Maharaja Ranjit Singh Punjab Technical University
Bathinda-151001

FACULTY OF ENGINEERING & TECHNOLOGY

SYLLABUS

FOR

B.TECH. COMPUTER SCIENCE & ENGINEERING
(IOT AND CYBER SECUITY INCLUDING BLOCK CHAIN TECHNOLOGY)

(4 YEARS PROGRAMME)

2023 BATCH ONWARDS

GROUP-A
1ST SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BPHYS1-101	Physics (Semiconductor Physics)	3	1	0	40	60	100	4
BMATH1-101	Mathematics-I (Calculus, Linear Algebra)	3	1	0	40	60	100	4
BMECE0-101	Engineering Graphics & Design	2	0	0	40	60	100	2
BELEE0-101	Basics Electrical Engineering	3	1	0	40	60	100	4
BPHYS1-102	Physics (Semiconductor Physics) Lab.	0	0	2	60	40	100	1
BMECE0-102	Engineering Graphics & Design Lab.	0	0	6	60	40	100	3
BELEE0-102	Basics Electrical Engineering Lab.	0	0	2	60	40	100	1
BMNCC0-004	Drug Abuse: Problem, Management and Prevention	2	0	0	100	0	100	0
BMNCC0-010	Universal Human values – I	22 hrs (to be completed during 21 days SIP)*			Satisfactory/ Unsatisfactory			0
ZZZZZ	Introduction to Concerned Branch of Engineering	2	0	0	100	0	100	0
Total		15	3	10	540	360	900	19

Note:

1. There will be Induction Programme of 3 weeks before start of normal classes.
2. Drug Abuse: Problem, Management and Prevention and Introduction to Concerned Branch of Engineering are non-credit Courses; however, it is necessary to secure atleast E grade in each of them.

* As per AICTE SIP Manual Hour Plan available at http://fdp-si.aicte-india.org

2ND SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BCHEM0-101	Chemistry-I	3	1	0	40	60	100	4
BMATH1-201	Mathematics-II (Probability and Statistics)	3	1	0	40	60	100	4
BHUMA0-101	English	2	0	0	40	60	100	2
BCSCE0-101	Programming for Problem Solving	3	0	0	40	60	100	3
BCHEM0-102	Chemistry-I Lab.	0	0	2	60	40	100	1
BHUMA0-102	English Lab.	0	0	2	60	40	100	1
BCSCE0-102	Programming for Problem Solving Lab.	0	0	4	60	40	100	2
BMFPR0-101	Manufacturing Practices	1	0	4	60	40	100	3
Total		12	2	12	400	400	800	20

Note:

1. Marks of 4 Week Manufacturing Practices Training during Summer Vacation will beincluded in 3rdSemester

(3rd SEMESTER)

Course		Contact Hrs.			Marks			Credits
Code	**Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BMATH1-301	Calculus and Ordinary Differential Equation	3	0	0	40	60	100	3
BCSES2-301	Introduction to IoT	3	0	0	40	60	100	3
BCSES1-302	Data structure &Algorithms	3	1	0	40	60	100	4
BCSES1-303	Digital Electronics	3	1	0	40	60	100	4
BCSES1-304	Data structure & Algorithms Laboratory	0	0	4	60	40	100	2
BCSES1-305	Digital Electronics Laboratory	0	0	2	60	40	100	1
BCSES1-306	IT Workshop (SciLab / MATLAB) Laboratory	0	0	4	60	40	100	2
BCSES1-307	Institution Training-I*(4 Weeks) done after 2nd semester	-	-	-	60	40	100	3
BHSMC0-007	Development of Societies	3	0	0	40	60	100	3
BMNCC0-052	The Maharaja of People	2	0	0	100	-	100	0
Total 6 Theory & 3 Lab. Courses		**17**	**2**	**10**	**540**	**460**	**1000**	**25**

(4th SEMESTER)

Course		Contact Hrs.			Marks			Credits
Code	**Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BCSES2-401	Introduction to Cyber Security	3	1	0	40	60	100	4
BCSES1-401	Computer Organization &Architecture	3	0	0	40	60	100	3
BCSES1-402	Operating Systems	3	1	0	40	60	100	4
BCSES1-403	Object Oriented Programming	3	1	0	40	60	100	4
BCSES1-404	Operating Systems Laboratory	0	0	2	60	40	100	1
BCSES1-405	Object Oriented Programming Laboratory	0	0	4	60	40	100	2
BHSMC0-016	Organizational Behaviour	3	0	0	40	60	100	3
BHSMC0-026	Universal Human values – II Understanding Harmony	2	1	0	40	60	100	3
Total 6 Theory & 2 Lab. Courses		**17**	**4**	**06**	**360**	**440**	**800**	**24**

PHYSICS (SEMICONDUCTOR PHYSICS)

Subject Code: BPHYS1-101 **L T PC** **Duration: 38Hrs.**
3 1 0 4

Course Outcomes

1. Understanding of Quantum theory, Electronic Material, Semiconductors and Light-Semiconductor Interactions and Fiber Optics Communication.
2. Skill enhancement to solve numerical problems related with Quantum theory, Electronic Material, Semiconductors and Light- Semiconductor Interactions and Fiber Optics Communication.
3. Apply knowledge of Quantum theory, Electronic Material, Semiconductors and Light-Semiconductor Interactions and Fiber Optics Communication to go for higher studies in diverse fields.
4. To inculcate and develop the ability to think abstractly.

UNIT-I

Quantum Theory: (10 Hrs.)
Need and origin of Quantum Concept, Wave-particle duality, Matter waves, Group and Phase velocities, Concept of Uncertainty Principle and its application: nonexistence of electron in the nucleus, wave function & its significance, normalization of wave function, Schrodinger wave equation: time independent and dependent, Eigen functions & Eigen values, particle ina box in 1-D. Concept of scattering from a potential barrier and tunneling.

UNIT-II

Electronic Materials: (8 Hrs.)
Free electron theory, Density of states and energy band diagrams, Introduction to bandgap theory, Direct and in direct and gaps. Types of electronic materials: metals, semiconductors and insulators, Occupation probability, Fermi level, Effective mass, phonons.

UNIT-III

Semiconductors and Light- Semiconductor Interactions: (12 Hrs.)
Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier- concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices. Optical transitions in bulk semiconductors: absorption, spontaneousemission, and stimulated emission; Lasers: principles and working of laser: population inversion, pumping, types of lasers with emphasis on the semi-conductor Lasers.

UNIT-IV

Fibre Optics Communication: (8 Hrs.)
Introduction and importance of use of optical fibres in data transmission, optical fibre as a dielectric wave guide: total internal reflection, numerical aperture and various fibre parameters, losses associated with optical fibres, step and graded index fibres, applications of optical fibres.

Recommended Books:

1. Satayaparkash, 'Quantum Mechanics'.
2. A. Ghatak and Lokanathan, 'Quantum Mechanics'.
3. J. Singh, 'Semiconductor Optoelectronics: Physics and Technology', McGraw HillInc.,1995.
4. S.M. Sze, 'Semiconductor Devices: Physics and Technology', Wiley, **2008**.
5. A. Yariv and P. Yeh, 'Photonics: Optical Electronics in Modern Communications', Oxford University Press, New York, **2007**.
6. P. Bhattacharya, 'Semiconductor Optoelectronic Devices', Prentice Hall of India, **1997**.
7. M R Shenoy, 'Online Course: Semiconductor Optoelectronics', NPTEL.
8. Monica Katiyar and Deepak Gupta, 'Online Course: Optoelectronic Materials and

Devices', NPTEL.
9. Ben. G. Streetman, 'Solid State Electronics Devices', Pearson PrenticeHall.

MATHEMATICS-I (CALCULUS, LINEARALGEBRA)

Subject Code: BMATH1-101 **L T PC** **Duration: 46Hrs.**
3 1 0 4

Course Outcomes:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

The students will learn:

1. To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
2. The fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
3. The tool of power series and Fourier series for learning advanced EngineeringMathematics.
4. To deal with functions of several variables that are essential in most branches of engineering.
5. The essential tool of matrices and linear algebra in a comprehensive manner.

UNIT–I

Calculus: (12 Hrs.)

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L' Hospital's rule; Maxima and minima. Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

UNIT –II

Sequences and Series: (10 Hrs.)

Convergence of sequence and series, tests for convergence (Comparison test, Ratio test, Raabe's test, Logarithmic test, Cauchy's root test, Cauchy's Integral test, series of positive and negative terms); Power series, Taylor's series, series for exponential, trigonometric and logarithm functions.

UNIT –III

Multivariable Calculus: (12 Hrs.)

Limit, continuity and partial derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence: Geometrical interpretation and basic properties, Directional derivative.

