehensions. Finally, this section covers critical aspects of Python's underlying object model including variables, reference counting, copying, and type checking.</p> <p>Program Organization, Functions, and Modules. More information about how to organize larger programs into functions and modules. A major focus of this section is on how to design functions that are reliable and can be easily reused across files. Also covers exception handling, script writing, and some useful standard library modules.</p> <p>Classes and Objects. An introduction to object-oriented programming in Python. Describes how to create new objects, overload operators, and utilize Python special methods. Also covers basic principles of object oriented programming including inheritance and composition.</p> <p>Inside the Python Object System. A detailed look at how objects are implemented in Python. Major topics include object representation, attribute binding, inheritance, memory management, and special properties of classes including properties, slots, and private attributes.</p> <p>Iterators and Generators. Covers the iteration protocol, iterable objects, generators and generator expressions. A major focus of this section concerns the use of generators to set up data processing pipelines--a particularly effective technique for addressing a wide variety of common systems programming problems (e.g., processing large data files, handling infinite data streams, etc.).</p> <p>Some Advanced Topics. A variety of more advanced programming topics including variable argument functions, anonymous functions (lambda), closures, decorators, static and class methods.</p> <p>Testing, Debugging, and Software Development Practice. This section discusses many issues that are considered important to Python software development. This includes effective use of documentation strings, program testing using both the doc test and unit test modules, and effective use of assertions. The Python debugger and profiler are also described.</p> <p>Packages. Some details on how to organize source code into packages. Some information about installing third party modules.</p> <p>LIST OF PROGRAMS:</p> <ol style="list-style-type: none"> 1. Compute the GCD of two numbers. 2. Find the square root of a number (Newton's method) 3. Exponentiation (power of a number) 4. Find the maximum of a list of numbers 5. Linear search and Binary search 			

6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame.
13. Simulate bouncing ball using Pygame.

PECS7202	C#	0-0-3	Credit 2
<p>Introduction to Dot-net and C # Framework:- Concept and need on .Net and C# framework. Components of .Net framework. Install visual studio.</p> <p>Fundamentals of Programming:- Data-types, Global, Stack and Heap Memory, Common Type System, Reference Type and Value Type, Data-types and Variables Declaration, Implicit and Explicit Casting, Checked and Unchecked Blocks – Overflow Checks, Casting between other data-types, Boxing and Unboxing, E-num and Constant, Operators.</p> <p>Control statements:- Decision making(if else, nested if else, switch) ,looping(while, do-while, for, for each loop), Examples for each control statements.</p> <p>Arrays and Methods:- single and multi dimensional array, methods and its type, parameter passing techniques.</p> <p>Class and Objects: - class, object, methods, parameter passing, Constructor, object passing, nested classes, overloading.</p> <p>Inheritance and Abstract class:- Inheritance, advantages, types, need of abstract class, difference between class and abstract class.</p> <p>Exception Handling: Exception and its types, Error, Exception handling, Using try & catch, Multiple catch, throw, throws, finally, Java's Built in exceptions, user defined exception.</p> <p>Text Books:-</p>			

