Shaheed Bhagat Singh State University, Ferozepur
B. Sc. (Computer Applications and Electronics)

B. Sc. Computer Applications and Electronics: It is an Under Graduate (UG) Programme of 3-year duration (6 semesters)

Eligibility: All those candidates who have passed the 10+2 with at least 50% marks (45% marks for reserved category) or its equivalent examination in any stream conducted by a recognized Board / University / Council.

B.Sc. (Computer Applications & Electronics) (Lateral Entry): It is an Under Graduate (UG) Programme of 2-year duration (4 semesters)

Eligibility: All those candidates who have passed 3 Year Diploma with at least 50% marks (45% marks for reserved category) in any Trade from Punjab State Board of Technical Education & Industrial Training, Chandigarh or such Examination from any other recognized State Board of Technical Education, or Sant Longowal Institute of Engineering & Technology, Longowal.

Scheme of Syllabi

First Semester

Total contact hours =33+2*

Course Code	Course Type	Course Name	Load Allocations			Marks Distribution		Total marks	Credits
			L	T	P	Internal	External		
BSCE-101C	Core Theory	Digital Electronics	3	1	0	40	60	100	4
BSCE-102C	Core Theory	Fundamentals of Information Technology (IT)	3	0	0	40	60	100	3
BSCE-103C	Core Theory	Problem-Solving using C	3	1	0	40	60	100	4
BSCE-104C	Core Practical/Laboratory	Problem-Solving using C Laboratory	0	0	4	60	40	100	2
BSCE-105C	Core Practical/Laboratory	Fundamentals of IT Laboratory	0	0	4	60	40	100	2
BSCE-106C	Core Practical/Laboratory	Digital Electronics Laboratory	0	0	4	60	40	100	2
BPHU-103C	Ability Enhancement Compulsory Course (AECC)-I	English	1	0	0	40	60	100	1
BPHU-104C	Ability Enhancement Compulsory Course (AECC)	English Practical/ Laboratory	0	0	2	30	20	50	1
HVPE-101C	Ability Enhancement Compulsory Course (AECC)	Human Values, De-addiction, and Traffic Rules	3	0	0	40	60	100	3
HVPE-102C	Ability Enhancement Compulsory Course (AECC)	Human Values, De-addiction and Traffic Rules (Lab/ Seminar)	0	0	2	25	--**	25	1
BMPD101C		Mentoring and Professional Development	0	0	2	25	--**	25	1
BSCE-107C	**Bridge Course***	Fundamentals of Mathematics	2	0	0	40	-	S/US	Non-Credit
	Total		**13+ 2***	**2**	**18**	**460+ 40***	**440**	**900**	**24**

**The Human Values, De-addiction, and Traffic Rules (Lab/ Seminar) and Mentoring and Professional Development course will have internal evaluation only.

*Students passed 10+2 without Mathematics. The performance will be evaluated similar to the internal evaluation of core theory subjects. Students scoring marks equal to or more than 40% marks will be awarded 'Satisfactory'.

Second Semester

Total contact hours =25+4*

Course Code	Course Type	Course Type	Load Allocations			Marks Distribution		Total Marks	Credits
			L	T	P	Internal	External		
BSCE-201C	Core Theory	Mathematics	3	1	0	40	60	100	4
BSCE-202C	Core Theory	Computer Architecture	3	1	0	40	60	100	4
BSCE-203C	Core Theory	Object Oriented Programming using C++	3	1	0	40	60	100	4
BSCE-204C	Core Practical /Laboratory	Computer Architecture Lab	0	0	4	60	40	100	2
BSCE-205C	Core Practical/ Laboratory	Object Oriented Programming using C++ Laboratory	0	0	4	60	40	100	2
EVS-101C	Ability Enhancement Compulsory Course	Environmental Studies	2	0	0	40	60	100	2
BMPD201C		Mentoring and Professional Development	0	0	2	25	--	25	1
SBS-101C		Introduction to Shaheed Bhagat Singh and his Co-patriots	1	0	0	25 On sbs exam 40	-	S/US	Non-Credit
BSCE-206C	Bridge Course*	Physics	4	0	0	40	-	S/US	Non-Credit
	TOTAL		**12+ 4***	**03**	**10**	**330 + 40***	**320**	**625**	**19**

*Students passed 10+2 without Physics. The performance will be evaluated similar to the internal evaluation of core theory subjects. Students scoring marks equal to or more than 40% marks will be awarded 'Satisfactory'.