UNIT –IV

Linear Algebra: (12 Hrs.)

Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

Recommended Books:

1. G.B. Thomas and R.L. Finney, 'Calculus and Analytic Geometry', 9th Edn., Pearson, Reprint, **2002**.
2. Erwin Kreyszig, 'Advanced Engineering Mathematics', 9th Edn, John Wiley & Sons,**2006**.
3. T.Veerarajan,'EngineeringMathematicsforFirstYear',TataMcGrawHill,NewDelhi, **2008.**
4. B.V. Ramana, 'Higher Engineering Mathematics', 11th Reprint, Tata McGraw Hill, New Delhi,**2010**.
5. D. Poole, 'Linear Algebra: A Modern Introduction', 2nd Edn., Brooks/Cole,**2005**.
6. B.S. Grewal, 'Higher Engineering Mathematics', 36th Edn., Khanna Publishers, **2010**.

ENGINEERING GRAPHICS &DESIGN

Subject Code: BMECE0-101 **L T P C** **Duration: 30 Hrs.**
2 0 0 2

Course Objective

1 To understand the concept of Engineering drawing, Drawing instruments, Graphic standards and its application in Engineering.
2 To develop Skills in Preparation of Basic Drawings.
3 To develop Skills in Reading and Interpretation of Engineering Drawings.
4 Understand the concept of projection and acquire visualization skills
5 To prepare the student to communicate effectively.
6 To understand the concept of 2D and 3D drawings

Course Outcomes

1 Knowledge of Engineering drawing, drawing instruments and application .
2 Exposure to preparation of simple drawings
3 Inculcate the Concept of 2D and 3D and the related drawings
4 Exposure to creating working drawings
5 Exposure to improved communication and ability to visualize objects

1. Introduction
Engineering Drawing/Engineering Graphics/Technical Drawing - a Visual Science. Types of Engineering Drawing, Introduction to drawing equipment and use of instruments. Symbols and conventions in drawing Practice. Types of lines and their use, BIS codes for lines, Technical lettering as per BIS codes, Introduction to Dimensioning, Concepts of scale in drawing, Types of scales. Basic Definition of geometrical objects: Points, lines, planes and solids.

2. Theory of Projections - Relevance of projection, Type of projections, Perspective, Orthographic, Axonometric and their basic principles, System of orthographic projection: in reference to quadrants and octants, illustration through simple problems of projection.

3. Projection of Points- Projection of points in quadrants and octants. Projection of point on Auxiliary planes.

4. Projection of Lines -Parallel to both H P and V P, Parallel to one and inclined to other, and inclined to both, contained in profile plane. True length and angle orientation of straight line: rotation method and auxiliary plane method. Distance between two nonintersecting lines, and trace of line.

5. Projection of Planes- Difference between plane and lamina. Projection of lamina Parallel to one and perpendicular to other, Perpendicular to one and inclined to other, Inclined to both reference planes, and Lamina oblique to three reference planes. Application of auxiliary planes, and trace of planes.

6. Projection of Solids- Definition of solids, types of solids, and elements of solids. Projection of solids in first or third quadrant, with axis parallel to one and perpendicularto other, axis parallel to one inclined to other, axis inclined to both the principle plane, axis perpendicular to profile plane and parallel to both H P and V P. Visible and invisible details in the projection. Use rotation and auxiliary plane method to draw the projections.

7. Section of Solids Definition of Sectioning and its purpose. Procedure of Sectioning, Types of sectional planes. Illustration through examples.

8. Development of Surface Purpose of development, Parallel line, radial line and triangulation method. Development of prism, cylinder, cone and pyramid surface for bothright angled and oblique solids, and development of surface of sphere.

9. Isometric Projection Classification of pictorial views, Basic Principle of Isometric projection, Difference between isometric projection and isometric drawing. Isometric projection of solids such as cube, prism, pyramid and cylinder, and assignments on isometric projection of simple machine parts.

10. Orthographic Projection Review of principle of Orthographic Projection, Sketch/drawingof blocks, and of simple machine parts.

Recommended Text/Reference Books

1. N.D. Bhatt, V.M. Panchal& P.R. Ingle, 'Engineering Drawing', Charotar Publishing House, 2014.
2. M.B. Shah & B.C. Rana, 'Engineering Drawing and Computer Graphics', Pearson Education, 2008.
3. B. Agrawal& C.M. Agrawal, 'Engineering Graphics', TMH Publication, 2012.
4. K.L. Narayana& P. Kannaiah, 'Text book on Engineering Drawing', Scitech Publishers,2008.

BASIC ELECTRICAL ENGINEERING

Subject Code: BELEE0-101 **L T PC** **Duration: 42Hrs.**
3 1 0 4

Course Outcomes:

1. To understand and analyze basic DC and AC circuits.
2. To study the use and working principle of single phase transformers.
3. To study the application and working principles of three phase and single phase induction motors.
4. To introduce to the components of low voltage electrical installations.

UNIT-1

DC Circuits: (8 Hrs.)
Electrical circuit elements (R, L and C), voltage and current sources, Ohm's law, Kirchhoff current and voltage laws, analysis of simple circuits with dcexcitation Superposition, Thevenin and Norton Theorems. Step response of RL, RC circuits.

UNIT-2

AC Circuits: (12 Hrs.)
Representation of sinusoidal waveforms, average, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC series and parallel combinations, series and parallel resonance. Three phase voltage source, phase sequence, three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-3

Transformers: (10 Hrs.)
Magnetic materials, BH characteristics, Single-phase Transformer, no load and full load

conditions,phasordiagrams,equivalentcircuit,calculationoflossesintransformers,regulation and efficiency, Auto-transformers, their applications and comparison with two winding transformers.

UNIT-4

Electrical Machines: (8 Hrs.)

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Direct-On-Line and Star-Delta starters**.** Construction and working of single-phase motors(Splitphase,shadedpole,capacitorstart,capacitorrun,capacitorstartandrunmotors).

Electrical Installations: (4Hrs.)

Components of LT Switchgear: Switch Fuse Unit (SFU), Miniature Circuit Breaker (MCB), Earth Leakage Circuit Breaker (ELCB), Moulded Case Circuit Breaker (MCCB), Types of Wiring, Earthing.

Recommended Books:

1. D.P. Kothari and I.J. Nagrath, 'Basic Electrical Engineering', Tata McGraw Hill,**2010**.
2. D.C. Kulshreshtha, 'Basic Electrical Engineering', McGraw Hill,**2009**.
3. L.S. Bobrow, 'Fundamentals of Electrical Engineering', Oxford University Press,**2011**.
4. E. Hughes, 'Electrical and Electronics Technology', Pearson,**2010**.
5. V.D. Toro, 'Electrical Engineering Fundamentals', Prentice Hall, India,**1989**.
6. J.P.S. Dhillon. J.S. Dhillon and D. Singh, 'Principles of Electrical & Electronics Engineering', Kalyani Publishers, New Delhi, **2005**.

PHYSICS (SEMICONDUCTOR PHYSICS) LAB.

Subject Code: BPHYS1-102 **L T P C**
0 0 2 1

Course Outcomes:

1. Able to verify the concepts/laws of basic quantum Semiconductors and electronics.
2. To inculcate and develop scientific aptitude by performing the various experiments.
3. Skill enhancement by solving experimental problems.
4. To inculcate the spirit of teamwork.

Note: Students will have to perform at least 10 experiments from the given topic/list.

Experiments based on Semiconductor Physics:

1. To study the V-I characteristic of different PN junction diode-Ge andSi.
2. To study the V-I characteristic of Zenerdiode.
3. To study the V-I characteristic of LED.
4. To analyze the suitability of a given Zener diode as a power regulator.
5. To find out the intensity response of a solar cell/Photodiode.
6. To find out the intensity response of a LED.
7. To determine the band gap of a semiconductor.
8. To determine the resistivity of a semiconductor by four probe method.
9. To confirm the de Broglie equation for electrons.
10. To study voltage regulation and ripple factor for a half-wave and a full-wave rectifier without and with different filters.
11. To study the magnetic field of a circular coil carrying current.
12. To find out polarizability of a dielectric substance.
13. To study B-H curve of a ferromagnetic material using CRO.
14. To find out the frequency of AC mains using electric-vibrator.
15. To find the velocity of ultrasound in liquid.
16. To study the Hall effect for the determination of charge current densities.
17. Distinguish between Diamagnetic material, Paramagnetic and ferromagnetic material.

18. Measurement of susceptibility of a liquid or a solution by Quincke's method:
19. AFM experiment to study the sample with the nano-scale objects and measure surface topography with different scales, width and height of nano objects, and force-distance curves.
20. To study the temperature coefficient of Resistance of copper.