1. Head First C # 3rd Edition by Andrew Stell
2. C # in depth by Jon Skeet

List of EXPERIMENTS

1. Write a program to print your bio-data.
2. Write a program to find simple interest.
3. Write a program to perform arithmetic operation in console application using switch case.
4. Write a program to perform reverse number.
5. Write a program to perform leap year and Fibonacci series.
6. Write a program to check whether the given No. is armstrong number or not.
7. Write program to print the kth digit from last. e.g. input 23617 and k=4 output 3.
8. Write program to find sum of all digits. Input 23617 output $2+3+6+1+7=19$.
9. Write program, which will find sum of product to consecutive digits. e.g. when the input is 23145 the output is $2 \times 3 + 3 \times 1 + 1 \times 4 + 4 \times 5 = 33$?
1. Write program, which reads two number (assume that both have same number of digits).
2. The program outputs the sum of product of corresponding digits. Input 327 and 539 Output $3 \times 5 + 2 \times 3 + 7 \times 9 = 84$?
3. Write program to find sum of even digits. Input 23617 output $2+6=8$?
4. Write program to find number of digits. Input 423 output 3. Input 21151 output 5 ?
5. Write program to print the last even digit. e.g. input 23613 output 6 ?
6. Write program to print the second last even digit. e.g. input 23863 output 8 (do not use 'if'). Input 325145761 output 4. [Hint: use two loops] ?
7. Read a number. Do half of number after last odd digit. Input 3 times. Input 61389426 output 184167639 (61389213×3). Input 87 output 261. Input 78 output 222 (74×3) ?
8. Find sum of numbers formed by exchanging consecutive digits. In above $42+14+51=107$?
9. Insert 10 numbers into stack using push operation then delete 3 elements using pop operation and display rest?
10. Find smallest number in an array.
11. Find largest number in an array.
12. Count even numbers in an array.
13. Count occurrence of a given number in an array.
14. Input two arrays and merge them in a new array in ascending order.

15. Find Addition of two 3X3 matrices.

16. Find Multiplication of two 3X3 matrices. Find Transpose of a given matrices.

PECS7203	Android Programming	0-0-3	Credit 2
<p>Introduction:-Android ,Setting up development environment, Dalvik Virtual Machine & .apk file extension, Basic Building blocks - Activities, Services, Broadcast Receivers & Content providers ,UI Components - Views & notifications, Components for communication -Intents & Intent Filters, Android API levels (versions & version names).</p> <p>Application Structure:- Android Manifest. xml, Uses-permission & uses-sdk, Resources & R.java, Assets, Layouts & Draw-able Resources, Activities and Activity lifecycle. Hello world Application</p> <p>Emulator-Android Virtual Device:-Launching emulator Editing emulator settings, Emulator shortcuts, Log-cat usage, Introduction to DDMS ,Hello World App ,Creating your first project The manifest file Layout resource Running your app on Emulator ,Second App:- (switching between activities), Develop an app for demonstrating the communication between Intents.</p> <p>Basic UI design:-Form widgets, Text Fields, Layouts, [dip, dp, sip, sp] versus px, Time and Date , Images and media ,Composite , Alert Dialogs & Toast , Popup, Tabs and Tab Activity, Examples.</p> <p>Preferences: Shared Preferences, Preferences from xml, Examples.</p> <p>Menu and Intents: Option menu, Context menu, Sub menu, menu from xml, menu via code , Explicit Intents ,Implicit intents • Examples on Menus and Intents.</p> <p>Styles and Themes: styles.xml, drawable resources for shapes, gradients (selectors) , style attribute in layout file , Applying themes via code and manifest file,Examples.</p> <p>Content Providers: SQLite Programming, SQLite Open Helper, SQLite Database, Cursor, Reading and updating Contacts , Reading bookmarks, Examples.</p> <p>Adapters and Widgtes: Adapters:-Array Adapters, Base Adapters, List View and List Activity Custom list view, Grid View using adapters, Gallery using adapters.</p> <p>Notifications: Broadcast Receivers, Services and notifications, Toast, Alarms.</p> <p>Location Based Services and Google Maps: Using Location Based Services, Finding current location and listening for changes in location , Proximity alerts , Working with Google Maps, Showing google map in an</p>			

Activity , Map Overlays , Itemized overlays , Geo-coder ,Displaying route on map

Sensors: • How Sensors work, Using Orientation and Accelerometer sensors, Best practices for performance

Services: Wi-fi , Telephony, Camera, Bluetooth,

Text Books:

1. Beginning Android Programming with Android Studio, 4ed,by J. F. DiMarzio
2. Android Programming for Beginners by John Horton.

EXPERIMENTS

1. Install Android studio
2. Install android sdk
3. Configure Android Studio for android
4. Create android virtual device(Emulator)
5. Create Hello World application
6. Create activity based applications
7. Implement programs for linking Activities with intents
8. Implement for Passing Data to the Target Activity
9. Implement program for Calling Built-In Applications Using Intents
10. Implement program using UI components
 - i. To Create three pages using layout system - Linear Layout, Relative Layout and Table Layout respectively.
 - ii. To Navigate to these screen from the home page that you created In module 1
 - iii. Implement country listing simple list view.
 - iv. Include custom list view.
 - v. Include a website inside android application using web view.
11. Write applications utilizing Shared Preferences and file system
 - i. Save data using shared preference
 - ii. To create a application to save data to a file in internal storage.
12. Write applications utilizing database and SQLite commands.

OPEN ELECTIVE-I (OE-I) 4th Semester

OECH6201	Polymer Technology	3L-0T-0P	3 Credits
<p>Course objectives: The objectives of this course are to introduce</p> <ol style="list-style-type: none"> 1. Basics of polymer formation, types, chemistry, kinetics, and methods of polymerization; 2. Polymer molecular weight, structure, properties, and degradation; 3. Manufacture and uses of various polymers; 4. Polymer additives, compounding of plastics, and moulding machines. 			
<p>Module-1 (4 weeks/12 Hours) Basics of polymer technology, chemistry, and kinetics Unit I (6 Hours/2 weeks): History of polymers, classification, and types of polymers. Polymer chemistry. Unit II (6 Hours/2 weeks): Kinetics and methods of polymerization. Introduction to reactor design.</p>			
<p>Module-II (4 weeks/12 Hours) Structure and molecular weight Unit III (6 Hours/2 weeks): Properties of plastics and macromolecular structure. Polymer degradation. Unit IV (6 Hours/2 weeks): Molecular weight of polymers and its determination by viscometry, light-scattering, and osmotic pressure methods.</p>			
<p>Module-III (4 weeks/12 Hours) Manufacture of polymers, compounding, and moulding Unit V (6 Hours/2 weeks): Monomers and their manufacture. Manufacture and uses of polymers: PE, PP, PS, PVC, Nylons, Polyesters, PVA, PVAc, PMMA, PAA, Polylactic acid, PF, UF, PC, Teflon. Unit VI (6 Hours/2 weeks): Polymer additives, compounding of plastics. Casting and moulding of plastics, moulding equipment, design of moulds.</p>			
<p>Module-IV (2 weeks/6 Hours) Speciality polymers and applications Unit VII (6 Hours/2 weeks): Application of polymers: Engineering plastics, conducting polymers. Polymers in water treatment, biomedical, and automobile industries. Plastic materials and elastomers as materials of construction in chemical equipment.</p>			
<p>Text books :</p> <ol style="list-style-type: none"> 1. 'Polymer Science and Technology', 3rd ed. by J R Fried, PHI. 2. 'Textbook of Polymer Science' by F W Billmeyer, Wiley. 3. 'Principles of Polymerization', 4th ed. by G Odian, Wiley. 			

Reference Books :

1. 'Polymer Science', 2nd ed. by VR Gowarikar, J Sreedhar, and NV Viswanathan, New Age.
2. 'Contemporary Polymer Chemistry', 3rd ed. by H Allcock, FL Deceased, and J Mark, PHI.
3. 'Introduction to Polymer Science and Technology' by N B Singh and S S Das, New Age.

Course Outcomes (CO):

At the end of the course, students would be able to understand about

1. polymer chemistry, formation, properties
2. molecular weight, additives and their role
3. compounding and operation of moulding machines
4. applications of polymers

OECH6210	Basics of AutoCAD-ChemCAD-Aspen Plus	3-0-0	Credit-3
<p>Course Objectives: To provide basic operative knowledge about AutoCAD, Aspen and Chemcad</p> <p>Module-I (15 Hours) Basic Concepts and Fundamentals of AutoCAD, creating Basic Drawings, manipulating objects, drawing and inquiry commands.</p> <p>Module-II (15 Hours) Basic Concepts and Fundamentals of Aspen Plus, Study of vapour – liquid equilibrium, liquid-liquid equilibrium.</p> <p>Module-III (15 Hours) Basic Concepts and Fundamentals of Chemcad, Reactor Analysis, Column Analysis</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. Using Aspen Plus® in Thermodynamics Instruction A Step-by-Step Guide by Stanley I. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Distillation Design and Control Using ASPENTM Simulation by William L. Luyben. Wiley & Sons, Inc., Hoboken, New Jersey <p>Course Outcome: At the end the students will be able to operate AutoCAD, Aspen and ChemCAD.</p>			