Physics Virtual Lab. Experiments:

21. To plot the characteristics of thermistor and hence find the temperature coefficient of resistance.
22. To determine the resistivity of semiconductors by Four Probe Method.
23. To study the forward and reverse biased characteristics of PNP and NPN transistors.
24. To study the B-H Curve.
25. To study the Hall effect experiment to determine the charge carrier density.
26. To determine the magnetic susceptibilities of paramagnetic liquids by Quincke's Method.
27. To study the phenomena of magnetic hysteresis and calculate the retentivity, coercivity and saturation magnetization of a material using a hysteresis loop tracer.
28. Verification and design of combinational logic using AND, OR, NOT, NAND and XORgates.

Note: Any other experiment based on the above mentioned topics may be included.

ENGINEERING GRAPHICS & DESIGNLAB.

Subject Code: BMECE0-102 **L T P C** **Duration: 45 Hrs.**
0 0 6* 3

Course Objective

1. To have an overview of interactive computer graphics.
2. To learn the various 2D and 3D draw commands for drawing preparation
3. To understand the use of modify commands for making of drawings
4. To learn the dimensioning of drawings
5. To understand the use of the software in different Engineering applications

Course Outcomes

1 Understand the basics of computer graphics
2 Expertise to draw 2D and 3D drawings
3 Ability to do editing and dimensioning of drawings
4 Exposure to solid modeling

1. Overview of Computer Graphics

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];

2. Customization & CAD Drawing

Consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerance; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

3. Annotations, Layering & other Functions

Applying dimensions to objects, applying annotations to drawings; Setting up and use of

Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques.

.*Lab work will be performed in two parts:

(i) Computer Lab (2 hours) Computer Graphics, CAD Drawing etc.

(ii) Drawing Hall (04 hours) Manual practice on drawing sheets of theory content the relevant theory part of Engineering Graphics & Design may also be covered in Lab work.

BASIC ELECTRICAL ENGINEERING LAB

Subject Code: BELEE0-102 **L T P C**
0 0 2 1

Course Outcomes:

1. Get an exposure to common electrical components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Understand the usage of common electrical measuring instruments.
4. Understand the basic characteristics of transformers and electrical induction motors.

EXPERIMENTS/DEMONSTRATIONS

1. To study basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. real-life resistors, capacitors and inductors.
2. To verify Ohm's law.
3. To verify Kirchhoff's voltage and current laws.
4. To verify Superposition Theorem.
5. To verify The venin Theorem.
6. To obtain the sinusoidal steady state response of R-L circuit – impedance calculation and verification. Observation of phase differences between current and voltage.
7. To obtain the sinusoidal steady state response of R-C circuit – impedance calculation and verification. Observation of phase differences between current and voltage.
8. To study resonance phenomenon in R-L-C series circuits.
9. To perform open circuit and short circuit test on a single phase transformer and calculatethe efficiency.
10. Demonstration of cut-out sections of machines: Induction machine (squirrel cage rotor and slipring arrangement) and single-phase induction machines.
11. To connect, start and reverse the direction of rotation by change of phase-sequence of connectionsof three phase induction motor.
12. To connect, start and reverse the direction of rotation of single-phase induction motor.
13. To demonstrate working of DOL starter for three-phase induction motor.
14. To demonstrate working of star-delta starter for three-phase induction motor.
15. To demonstrate the components of LT switchgear.

DRUG ABUSE: PROBLEM, MANAGEMENT ANDPREVENTION

Subject Code: BMNCC0-004 **L T PC** **Duration: 30 Hrs.**
2 0 0 0

Course Outcomes:

1. Differentiate between physical and psychological dependence of drug abuse.
2. Understanding the consequences of drug abuse.
3. Explain prevention of drug abuse.
4. Identify treatments and management of drug abuse.

UNIT-I

Meaning of Drug Abuse:

Meaning: Drug abuse, Drug dependence and Drug addiction. Nature and extent of drug abuse in India and Punjab.

UNIT-II

Consequences of Drug Abuse:
Individual: Education, Employment, Income.
Family: Violence.
Society: Crime.
Nation: Law and Order problem.

UNIT-III

Prevention of Drug Abuse:
Role of Family: Parent-child relationship, Family support, supervision, shipping values, active scrutiny.
School: Counselling, Teacher as role-model, Parent-teacher-health professional coordination, Random testing on students.

UNIT-IV

Treatment and Control of Drug Abuse:
Medical Management: Medication for treatment and to reduce withdrawal effects.
Psychological Management: Counselling, Behavioural and Cognitive therapy.
Social Management: Family, Group therapy and Environmental intervention.
Treatment: Medical, Psychological and Social Management.
Control: Role of Media and Legislation.

Recommended Books:

1. Ram Ahuja, 'Social Problems in India', Rawat Publications, Jaipur, **2003**.
2. 'Extent, Pattern and Trend of Drug Use in India', Ministry of Social Justice and Empowerment, Govt. of India, **2004.**
3. J.A. Inciardi, 'The Drug Crime Connection', Sage Publications, Beverly Hills,**1981**.
4. T. Kapoor, 'Drug Epidemic among Indian Youth', Mittal Publications, New Delhi,**1985**.
5. Kessel, Neil and Henry Walton, 'Alcoholism, Harmond Worth', Penguin Books,**1982**.
6. Ishwar Modi and Shalini Modi, 'Addiction and Prevention', Rawat Publications,Jaipur, **1997.**
7. 'National Household Survey of Alcohol and Drug Abuse', Clinical Epidemiological Unit, All India Institute of Medical Sciences, New Delhi, **2003 &2004**.
8. Ross Coomber and Others, 'Key Concept in Drugs and Society', Sage Publications, New Delhi,**2013**.
9. BhimSain, 'Drug Addiction Alcoholism, Smoking Obscenity', Mittal Publications, New Delhi,**1991**.
10. Ranvinder Singh Sandhu, 'Drug Addiction in Punjab: A Sociological Study', Guru Nanak Dev University, Amritsar,**2009**.
11. Chandra Paul Singh, 'Alcohol and Dependence among Industrial Workers', Shipra,Delhi, **2000**.
12. S. Sussman and S.L. Ames, 'Drug Abuse: Concepts, Prevention andCessation', Cambridge University Press,**2008**.
13. P.S. Verma, 'Punjab's Drug Problem: Contours and Characteristics', Vol. LII, No. 3, P.P. 40-43, Economic and Political Weekly, **2017**.
14. 'World Drug Report', United Nations Office of Drug and Crime,**2016**.
15. 'World Drug Report', United Nations Office of Drug and Crime,**2017**.

CHEMISTRY-I

Subject Code: BCHEM0-101 **L T PC** **Duration: 42Hrs.**
3 1 0 4

Course Objectives:

1. To understand the atomic and & molecular nature of various molecules
2. To understand the band structures
3. To elaborate the applications of spectroscopic techniques
4. To understand the thermodynamic functions and their applications
5. To rationalize periodic properties
6. To understand the concepts of stereochemistry and preparation of organic molecules

Course Outcomes:

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is beingincreasingly based on the electronic, atomic and molecular level modifications.

Quantum theory is more than 100 years old and to understand phenomena at nanometerlevels, one has to base the description of all chemical processes at molecular levels. Thecourse will enable the student to:

1. Analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2. Rationalize bulk properties and processes using thermodynamic considerations.
3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
4. Rationalize periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
5. List major chemical reactions that are used in the synthesis of molecules.

UNIT-I

1. Atomic and Molecular Structure: (12 Hrs.)

Bohr Theory of Hydrogen atom, Spectrum of H atom, Sommerfeld extension of Bohr Theory, Particle and wave nature of electron, De-Broglie equation, Aufbau principle, Compton effect, Schrodinger wave equation, Laplacian and Hamiltonian operator, Linear Combination of atomic orbitals. Molecular orbitals of diatomic molecules and Energy level diagrams of homo nuclear and hetero nuclear diatomics. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

UNIT-II

2. Spectroscopic Techniques and Applications: (8 Hrs.) Principles and selection rules of Electronic spectroscopy and Fluorescence spectroscopy along with their applications. Principles and selection rules of Vibrational and rotational spectroscopy of diatomic molecules and their Applications. Nuclear magnetic resonance up to spin-spin coupling and magnetic resonance imaging.

3. Intermolecular Forces and Potential Energy Surfaces: (4 Hrs.)

Ideal gas equation, Ionic, dipolar and van Der Waals interactions. Real gas equation. Equations of state of real gases and critical phenomena. Potential energy surfaces of H_3, and HCN

UNIT-III

4. Use of Free Energy in Chemical Equilibria: (6 Hrs.)

Ideal Solution, Non Ideal Solutions, Thermodynamic functions: energy, entropy and free energy. Numerical problems based on entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Thermodynamic properties of ideal solutions. Introduction to Electrochemical Corrosion and its mechanism. Use of free energy considerations in metallurgy through Ellingham diagrams.