OECE6202	Sustainable Construction Method	3-0-0	3 Credits
<p>Module-I: Introduction: Life Cycle impacts of materials and products – sustainable design concepts – strategies of Design for the Environment -The sun-earth relationship and the energy balance on the earth's surface, climate, wind – Solar radiation and solar temperature – Sun shading and solar radiation on surfaces – Energy impact on the shape and orientation of buildings – Thermal properties of building materials.</p> <p>Module-II: Energy efficient buildings: Passive cooling and day lighting – Active solar and photovoltaic- Building energy analysis methods- Building energy simulation- Building energy efficiency standards- Lighting system design- Lighting economics and aesthetics- Impacts of lighting efficiency – Energy audit and energy targeting- Technological options for energy management.</p> <p>Module-III: Indoor Environmental Quality management: Psychrometry- Comfort conditions- Thermal comfort- Ventilation and air quality-Air conditioning requirement- Visual perception- Illumination requirement- Auditory requirement- Energy management options- -Air conditioning systems- Energy conservation in pumps- Fans and blowers- Refrigerating machines- Heat rejection equipment- Energy efficient motors- Insulation.</p> <p>Module-IV: Green building concept: Green building rating tools- Leeds and IGBC codes. – Material selection, Embodied energy- Operating energy- Façade systems- Ventilation systems- Transportation- Water treatment systems- Water efficiency- Building economics. Green building design case study.</p> <p>Text Books/References:</p> <ol style="list-style-type: none"> 1. Kibert, C. “Sustainable Construction: Green Building Design and Delivery”, John Wiley & Sons, 2005 2. Edward G Pita, “An Energy Approach- Air-conditioning Principles and Systems”, Pearson Education, 2003. 3. Colin Porteous, “The New Eco-Architecture”, Spon Press, 2002. 4. Energy Conservation Building Codes: www.bee-india.nic.in 5. Lever More G J, “Building Energy Management Systems”, E and FN Spon, London, 2000. 6. Ganesan T P, “Energy Conservation in Buildings”, ISTE Professional Center, Chennai, 1999. 7. John Littler and Randall Thomas, “Design with Energy: The Conservation and Use of Energy in Buildings”, Cambridge University Press, 1984. 			

OECS6203	OOps Using C++	3-0-0	Credit-3
<p>Course Objective:</p> <p>This course is aimed at mastering object oriented programming technique in software development and demonstrates these techniques in solution to different types of problems.</p> <p>Module –I (10 Hours) Introduction to OOP, OOP Concepts, Overview of C++, C++ fundamentals, Classes, Objects, Inline functions, function Overloading, Scope Resolution Operator, Constructors ,Destructors, Static Members, Passing objects to functions, Function returning objects.</p> <p>Module – II (10 Hours) Arrays, Pointers, this pointer, References, Dynamic memory Allocation, functions Overloading, Default arguments, Overloading Constructors, copy constructors, Pointers to Functions, Ambiguity in function overloading.</p> <p>Module –III (10 Hours) Operator Overloading, Overloading of some special operators, Inheritance, Types of Inheritance, Protected members, Polymorphism, Virtual base Class, Virtual functions, Pure virtual functions, Abstract classes.</p> <p>Module – IV (8 Hours) Class template, Generic classes, Function template, generic functions, Exception Handling, Exception handling options, Streams, Formatted I/O, C++ File I/O, Array based I/O, Standard Template Library (STL).</p> <p>Text Books</p> <ol style="list-style-type: none"> 1. H. Schildt - C++ The Complete Reference, 4th Edition, Tata McGraw-Hill, New Delhi. <p>Reference Books</p> <ol style="list-style-type: none"> 1. A. N Kanthane, Object Oriented Programming with ANSI & Turbo C++, Pearson Education, New Delhi. 2. Object Oriented Programming with C++, E. Balagurusamy, Mcgraw Hill Education 3. Object Oriented Programming in C Robert Lafore – SAMS Publishing. <p>Course Outcomes: Students will be able to -</p> <ol style="list-style-type: none"> 1. Familiar with issues with software design. 2. Be familiar to key concepts of object oriented programming. 3. Have knowledge about C++ concepts related to good modular design. 4. Implement patterns involving realization of abstract interfaces and polymorphism. 5. Learn how to utilize Exceptions and standard template library. 			

OEEE6204	Signals and Systems	3L-0T-0P	3 Credits
<p>Module 1: Introduction to Signals and Systems (8 hours): Signals and systems as seen in everyday life, and in various branches of engineering and science. Signal properties: periodicity, absolute integrability, determinism and stochastic character. Some special signals of importance: the unit step, the unit impulse, the sinusoid, the complex exponential, some special time-limited signals; continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, realizability. Examples.</p> <p>Module 2: Behavior of continuous and discrete-time LTI systems (12 hours) Impulse response and step response, convolution, input-output behavior with aperiodic convergent inputs, cascade interconnections. Characterization of causality and stability of LTI systems. System representation through differential equations and difference equations. State-space Representation of systems. State-Space Analysis, Multi-input, multi-output representation. State Transition Matrix and its Role. Periodic inputs to an LTI system, the notion of a frequency response and its relation to the impulse response.</p> <p>Module 3: Fourier, Laplace and z- Transforms (12 hours) Fourier series representation of periodic signals, Waveform Symmetries, Calculation of Fourier Coefficients. Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. The Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval's Theorem. Review of the Laplace Transform for continuous time signals and systems, system functions, poles and zeros of system functions and signals, Laplace domain analysis, solution to differential equations and system behavior. The z-Transform for discrete time signals and systems, system functions, poles and zeros of systems and sequences, z-domain analysis.</p> <p>Module 4: Sampling and Reconstruction (8 hours) The Sampling Theorem and its implications. Spectra of sampled signals. Reconstruction: ideal interpolator, zero-order hold, first-order hold. Aliasing and its effects. Relation between continuous and discrete time systems. Introduction to the applications of signal and system theory: modulation for communication, filtering, feedback control systems.</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. A. V. Oppenheim, A. S. Willsky and S. H. Nawab, "Signals and systems", Prentice Hall India, 1997. 2. J. G. Proakis and D. G. Manolakis, "Digital Signal Processing: Principles, Algorithms, and Applications", Pearson, 2006. <p>References:</p> <ol style="list-style-type: none"> 1. H. P. Hsu, "Signals and systems", Schaum's series, McGraw Hill Education, 2010. 2. S. Haykin and B. V. Veen, "Signals and Systems", John Wiley and Sons, 2007. 			

3. A. V. Oppenheim and R. W. Schaffer, "Discrete-Time Signal Processing", Prentice Hall, 2009.
4. M. J. Robert, "Fundamentals of Signals and Systems", McGraw Hill Education, 2007.
5. B. P. Lathi, "Linear Systems and Signals", Oxford University Press, 2009.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

1. Understand concepts of signals and continuous time and discrete time systems.
2. Understand the behavior of continuous time and discrete time systems.
3. Analyze systems in complex frequency domain.
4. Understand sampling theorem and its implications in signal reconstruction from the samples.

OEEC6205	Python for Engineers	3-0-0	Credits 3
COURSE OBJECTIVES <ol style="list-style-type: none"> 1. To learn syntax, semantics and create functions in Python. 2. Handle strings and Files in python for machine learning, Image processing and IoT applications. 			
MODULE-I (12 Hours) Unit-1 Fundamental data types and data structures, Organizing code with functions, modules and packages, Loading packages, namespaces, Control flow. Unit-2 Types & Operations: Numbers Types: Numeric type basics, Numbers in action, Other numeric types- Strings Fundamentals: String Basics, String Literals, Strings in action, String Methods – Lists and Dictionaries- Tuples- Files.			
MODULE-II (12 Hours) Unit-3 The NumPy array, Selecting data using slicing and logical indexing, Efficient numerical processing with multi-dimensional arrays, Expressive array operations and manipulations, Unit 4 1D and 2D data structures: Series and Data Frame, Normalizing data, Dealing with missing data, Data manipulation (alignment, aggregation, and summarization), Statistical analysis,			
MODULE-III (12 Hours) Unit-5 Linear and nonlinear models, Constant and variable learning-rates, Cost functions, regularization methods, and			

other constraints, Fitting, transforming, and predicting.