5. Periodic Properties: (4 Hrs.)

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases principle

UNIT-IV

6. Stereochemistry: (4 Hrs.)

Representations of 3-dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis of butane. Isomerism in transitional metal compounds.

7. Organic Reactions and Synthesis of a Drug Molecule: (4 Hrs.)

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule – β lactum, Paracetamol, Chloroquine and Aspirin

Recommended Books:

1. B.H. Mahan, 'University Chemistry'.
2. M.J. Sienko and R.A. Plane 'Chemistry: Principles and Applications'.
3. C.N. Banwell, 'Fundamentals of Molecular Spectroscopy'.
4. B.L. Tembe, Kamaluddin and M.S. Krishnan, 'Engineering Chemistry (NPTEL Web-book)
5. P.W. Atkins, 'Physical Chemistry'.
6. K.P.C. Volhardt and N.E. Schore 'Organic Chemistry: Structure and Function', 5th Edn.,http://bcs.whfreeman.com/vollhardtschore5e/default.asp

MATHEMATICS-II (PROBABILITY AND STATISTICS)

Subject Code: BMATH1-201 **L T PC** **Duration: 40Hrs.**
3 1 0 4

COURSE OBJECTIVE

Students will learn

1. Understanding Probability theory.
2. Probability distribution, bivariate distribution, conditional densities
3. Statistical analysis, correlation and regression, moment, skewness and kurtosis.
4. Statistical hypothesis about real world problem, curve fitting, small samples.

Course Outcomes (CO)

Students will be able

1. To express the concept of basic probability and its features, expected values and moments.
2. To explain the concept of continuous probability distribution and bivariate distribution
3. To describe basic statistics (moments, skewness, kurtosis, correlation and regression).
4. To explain about applied statistics and small samples.

UNIT–I

Basic Probability: (12 Hrs.)

Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Chebyshev's Inequality.

UNIT –II

Continuous Probability Distributions: (6 Hrs.)

Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities.

Bivariate Distributions: (6 Hrs.) Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.

UNIT –III

Basic Statistics: (10 Hrs.)

Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation.

UNIT –IV

Applied Statistics: (8 Hrs.)

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Small Samples: (4 Hrs.)

Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Recommended Books:

1. E. Kreyszig, 'Advanced Engineering Mathematics', John Wiley & Sons,**2006**

2. P.G. Hoel, S.C. Port and C.J. Stone, 'Introduction to Probability Theory', Universal Book Stall, **2003**.
3. S. Ross, 'A First Course in Probability', Pearson Education India, **2002**.
4. W. Feller, 'An Introduction to Probability Theory and its Applications', Vol.-1,Wiley,**1968**.
5. B.S. Grewal, 'Higher Engineering Mathematics', Khanna Publishers, **2000**.
6. T. Veerarajan, 'Engineering Mathematics', Tata McGraw Hill, New Delhi, **2010**.

ENGLISH

Subject Code: BHUMA0-101 **L T PC** **Duration: 25Hrs.**
2 0 0 2

Course Objectives:

1. Students should be able to enhance language proficiency, critical thinking and analytical skills
2. To expose the students to various spoken skills
3. To strength their professional skills
4. To maintain good linguistic competency and accuracy in grammar

Course Outcomes:

1. The students will be able to understand specific piece of information
2. Be able to express themselves in writing for social occasions
3. Be able to identify the language functions in the spoken discourse
4. Improvement of technical communication skills , such as writing reports giving presentations and effectively communicating ideas related to respective field

UNIT-I

1. Vocabulary Building:
The concept of Word Formation
Root words from foreign languages and their use in English
Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. Synonyms, antonyms, and standard abbreviations.

UNIT-II

2. Basic Writing Skills:
Sentence Structures
Use of phrases and clauses in sentencesImportance of proper punctuation Creating coherence
Organizing principles of paragraphs in documentsTechniques for writing precisely

UNIT-III

3. Identifying Common Errors in Writing:
Subject-verb agreement Noun-pronoun agreement
Misplaced modifiers
Articles
Prepositions
Redundancies
Clichés

UNIT-IV

4. Nature and Style of sensible Writing:

Describing
Defining
Classifying
Providing examples or evidence
Writing introduction and conclusion

5. Writing

Practices:

Comprehension
Précis Writing
Essay Writing

Recommended Books:

1. Michael Swan, 'Practical English Usage', OUP, **1995**.
2. F.T. Wood, 'Remedial English Grammar', Macmillan, **2007.**
3. William Zinsser, 'On Writing Well', Harper Resource Book, **2001.**
4. Liz Hamp-Lyons and Ben Heasly, 'Study Writing', Cambridge University Press, **2006**.
5. Sanjay Kumar and Pushp Lata, 'Communication Skills', Oxford University Press, **2011**.
6. 'Exercises in Spoken English', Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

PROGRAMMING FOR PROBLEMSOLVING

Subject Code: BCSCE0-101 **L T PC** **Duration: 41Hrs.**
3 0 0 3

Course Objectives:

1. To be familiarize with flow of algorithm to solve simple problems
2. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
3. To develop modular, reusable and readable C Programs using the concepts like functions, arrays, strings, pointers and structures.

Course Outcomes:

The student will learn

1. To learn the basic terms related to programming and understand arithmetic expressions.
2. To understand the concept of arrays.
3. To implement functions and recursion.
4. To learn structure, pointers and file handling

UNIT-I

1. Introduction to Programming: (6 Hrs.)

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)**.** Idea of Algorithm: steps tosolve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

2. Arithmetic Expressions and Precedence: (12Hrs.)

Conditional Branching and Loops. Writing and evaluation of conditionals and consequentbranching. Iteration and loops.

UNIT-II

3. Arrays: (5 Hrs.)
Arrays (1-D, 2-D), Character arrays and Strings

4. Basic Algorithms: (5 Hrs.)
Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

UNIT-III

5. Function: (4Hrs.)
Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference

6. Recursion: (4Hrs.)
Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

UNIT-IV

7. Structure: (3 Hrs.)
Structures, Defining structures and Array of Structures. Pointers: (2Hrs.)
Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

8. File Handling: (only if time is available, otherwise should be done as part of the lab)

Recommended Text Books:
1. Byron Gottfried, 'Schaum's Outline of Programming with C', McGraw Hill.
2. E. Balaguruswamy, 'Programming in ANSI C', Tata McGraw Hill.

Recommended Reference Books:
1. Brian W. Kernighan and Dennis M. Ritchie, 'The C Programming Language', Prentice Hall of India.

CHEMISTRY-I LAB

Subject Code: BCHEM0-101 **L T P C**
0 0 2 1

Course Objectives:
1. To learn the preparation and standardization of solutions
2. To learn the estimation of various physical properties of given liquid samples
3. To estimate various crucial parameters for water sample
4. To learn the preparation of various molecules and detection of functional groups.

Course Outcomes:
The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. Thestudents will learn to:
1. Estimate rate constants of reactions from concentration of reactants/products as a function of time
2. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.
3. Synthesize a small drug molecule and analyze a salt sample

Choice of 10-12 experiments from the following:

1. Preparation of a standard solution
2. Determination of surface tension and viscosity
3. Thin layer chromatography
4. Determination of total Alkalinity/ Acidity of a water sample.
5. Determination of residual chlorine in water sample
6. Estimation of total, temporary and permanent hardness of water
7. Determination of the rate constant of a reaction
8. Determination of strength of an acid conductometrically
9. Potentiometry - determination of redox potentials and emfs
10. Synthesis of apolymer
11. Saponification /acid value of anoil
12. Detection and confirmation of organic functional groups.
13. Models of spatialorientation
14. Totestthe validity of Lambert Beerlaw/ Determinationofλ_{max}/ Determination of unknown concentration of a solution.
15. Determination of the partition coefficient of a substance between two immiscible liquids
16. Adsorption of acetic acid bycharcoal
17. Synthesis of a drug – Acetaminophen, Aspirin

ENGLISH LAB.

Subject Code: BHUMA0-102 **L T P C**
0 0 2 1

Course Objectives:

1. To enhance LSRW Skills
2. To improve the fluency in spoken English
3. To familiarize students with the use of English in everyday situations
4. To maintain good linguistic competency and accuracy in grammar

Course Outcomes:

1. Identify common errors in spoken and written communication
2. List familiarized with English vocabulary and language proficiency
3. Improve nature and style of sensible writing.
4. Improve acquire employment and work place communication skills.