Unit-6

Logarithmic and curvilinear transforms, Data scaling, Outliers, Linear regressors, l1 and l2 normalization, Support vector machines (SVM).

MODULE – IV

(8 Hours)

Unit-7

Image storage formats, Scikit-image, Smoothing and de-noising, Edge detection, Feature-based segmentation.

Introduction to Python for IOT, Library support in Python, Python for IOT Applications.

Exception & Tools: Exception Basics-Exception Coding Details- Exception Objects- Designing with Exceptions.

Text Books:

1. Mark Lutz ISRD Group, “Learning python”, O’Reilly Publication 5th edition, 2013.

Reference Books:

1. Richard L. Halterman, Fundamentals of Python Programming, Southern Adventist University, 2017.
2. Mark Summerfield, “Programming in python 3”, Pearson Education 2009.
3. C. Mullar, ”Introduction to Machine learning with python”, Oreilly, 20013

Course Outcomes:

1. Implement the functions of Python in signal and image processing.
2. Examine python syntax, and semantics for python flow control.

OEME6206	Safety Engineering	3-0-0	Credit-3
<p>CONCEPTS: Evolution of modern safety concept- Safety policy - Safety Organization - line and staff functions for safety- Safety Committee- budgeting for safety.</p> <p>TECHNIQUES: Incident Recall Technique (IRT), disaster control, Job Safety Analysis (JSA), safety survey, safety inspection, safety sampling, Safety Audit.</p> <p>ACCIDENT INVESTIGATION AND REPORTING: Concept of an accident, reportable and non reportable accidents, unsafe act and condition – principles of accident prevention, Supervisory role- Role of safety committee – Accident causation models - Cost of accident. Overall accident investigation process - Response to accidents, India reporting requirement, Planning document, Planning matrix, Investigators Kit, functions of investigator, four types of evidences, Records of accidents, accident reports Class exercise with case study.</p> <p>SAFETY PERFORMANCE MONITORING: Reactive and proactive monitoring techniques - Permanent total disabilities, permanent partial disabilities, temporary total disabilities -Calculation of accident indices,</p>			

frequency rate, severity rate, frequency severity incidence, incident rate, accident rate, safety “t” score, safety activity rate – problems.

SAFETY EDUCATION AND TRAINING :Importance of training-identification of training needs-training methods – programme, seminars, conferences, competitions – method of promoting safe practice - motivation – communication - role of government agencies and private consulting agencies in safety training – creating awareness, awards, celebrations, safety posters, safety displays, safety pledge, safety incentive scheme, safety campaign – Domestic Safety and Training.

References

1. Accident Prevention Manual for Industrial Operations”, N.S.C. Chicago, 1982
2. Heinrich H.W. “Industrial Accident Prevention” McGraw-Hill Company, New York, 1980.
3. Krishnan N.V. “Safety Management in Industry” Jaico Publishing House, Bombay, 1997.
4. John Ridley, “Safety at Work”, Butterworth & Co., London, 1983.
5. Roland P. Blake , “Industrial Safety” Prentice Hall, Inc., New Jersey, 1973
6. “Industrial safety management”, L M Deshmukh, TATA McGraw Hill, 2010

OEMA6207	Numerical Methods	3-0-0	Credit-3
Module –I (12 Hours) Number system, Floating point arithmetic, Errors, truncation error, Bisection method, Scant method, Regula-Falsi Method, Newton-Raphson method, Muller method, Rate of Convergence, Lagranges’s interpolation, Newton divided difference interpolation, Newton’s forward and backward interpolation, Piecewise and Spline interpolation.			
Module -II : (12 Hours) Numerical integration: Romberg integration, Gaussian Quadrature (2-point, 3-point), Newton- Cotes rules. Numerical solution to ordinary differential equations: Taylor’s series methods, Euler method, modified Euler method Runge - Kutta methods, predictor- corrector method, multistep methods.			
Module -III: (8 Hours) Matrix eigen value problem, power method, Rayleigh Quotient, shifted power method, inverse power method, QR method.			
Module IV: (8 Hours) Parabolic Partial Differential Equation: Explicit Method, Implicit method, Crank-Nicolson method.			