Oral Communication

(This unit involves interactive practice sessions in Language Lab.)

1. Listening Comprehension
2. Pronunciation, Intonation, Stress and Rhythm
3. Common Everyday Situations: Conversations and Dialogues
4. Communication at Workplace
5. Interviews
6. Formal Presentations

PROGRAMMING FOR PROBLEM SOLVING LAB.

Subject Code: BCSCE0-102 **L T P C**

0 0 4 2

Course objectives:

1. To be familiarize with flow of algorithm to solve simple problems
2. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
3. To develop modular, reusable and readable C Programs using the concepts like functions, arrays, strings, pointers and structures.

Course Outcomes:

1. Correct syntax errors as reported by the compilers and logical errors encountered at run time
2. Develop programs by using decision making and looping constructs.
3. Implement real time applications using the concept of array, pointers, functions and structures.
4. Solve real world problems using matrices, searching and sorting

NOTE: The laboratory should be preceded or followed by a tutorial to explain the approachor algorithm to be implemented for the problem given.

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment
Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions
Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures
Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series
Tutorial 5: 1D Arrays: searching, sorting:
Lab 5: 1D Array manipulation
Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations
Tutorial 7: Functions, call by value:
Lab 7: Simple functions
Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numericalintegration):
Lab 8 and 9: Programming for solving Numerical methods problems
Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions
Tutorial 11: Pointers, structures and dynamic memory allocation
Lab 11: Pointers and structures
Tutorial 12: File handling:
Lab 12: File operations

MANUFACTURING PRACTICES (THEORY & LAB)

Subject Code: BMFPR0-101 **L T PC** **Duration: 80 Hrs.**
1 0 4 3

Course objectives.

1 Understand the operations of manufacturing methods and processes.
2 Perform the various manufacturing operations.
3 Understand the basics of advanced manufacturing methods.
4. Understanding the basics of computer numerical control machines.

Course outcomes:

After the completion of this course students will be able:-

1. To perform various metal forming operations.
2. To perform various metal cutting operations.
3. To perform various metal joining operations.
4. To write simple CNC part programming.

Lectures & Videos: (10 Hrs.)

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturingMethods.
2. CNC machining, Additive manufacturing.
3. Fitting operations & power tools.
4. Sheet Metal Operations.
5. Electrical &Electronics.
6. Carpentry.
7. Plastic moulding (injection moulding, blow moulding, extrusion moulding), glasscutting.
8. Metalcasting.
9. Welding (arc welding & gas welding), brazing.

Recommended Text/Reference Books:

1. S.K. Hajra Choudhury, A.K. Hajra Choudhury and S.K. Nirjhar Roy, 'Elements of Workshop Technology', Vol.-I, **2008** and Vol.-II **2010**, Media Promoters and Publishers Pvt. Ltd., Mumbai.
2. S. Kalpakjian, Steven S. Schmid, 'Manufacturing Engineering and Technology', 4th Edn., Pearson Education India Edn.,**2002**.
3. Gowri P. Hariharan and A. Suresh Babu, 'Manufacturing Technology – I', Pearson,**2008**.
4. Roy A. Lindberg, 'Processes and Materials of Manufacture', 4th Edn., Prentice Hall India, 1998.
5. P.N. Rao, 'Manufacturing Technology', Vol.-I and Vol.-II, Tata McGraw Hill House, 2017.

Workshop Practice: (70 Hrs.)

1. Machine shop **(10Hrs.)**
2. Fitting shop **(8Hrs.)**
3. Carpentry **(6Hrs.)**
4. Electrical & Electronics **(8 Hrs.)**
5. Welding shop **(8 Hrs. (Arc welding 4 Hrs. + Gas welding 4Hrs.)**
6. Casting **(8Hrs.)**
7. Sheet Metal Operations **(10 Hrs.)**
8. Smithy **(6Hrs.)**
9. Plastic moulding& Glass Cutting **(6Hrs.)**
10. Examinations could involve the actual fabrication of simple components, utilizing one ormore of the techniques covered above.

INTRODUCTION TO COMPUTER SCIENCE & ENGINEERING

Subject Code: BMNCC0-014 **L T PC** **Duration: 24Hrs.**
2 0 0 0

Course Outcomes:

1. Basic knowledge of Computer Science and Engineering
2. Exploring Computer Science Fields and Opportunities
3. Understanding Computer Hardware and Software
4. Software Types and Operating Systems

UNIT-I

Introduction to Computer Science & Engineering, Difference between science & engineering, Applications of Computer Science & engineering.

UNIT-II

Different branches/fields of Computer Science, Scope of Computer Science in industry, self-employment etc.

UNIT-III

Introduction to Computer, parts of computer system. Difference between Hardware & software, Configuration of computer systems, Types of memory-RAM, ROM, Introduction to UPS-Online and Offline, printers etc.

UNIT-IV

Different types of Software- Application software and System Software, Types of Languages-High level and low level languages, Introduction to Operating System.

Calculus and Ordinary Differential Equation

Subject Code- BMATH1- 301 **L T P C** **Duration – 45hrs**
3 0 0 3

Course Objectives:
Students will learn
1. Basics of sequence and series and their results to check convergence.
2. Multivariable concepts and their real life problems.
3. Green's theorem, stokes theorem, and Gauss theorem and their applications.
4. Linear, non-linear ordinary differential equations of first and higher order.

Course Outcomes (CO)
Students will be able
1. To apply concepts of convergence of sequence and series.
2. To apply green's theorem, stroke's theorem and green's theorem in real life situations.
3. To solve linear and non-linear ordinary differential equations.
4. To solve second and higher order linear, non-linear differential equation.

COURSE CONTENT

UNIT-I (12 Hrs)

Sequences and Series: Basic concept of Convergence, tests for convergence, power series, Taylor's series, Series for exponential, trigonometric and logarithmic functions.

Multivariable Calculus: Partial derivatives, directional derivatives, total derivative, Tangent plane and normal line, Maxima, minima and saddle points, Method of Lagrange multipliers.

UNIT-II (11 Hrs)

Multiple Integration: double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables, Theorems of Green, Gauss and Stokes (without proof), orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds.

UNIT-III (11 Hrs)

First order ordinary differential equations: Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-IV (11 Hrs)

Ordinary differential equations of higher orders: Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

RECOMMENDED BOOKS

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
4. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
5. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.
6. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
7. Earl A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.

INTRODUCTION TO INTERNET OF THINGS

Subject Code- BCSES2-301 **L T P C** **Duration – 45 hrs.**
3 0 0 3

COURSE OBJECTIVCE

The objective of this course is to impart necessary and practical knowledge of components of Internet of Things and develop skills required to build real-life IoT based projects.

COURSE OUTCOMES

CO1: Understand internet of Things and its hardware and software components
CO2: Interface I/O devices, sensors & communication modules.
CO3: Remotely monitor data and control devices
CO4: Develop real life IoT based projects

Unit 1(10 Hours)

Introduction to IoT :Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Everything as a Service(XaaS), Role of Cloud in IoT, Security aspects in IoT.

Unit II (10 Hours)

Elements of IoT: Hardware Components- Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces. Software Components- Programming API's (using Python/Node.js/Arduino) for Communication Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP.

Unit III (15 Hours)

IoT Application Development : Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration, Device data storage- Unstructured data storage on cloud/local server, Authentication, authorization of devices.

Unit IV (10 Hours)

IoT Case Studies: IoT case studies and mini projects based on Industrial automation, Transportation, Agriculture, Healthcare, Home Automation

LIST OF SUGGESTED BOOKS

1. Vijay Madisetti, Arshdeep Bahga, Ïnternet of Things, "A Hands on Approach", University Press
2. Dr. SRN Reddy, Rachit Thukral and Manasi Mishra, "Introduction to Internet of Things: Apractical Approach", ETI Labs
3. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Tchnologies,Platforms, and Use Cases", CRC Press
4. Jeeva Jose, "Internet of Things", Khanna Publishing House, Delhi
5. Adrian McEwen, "Designing the Internet of Things", Wiley
6. Raj Kamal, "Internet of Things: Architecture and Design", McGraw Hill
7. Cuno Pfister, "Getting Started with the Internet of Things", O Reilly Media

DATA STRUCTURE & ALGORITHMS

Subject Code- BCSES1-302 **L T P C** **Duration – 60 hrs.**
3 1 0 4

COURSE OBJECTIVE

1. To impart the basic concepts of data structures, algorithms and time complexity.
2. To understand concepts about stacks and queues.
3. To understand concepts about linked lists and trees.
4. To enable them to learn and write algorithms for hashing, sorting and graphs.

COURSE OUTCOMES

1. To impart the basic concepts of data structures, algorithms and time complexity.
2. To understand concepts about stacks and queues
3. To understand concepts about linked lists and trees
4. To enable them to learn and write algorithms for hashing, sorting and graphs

COURSE CONTENT

UNIT-I (15 Hrs)

Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.

UNIT-II (15 Hrs)

Stacks and Queues: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation –corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

UNIT-III (15 Hrs)

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several Operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Binary Search trees,

Binary Search Tree, Tree operations on each of the trees and their algorithms with complexity analysis. Introduction to B Tree, B+ Tree and AVL Tree

UNIT-IV (15 Hrs)

Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and comparison among all the methods, Hashing.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

RECOMMENDED BOOKS:

1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni,Computer Science Press.

SUGGESTED REFERENCE BOOKS:

2. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by MarkAllen Weiss, Addison-Wesley Publishing Company
3. "How to Solve it by Computer", 2nd Impression by R.G. Dromey, Pearson Education.

Digital Electronics

Subject Code- BCSES1-303 **L T P C** **Duration – 60 Hrs**
3 1 0 4

COURSE OBJECTIVE

To learn the basic methods for the design of digital circuits and provide the fundamental concepts used in the design of digital systems.

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

1. Understand working of logic families and logic gates.
2. Design and implement Combinational and Sequential logic circuits.
3. Understand the process of Analog to Digital conversion and Digital to Analog conversion.
4. Be able to use PLDs to implement the given logical problem.

COURSE CONTENT

UNIT-I (15hrs)

Fundamentals of Digital Systems and logic families: Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOSand TTL, Tri-state logic.

Combinational Digital Circuits: Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, paritychecker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

UNIT-II (15hrs)

Sequential circuits and systems: A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T and D types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

UNIT-III (15hrs)

A/D and D/A Converters: Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using Voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs

UNIT-IV (15hrs)

Semiconductor memories and Programmable logic devices: Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory (RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

RECOMMENDED BOOKS

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
3. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

DATA STRUCTURE & ALGORITHMS LABORATORY

Subject Code- BCSES1-304 **L T P C**
0 0 4 2

COURSE OUTCOMES

1 . To implementing searching algorithms and operations on stacks.
2 . To enable the students to learn and implement sorting algorithms.
3 . To implement operations for different types of queues.
4 . To implement programs related to various types of Linked Lists.

PRACTICALS

1. Write a program for Linear search methods.
2. Write a program for Binary search methods.
3. Write a program for insertion sort, selection sort and bubble sort.
4. Write a program to implement Stack and its operation.
5. Write a program for quick sort.
6. Write a program for merge sort.
7. Write a program to implement Queue and its operation.
8. Write a program to implement Circular Queue and its operation.
9. Write a program to implement singly linked list for the following operations: Create, Display, searching, traversing and deletion.
10. Write a program to implement doubly linked list for the following operations: Create, Display, inserting, counting, searching, traversing and deletion.
11. Write a program to implement circular linked list for the following operations: Create, Display, inserting, counting, searching, traversing and deletion.

DIGITAL ELECTRONICS LABORATORY

Subject Code- BCSES1-305 **L T P C**
0 0 2 1

COURSE OUTCOMES

1 To Familiarization with Digital Trainer Kit and associated equipment.
2 To Study and design of TTL gates
3 To learn the formal procedures for the analysis and design of combinational circuits.
4 To learn the formal procedures for the analysis and design of sequential circuits

PRACTICALS: Implementation all experiments with help of Bread- Board.

1. Study of Logic Gates: Truth-table verification of OR, AND, NOT, XOR, NAND and NOR gates; Realization of OR, AND, NOT and XOR functions using universal gates.
2. Half Adder / Full Adder: Realization using basic and XOR gates. 13 13 Punjab Technical University B.Tech. Computer Science Engineering (CSE)
3. Half Subtractor / Full Subtractor: Realization using NAND gates.
4. 4-Bit Binary-to-Gray & Gray-to-Binary Code Converter: Realization using XOR gates.
5. 4-Bit and 8-Bit Comparator: Implementation using IC7485 magnitude comparator chips.

6. Multiplexer: Truth-table verification and realization of Half adder and Full adder using IC74153 chip.
7. Demultiplexer: Truth-table verification and realization of Half subtractor and Full subtractor using IC74139 chip.
8. Flip Flops: Truth-table verification of JK Master Slave FF, T-type and D-type FF using IC7476 chip.
9. Asynchronous Counter: Realization of 4-bit up counter and Mod-N counter using IC7490 & IC7493 chip.
10. Synchronous Counter: Realization of 4-bit up/down counter and Mod-N counter using IC74192 & IC74193 chip.
11. Shift Register: Study of shift right, SIPO, SISO, PIPO, PISO & Shift left operations using IC7495 chip.
12. DAC Operation: Study of 8-bit DAC (IC 08/0800 chip), obtain staircase waveform using IC7493 chip.
13. ADC Operations: Study of 8-bit ADC.

IT WORKSHOP (SciLab / MATLAB) LABORATORY

Subject Code- BCSES1-306 **L T P C**
0 0 4 2

COURSE OUTCOMES

1. Introduction to Sci Labs / MATLAB environment and types of Sci Labs / MATLAB files.
2. To be able to write programs for Matrix manipulations.
3. MATLAB code for computing factorial of a number
4. To be able to write programs using functions and plotting results

Following experiments to be conducted using Sci Labs / MATLAB

1. Introduction to Sci Labs / MATLAB environment and types of Sci Labs / MATLAB files.
2. Use of help command to get help about different inbuilt functions.
3. Write a program to show the output of various unary and binary operators.
4. Write programs for Matrix Manipulations, (reshaping matrices, expanding matrix size, appending or deleting a row/column to a matrix, concatenation of matrices).
5. Write programs which demonstrate the use special matrices.
6. Write programs to show output for various matrix and array operations.
7. Write programs for demonstrating the use for various control statements.
8. Write a MATLAB code for computing factorial of a number n. Assume n is already defined. The code should return a scalar, not a vector.
9. Write programs using functions and plot results.

*other programs related to some application area may also be done

INSTITUTION TRAINING-I*(4 WEEKS)

Subject Code- BCSES1-307 **L T P C** **Duration – 4 WEEKS**
0 0 0 3

Training after the 2nd Semester, students are required to be involved in Inter/ Intra Institutional Activities viz; Training with higher Institutions; Soft skill training organized by Training and Placement Cell of the respective institutions; contribution at incubation/ innovation /entrepreneurship cell of the institute; participation in conferences/ workshops/ competitions etc.; Learning at Departmental Lab/Tinkering Lab/ Institutional workshop; Working for consultancy/ research project within the institutes and Participation in all the activities of Institute's Innovation Council for eg: IPR workshop/Leadership Talks/ Idea/Design/ Innovation/ Business Completion/ Technical Expos etc.

DEVELOPMENT OF SOCIETIES

Subject Code- BHSMC0-007 **L T P C** **Duration – 45hrs**
3 0 0 3

Course Outcomes

Students will be able to

1 Become familiar with development of different social systems, connectedness of human being with society and able to evaluate different models of social development.

2 Develop ideas about political system and identify discriminating features of various governing systems.

3 Build up knowledge about different economic systems and evaluate various ideas of economic developmental ideologies.

4 Understand the relationship between human and society both historically and analytically

Course objectives

To make the students

1. To Understand societal development and various societal models

2. To understand and analyze different political systems

3. To develop knowledge about economic systems and ideologies

4 To understand the economic development in different periods of history.

UNIT-I (15 hrs)

Social Development: Concepts behind the origin of Family, Clan and Society, Different Social Systems, Relation between Human being and Society, Comparative studies on different models of Social Structures and their evolution

UNIT-II (15 hrs)

Political Development: Ideas of Political Systems as learnt from History, Different models of Governing system and their comparative study

UNIT-III (15 hrs)

Economic Development: Birth of Capitalism, Socialism, Marxism, Concept of development in pre-British, British and post British period- Barter, Jajmani, Idea of development in current context., E. F. Schumacher's idea of development, Buddhist economics. Gandhian idea of development. Swaraj and Decentralization.