Hyperbolic Partial Differential Equation: Explicit Method, Implicit method. Elliptic Partial Differential Equation: Finite-difference method.

Text Books

1. Jain M.k, Iyengar S.R.K & Jain R.K, Numerical methods for Scientific and Engineering Computation, 6th Edition, New Age International(P) Ltd.
2. Atkinson Kendall E, An introduction to Numerical Analysis, 2nd Edition, John Wiley & Sons

Reference Books

1. Fusset L.V, Applied numerical Analysis Using MATLAB, 2nd Edition, PEARSON
2. Chapra Steven C & Canale Raymond P., Numerical methods for Engineers, 7th Edition, McGraw Hill Education.

OEMA6208	Discrete Mathematics	3-0-0	Credit-3
<p>Module-I. (15 Hours) Sets and Propositions: Principle of Inclusion and Exclusion, Mathematical induction, Propositions, Logical Connectives, Conditionals and Bi-conditionals, Logical Equivalences, Predicate Calculus, Quantifiers, Theory of inference, Methods of proof. Relations and Functions: properties of binary relations, Closure of relations, Warshall's algorithm, Equivalence relations, Partial ordering relations and lattices, Functions, Composition of Functions, Invertible Functions, Recursive Functions, Pigeonhole principle.</p> <p>Module-II. (8 Hours) Generating Functions: Generating Functions, Recurrence Relations and Recursive Algorithms, Recurrence relations, Linear recurrence relations with constant coefficients, Solution of recurrence relations by the method of generating functions, Divide and conquer algorithms,</p> <p>Module-III. (12 Hours) Groups and Rings: groups and subgroups, Cosets and Lagrange's theorem, Codes and Group codes, Error detection and correction using Group codes, Isomorphism, Homomorphism and normal subgroups, Rings, Integral domains and Fields, Boolean Algebras: Lattices and algebraic systems, Principle of duality, Distributive and complemented lattices, Boolean functions and Boolean expressions, Simplification of logic expressions using Karnaugh Map, Switching Circuits.</p> <p>Module-IV. (10 Hours) Graphs and Trees: Basic terminology, Diagraphs and relations, representation of Graphs, paths and circuits, graph traversals, shortest path in weighted graphs, Eulerian paths and circuits, Hamiltonian paths and circuits, Traveling sales man problem, Planar graphs, Graph Coloring, Trees, Rooted trees, Binary search trees, Spanning trees, Minimum spanning trees, Kruskal's Algorithm, Prim's Algorithm.</p>			

Text Book:

1. C. L. Liu, D. P. Mohapatra, Elements of Discrete Mathematics: A computer Oriented Approach, McGraw Hill Education (India) Private Limited, 4th Edition, 2013.

Reference Books:

1. R.K. Bisht, and H.S. Dhami, Discrete Mathematics, Oxford University Press, First Edition, 2015
2. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw Hill, 5th ed, 2003.
3. J. P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications, to Computer Science, Tata Mc-Graw Hill, 2001.
4. Joe L. Mott, A. Kandel, and T. P. Baker, Discrete Mathematics for Computer Scientists & Mathematics, Prentice Hall of India, 2nd Edition, 2006.
5. N. Deo, Graph Theory with applications to Engineering & Computer Science, Prentice Hall of India, 2006.
6. S. Lipschutz, Discrete Mathematics, Tata McGraw Hill, 2005