RECOMMENDED BOOKS:

TEXT BOOK:

1. 'Indian Society' by Dr S.K Jena & B.N Mohanty
2. 'Indian Society' by C.N Shankar Rao
3. 'Foundations of Political Science, Indian Constitution & Government' by Gulshan Rai, SomNathVerma& Suresh Kumar

***REFERENCE BOOKS:**

1. 'The Interpretation of Cultures: Selected Essays' by Geertz & Clifford. 1973, New York
2. 'Dictionary of Modern Sociology Hoult' by Thomas Ford, ed. 1969) Totowa, New Jersey, United States: Littlefield, Adams & Co.
3. 'Sociology –In a Changing Society' by William Korblum
4. 'The Origin of Humankind' by Leakey, Richard 1996, New York Basic Books

4. OTHER SESSIONS

*TUTORIALS:

*LABORATORY:

*PROJECT: Possible projects in this course could be

a) Interact with local communities and understand their issues.

b) Study local cottage industry and agricultural practices. Role of engineering and specialized knowledge.

c) Evaluation of technology in the context of its application. Social impact of technology. Environmental impact of technology. Evaluation from a holistic perspective.

THE MAHARAJA OF PEOPLE

Subject Code: BMNCC0-052 **L T P C** **Duration: 30 Hrs.**
2 0 0 0

UNIT-I (8 Hrs)

The Early Life: Early life of Maharaja Ranjit Singh, First battle, Death of Father, Act of bravery, Unifying Punjab, Coronation

UNIT-II (8 Hrs)

Conquests: Jhang, Kasoor, Multan, Peshawar, Naushehra, Annexation of Peshawar into Sikh Kingdom, Jamraudh, Kashmir, Ladakh, Tibbet, Formation of State of J & K

UNIT-III (8 Hrs)

Administrative Capabilities

Administration: Central Govt., Provincial & local Govt., Financial Administration, Judicial systems, Secular State, Military System, Creation of a regular force, Organization of Army, Recruitment & Payment, Education System, Pattern of the arts, a unique portrait, Touchstone, The court of Maharaja Ranjit Singh, Europeans at Sikh Court

UNIT-IV (6 Hrs)

The Legacy: Diamond Kohinoor, Love for common Folk, A ruler much ahead of his times, Graciousness of Maharaja, True Nationalist, Maharaja's Notion of Nationalism & Secularism, the last journey, The enduring legacy of Maharaja, Secrets of popularity of Maharaja, Nature of Maharaja's polity.

Recommended Books:

1. Rajmohan Gandhi: Punjab: A History from Aurangzeb to Mountbatten, 2013.
2. Grewal, J.S.: The Sikhs of the Punjab, Cambridge University Press, 1968.
3. Khushwant Singh: A History of the Sikhs Vol. 1 1469-1839, Oxford University Press, 1963.
4. Untold story of Maharaja Ranjit Singh

INTRODUCTION TO CYBER SECURITY

Subject Code- BCSES2-401 **L T P C** **Duration – 60 hrs.**
3 1 0 4

COURSE OBJECTIVES

The course has been designed to give students an extensive overview of cyber security issues, tools and techniques that are critical in solving problems in cyber security domains. The course aims at providing students with concepts of computer security, cryptography, digital money, secure protocols, detection and other security techniques.

COURSE OUTCOMES

1. Understand, appreciate, employ, design and implement appropriate security technologiesand policies to protect computers and digital information.
2. Identify & Evaluate Information Security threats and vulnerabilities in InformationSystems and apply security measures to real time scenarios
3. Identify common trade-offs and compromises that are made in the design and development process of Information System
4. Demonstrate the use of standards and cyber laws to enhance information security in the development process and infrastructure protection

UNIT 1 (15 Hours)

Data communication Components: Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

Unit II (15 Hours)

Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols.
Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping –ARP, RARP. Forwarding and Unicast Routing protocols.
Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control.
Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP

Unit III (15 Hours)

Cyber Security: Essential Terminologies: CIA, Risks, Breaches, Threats, Attacks, Exploits. Information Gathering (Social Engineering, Foot Printing & Scanning).
Cryptography and Cryptanalysis: Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Applications of Cryptography. Overview of Firewalls- Types of Firewalls, User Management, VPN Security, Security Protocols: - security at the Application Layer- PGP and S/MIME, Security at Transport Layer- SSL and TLS, Security atNetwork Layer-IPSec.

Unit IV (15 Hours)

Infrastructure and Network Security: Introduction to System Security, Server Security, OS Security, Physical Security, Introduction to Networks, Network packet Sniffing, Network Design Simulation. DOS/ DDOS attacks. Asset Management and Audits, Vulnerabilities and Attacks. Intrusion detection and Prevention Techniques, Host based Intrusion prevention Systems, Security Information Management, Network Session Analysis, System Integrity Validation. Open Source/ Free/ Trial Tools: DOS Attacks, DDOS attacks, Wireshark, Cain & abel, iptables/ Windows Firewall, snort, suricata, fail2ban

LIST OF SUGGESTED BOOKS

1. William Stallings, "Cryptography and Network Security", Pearson Education/PHI
2. V.K. Jain, "Cryptography and Network Security", Khanna Publishing House.
3. Gupta Sarika, "Information and Cyber Security", Khanna Publishing House, Delhi.
4. Atul Kahate, "Cryptography and Network Security", McGraw Hill.
5. V.K. Pachghare, "Cryptography and Information Security", PHI Learning
6. Nina Godbole, "Information System Security", Wiley
7. Bothra Harsh, "Hacking", Khanna Publishing House, Delhi.
8. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw-Hill.
9. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice HallIndia.
10. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.

COMPUTER ORGANIZATION & ARCHITECTURE

Subject Code- BCSES1-401 **L T P C** **Duration – 45hrs**
3 0 0 3

COURSE OBJECTIVE

To expose the students to the following:
1. How Computer Systems work & the basic principles
2. Instruction Level Architecture and Instruction Execution
3. The current state of art in memory system design
4. How I/O devices are accessed and its principles.
5. To provide the knowledge on Instruction Level Parallelism
6. To impart the knowledge on micro programming
7. Concepts of advanced pipelining techniques.

COURSE OUTCOMES

1. Draw the functional block diagram of a single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions,addressing modes, instruction set.
2. Write assembly language program for specified microprocessor for computing16 bit multiplication, division and I/O device interface (ADC, Control circuit, serialport communication).
3. Write a flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process.
4. Given a CPU organization and instruction, design a memory module and analyze its operation by interfacing with the CPU.
5. Given a CPU organization, assess its performance, and apply design techniques to enhance performance using pipelining, parallelism and RISC methodology

COURSE CONTENT

UNIT-I (11 hrs)

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU–registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs.

Data representation: signed number representation, fixed and floating pointer presentations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look ahead adder etc. multiplication shift and add.

UNIT-II (12 hrs)

Introduction to x86 architecture.

CPU control unit design: hardwired and micro-programmed design approaches.

Memory system design: semiconductor memory technologies, memory organization.

UNIT-III (11 hrs)

Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers–program controlled, interrupt driven and DMA, software interrupts and exceptions. Programs and processes–role of interrupts in process state transitions.

UNIT-IV (11 hrs)

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards.

Parallel Processors: Introduction to parallel processors.

Memory organization: Memory interleaving, concept of hierarchical memory

organization, cache memory, cache size vs. block size, mapping, replacement algorithms.

RECOMMENDED BOOKS:

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
2. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

SUGGESTED REFERENCE BOOKS:

1. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill
2. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.
3. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

OPERATING SYSTEMS

Subject Code- BCSES1-402 **L T P C** **Duration – 60hrs**
3 1 0 4

COURSE OBJECTIVE

To learn the fundamentals of Operating Systems.

1. To learn the mechanisms of OS to handle processes and threads and their communication
2. To learn the mechanisms involved in memory management in contemporary OS
3. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
4. To know the components and management aspects of concurrency management
5. To learn to implement simple OS mechanisms

COURSE OUTCOMES

At the end of this course, students will demonstrate the ability to1.
Create processes and threads.

2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
3. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4. Design and implement file management system and For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

COURSE CONTENT

UNIT-I (15hrs)

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS-Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.

UNIT-II (16hrs)

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, **Scheduling criteria:** CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time;

Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.

UNIT-III (15hrs)

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation
-Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC),Not recently used (NRU) and Least Recently used (LRU).

UNIT-IV (14hrs)

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation(linear list, hashtable), efficiency and performance.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks

RECOMMENDED BOOKS

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

SUGGESTED REFERENCE BOOKS:

1. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
2. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
3. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

OBJECT ORIENTED PROGRAMMING

Subject Code- BCSES1-403 **L T P C** **Duration – 60 hrs**
3 1 0 4

COURSE OBJECTIVE

To introduce the principles and paradigms of Object Oriented Programming Language for design and implement the Object Oriented System

COURSE OUTCOME

1. To introduce the basic concepts of object oriented programming language and its representation
2. To allocate dynamic memory, access private members of class and the behavior of inheritance and its implementation.
3. To introduce polymorphism, interface design and overloading of operator.
4. To handle backup system using file, general purpose template and handling of raised exception during programming

UNIT-I (15hrs)

Introduction to C++, C++ Standard Library, Illustrative Simple C++ Programs. Header Files, Namespaces, Application of object oriented programming.