OEMT6209	Composite Materials	3-0-0	Credit-3
Objective of the Course: <ol style="list-style-type: none"> 1. To obtain knowledge on classification, processing, characterization and applications of composite materials. 2. To obtain knowledge on mechanical properties and failure mechanisms of composites under loading conditions for engineering applications 			
Module I (12 hours) Introduction: definitions and classifications; natural composites; role of matrix and reinforcement; factors which determine properties; the benefits of composites. Reinforcements and the reinforcement matrix interface: natural fibers; synthetic organic fibers – aramid, polyethylene; and synthetic inorganic fibers – glass, alumina, boron, carbon, silicon based fibers; particulate and whisker reinforcements, reinforcement-matrix interface – wettability, interfacial bonding, methods for measuring bond strength. Metal matrix composites: Introduction, important metallic matrices; metal matrix composite processing: solid state processing – diffusion bonding, powder metallurgy; liquid state processing – melt stirring, compo-casting (rheocasting), squeeze casting, liquid infiltration under gas pressure; deposition – spray co-deposition and other deposition techniques like CVD and PVD; in situ processes. Interface reactions. Properties of MMCs – physical properties; mechanical properties like elastic properties, room temperature strength and ductility, properties at elevated temperatures, fatigue resistance. Processing, structure of multi-filamentary superconductors, properties of aluminium reinforced with silicon carbide particles.			
Module II (12 hours) Ceramic matrix composites: Introduction; processing and structure of monolithic materials– technical ceramics, glass-ceramics. Processing of ceramics: conventional mixing and pressing – cold pressing and			

sintering, hot pressing, reaction bonding processes, techniques involving slurries, liquid state processing – matrix transfer moulding, liquid infiltration, sol-gel processing, vapour deposition techniques like CVD, CVI, liquid phase sintering, lanxide process and in situ processes. Processing, properties and applications of alumina matrix composites - SiC whisker reinforced, zirconia toughened alumina; Glass ceramic matrix composites; Carbon-carbon composites - porous carbon-carbon composites, dense carbon-carbon composites.

Polymer matrix composites: Introduction; polymer matrices – thermosetting, thermoplastic, rubbers. Processing of PMCs: Hand methods – hand lay-up, spray-up methods; Moulding methods – matched die moulding, bag moulding processes (autoclave moulding), resin transfer moulding, pultrusion; Filament winding; Injection moulding. Processing, properties and applications of fibre-reinforced epoxies, PEEK matrix composites, rubber matrix composites. Damping characteristics. Environmental effects in polymer matrix composites. Recycling of PMCs.

Module III

(12 hours)

Composite structures: Sandwich structures, foam core type arrangements; Honey comb structures.

Micromechanics of unidirectional composites: micromechanics models for stiffness – longitudinal stiffness, transverse stiffness, shear modulus, poisson's ratio. Micromechanics models for strength – longitudinal tensile strength, longitudinal compressive strength, transverse tensile strength, transverse compressive strength, in plane shear failure, thermal and moisture effects.

Short fibre composites: reasons for using short fibre composites, fibre length, fibre orientation, stress and strain distribution at fibres, critical fibre length and average fibre stress, stiffness and strength: stiffness of aligned systems, non-aligned systems and variable fibre orientation, strength of aligned systems, 2-D composites, variable fibre orientation.

Module IV

(06 hours)

Toughening mechanisms in composite materials: crack bowing, crack deflection, debonding, pull-out, wake toughening, microcrack toughening, transformation toughening.

Suggested Text Books:

1. Composite Materials Science and Engineering, K.K. Chawla, Springer Foundry Technology by Lal.
2. Composite Materials: Engineering and Science, by Matthews and Rawlings, CRC Press.

Suggested Reference Books:

1. An Introduction to composite material, by D. Hull and T.W. Clyne, Cambridge University press.
2. Metal Matrix Composites, Thermo mechanical Behaviour by M.Taya, and R.J. Arsenault, Pergamon Press, Oxford.
3. Fundamentals of Metal Matrix Composites by S. Suresh, A. Martensen, and A. Needleman, Butterworth, Heinemann

Course Outcomes:

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

1. Get knowledge on classification, processing, characterization and applications of various composite materials.
2. Ability to arrive at different deformation and failure mechanisms of composite materials under different loading conditions in engineering applications.