Object Oriented Concepts, Introduction to Objects and Object Oriented Programming, Encapsulation, Polymorphism, Overloading, Inheritance, Abstract Classes, Accessifier (public/ protected/ private), Class Scope and Accessing Class Members, Controlling Access Function, Constant, Class Member, Structure and Class

UNIT-II (15hrs)

This Pointer, Dynamic Memory Allocation and Deallocation (New and Delete), Static Class Members, Constructors, parameter Constructors and Copy Constructors, Deconstructors, Introduction of inheritance, Types of Inheritance, Overriding Base Class Members in aDerived Class, Public, Protected and Private Inheritance

UNIT-III (15hrs)

Polymorphism, Pointer to Derived class, Virtual Functions, Pure Virtual Function, Abstract Base Classes, Static and Dynamic Binding

Fundamentals of Operator Overloading, Rules for Operators Overloading, Implementation of Operator Overloading Like <<,>> Unary Operators, Binary Operators.

Basics of C++ Exception Handling, Try, Throw, Catch, multiple catch, Re-throwing an Exception.

UNIT-IV (15hrs)

Text Streams and binary stream, Sequential and Random Access File, Stream Input/ Output Classes, Stream Manipulators.

Templates: Function Templates, Overloading Template Functions, Class Template, Class Templates

Introduction: design patterns, Classifications

Introduction: model- view- controller pattern

RECOMMENDED BOOKS:

1. Robert Lafore, 'Object Oriented Programming in Turbo C++', 2nd Ed., The WAITE Group Press, **1994**.
2. Herbert shield, 'The complete reference C ++', 4th Ed., Tata McGraw Hill, **2003**.
3. Shukla, 'Object Oriented Programming in C++', Wiley India, 2008.
4. H M Deitel and P J Deitel, 'C++ How to Program', 2nd Ed., Prentice Hall, **1998**.
5. D Ravichandran, 'Programming with C++', 3rd Ed., Tata McGraw Hill, **2003**.
6. Bjarne Stroustrup, 'The C++ Programming Language', 4th Ed.,Addison Wesley,**2013**.
7. R. S. Salaria, 'Mastering Object-Oriented Programming with C++', Salaria Publishing

House, **2016**.

OPERATING SYSTEMS LABORATORY

Subject Code- -BCSES1-404 **L T P C**
0 0 2 1

COURSE OUTCOMES

1. To be able to install various operating systems
2. To learn commands for files and directories.
3. To learn about background processes and commands to print something.
4. To be able to learn shell programming.

1. Installation Process of various operating systems
2. Virtualization, Installation of Virtual Machine Software and installation of Operating System on Virtual Machine
3. Commands for files & directories: cd, ls, cp, md, rm, mkdir, rmdir. Creating and viewing files using cat. File comparisons. Disk related commands: checking disk free spaces. Processes in linux, connecting processes with pipes, background processing, managing multiple processes. Manual help. Background process: changing process priority, scheduling of processes at command, batch commands, kill, ps, who, sleep. Printing commands, grep, fgrep, find, sort, cal, banner, touch, file. File related commands ws, sat, cut, grep.
4. Shell Programming: Basic of shell programming, various types of shell, ShellProgramming in bash, conditional & looping statement, case statements, parameter passing and arguments, shell variables, shell keywords, creating shell programs for automate system tasks, report printing.

OBJECT ORIENTED PROGRAMMING USING C++ LABORATORY

Subject Code- BCSES1-405 **L T P C**
0 0 4 2

COURSE OUTCOMES

1. To learn the concept of classes and objects.
2. To be able to implement constructors and destructors.
3. To implement initializer list and operator overloading
4. To learn type casting and inheritance.

PRACTICALS

1. Classes and Objects- Write a program that uses a class where the member functions are defined inside a class.
2. Classes and Objects- Write a program that uses a class where the member functions are defined outside a class.
3. Classes and Objects- Write a program to demonstrate the use of static data members.
4. Classes and Objects- Write a program to demonstrate the use of const data members.
5. Constructors and Destructors- Write a program to demonstrate the use of zero argument and parameterized constructors.
6. Constructors and Destructors- Write a program to demonstrate the use of explicit constructor.
7. Initializer Lists- Write a program to demonstrate the use of initializer list.
8. Operator Overloading- Write a program to demonstrate the overloading of increment and decrement operators.
9. Operator Overloading- Write a program to demonstrate the overloading of binary

arithmetic operators.
10. Typecasting- Write a program to demonstrate the typecasting of basic type to class type.
11. Typecasting- Write a program to demonstrate the typecasting of class type to basic type.
12. Typecasting- Write a program to demonstrate the typecasting of class type to class type.
13. Inheritance- Write a program to demonstrate the multilevel inheritance

ORGANIZATIONAL BEHAVIOR

Subject Code- BHSMC0-016 **L T P C** **Duration – 45hrs**
3 0 0 3

Course Objectives: The course aims to provide an understanding of basic concepts, theories and techniques in the field of human behavior at the individual, group and organizational levels in the changing global scenario. The course must be taught using case study method.

Course Outcomes:-

1. After Studying this course the students will equip with ability to identify, explore and examine factors
2. Impinge on Individual and group behavior in organizations in the new millennium
3. Explain the terminology associated with organizational behavior
4. Incorporate and apply the predominate organization behavior theories to gain
5. knowledge of contemporary issues in organizational behavior
6. Frameworks to work with real life organizational issues concerned with human behavior at work place

UNIT-I (12Hrs)

Organizational Behaviour: Concepts, Theories and organization aspects of OB, Contributing Disciplines to OB, challenges and opportunities for OB. Foundations of Individual Behaviour: Biographical Characteristics, Course, Theories of Course, Attitudes,
Attitude Change, Values & Believes, Prejudices Personality: Determinants of Personality, Perception, Attribution Theory, Person's Perception.

UNIT-II (11Hrs)

Motivation: Definition & Process, Early Theories of Motivation, Contemporary Theories of Motivation, Nature and process of Motivation, Application of Motivation Concept. Job Satisfaction: Nature & Significance of Job satisfaction. Leadership: Nature Significance & Theories; Leadership Effectiveness Model; Leadership Traits & Skills; Behavioural Styles in Leadership. Transactional Analysis, Life Position, Johari Window Model.

UNIT-III (11Hrs)

Foundations of Group Behaviour: Nature & Concept of Group Formation, Stages of Group Formation, Theories of Group Formation. Teams, Difference between Group and TeamGroup Decision Making: Meaning & Nature, Decision Making Process; Decision Making Styles; Advantages & disadvantages of Decision Making; Techniques of Decision Making; Group Size & Decision Making.

UNIT-IV (11Hrs)

Organizational Change & Development: Meaning & Definition, Change Agents, Change Models, Resistance to Change. Power and Politics in Organization: Nature & Concepts, Sources & Types of Power, Techniques of Politics. Stress Management: Meaning and Concept of Stress,

Stress in Organizations

Recommended Books

1. Robbins, 'Organization Behavior', Pearson Education.
2. Luthans, Organization Behavior', Tata McGraw Hill.
3. Hersey, 'Management of Organizational Behavior', Prentice Hall India.
4. Aswathappa, 'Organization Behavior', Himalaya Publications.
5. L.M. Prasad, 'Organization Behavior', Sultan Chand & Sons
6. Parikh, Gupta, 'Organizational Behavior', Tata McGraw Hill

UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY

Subject Code: BHSMC0-026 **L T P C** **Duration: 45Hrs**
2 1 0 3

Course Objectives

This course is intended to provide a much needed orientational input in value education to the young enquiring minds.

Course Outcomes

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

UNIT I (09 Hrs.)

Introduction to Value Education Lecture: Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Right Understanding, Relationship and Physical Facility, Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations

UNIT II (12 Hrs.)

Harmony in the Human Being: Understanding Human being as the Co-existence of the Selfand the Body Lecture 8: Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health

UNIT III (09 Hrs.)

Harmony in the Family and Society : Harmony in the Family – the Basic Unit of Human Interaction, Values in Human-to-Human Relationship, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Exploring the Feeling of Respect, Understanding Harmony in the Society, Vision for the Universal Human Order

UNIT IV (15 Hrs.)

Harmony in the Nature/Existence: Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence

Implications of the Holistic Understanding – a Look at Professional Ethics: Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession

Suggested Readings:

Text Book and Teachers Manual

a. The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
b. The Teacher's Manual Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978- 93-87034-53-2 3.2

Recommended Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff(Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J CKumarappa
8. Bharat Mein Angreji Raj - PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)