Semester III — Contact Hours = 33

Course Code	Course Type	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
			L	T	P	Internal	External		
BSCE-301C	Core Theory	Computer Networks	3	0	0	40	60	100	3
BSCE-302C	Core Theory	Programming in Python	3	0	0	40	60	100	3
BSCE-303C	Core Theory	Data Structures	3	0	0	40	60	100	3
BSCE-304C	Core Theory	Electronic Devices and Circuits	3	0	0	40	60	100	3
BSCE-305C	Core Practical/Lab	Electronic Devices and Circuits Laboratory	0	0	4	60	40	100	2
BSCE-306C	Core Practical/Lab	Programming in Python Laboratory	0	0	4	60	40	100	2
BSCE-307C	Core Practical/Lab	Data Structures Laboratory	0	0	4	60	40	100	2
BSCE-308C	Skill Enhancement Course-I	PC Assembly & Troubleshooting	3	0	0	40	60	100	3
BSCE-309C	Skill Enhancement Course- Lab	PC Assembly & Troubleshooting Laboratory	0	0	4	60	40	100	2
BMPD-301C		Mentoring and Professional Development	0	0	2	25	--	25	1
	TOTAL		**15**	**0**	**18**	**465**	**460**	**925**	**24**

Semester IV — Contact Hours = 29

Course Code	Course Type	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
			L	T	P	Internal	External		
BSCE-401C	Core Theory	Linear Integrated Circuits	3	0	0	40	60	100	3
BSCE-402C	Core Theory	Database Management Systems	3	0	0	40	60	100	3
BSCE-403C	Core Theory	Operating Systems	3	0	0	40	60	100	3
BSCE-404C	Core Theory	Internetworking & Protocols	3	0	0	40	60	100	3
BSCE-405C	Core Theory	Network Security	3	0	0	40	60	100	3
BSCE-406C	Core Practical/Laboratory	Linear Integrated Circuits Laboratory	0	0	4	60	40	100	2
BSCE-407C	Core Practical/Laboratory	Database Management Systems Laboratory	0	0	4	60	40	100	2
BSCE-408C	Core Practical/Laboratory	Operating Systems Laboratory	0	0	4	60	40	100	2
BMPD-401C		Mentoring and Professional Development	0	0	2	25	--	25	1
	TOTAL		**15**	**00**	**14**	**405**	**420**	**825**	**22**

1st Semester

Course Name: Digital Electronics

1st Semester BSCE-101C L3 T1 P0 C4

Course Outcome: At the end of the course, the student will be able to:

1. Categorize different number systems and the utility of logic gates.
2. Minimize the Boolean functions using different techniques.
3. Design combinational circuits.
4. Design sequential circuits.
5. Know the concepts of A/D and D/A converters.

Unit-I: NUMBER SYSTEMS: Binary, Octal, Decimal, Hexadecimal. Number base conversions, 1's, 2's complements, signed Binary numbers. Binary Arithmetic, Binary codes: Weighted BCD, Gray code, Excess 3 code, AND, OR, NOT, NAND, NOR, Exclusive-OR, and Exclusive-NOR. Implementations of Logic Functions using gates.

Unit-II: BOOLEAN ALGEBRA: Boolean postulates and laws – De-Morgan's Theorem, Principle of Duality, Boolean expression – Boolean function, Minimization of Boolean expressions – Sum of Products (SOP), Product of Sums (POS), Minterm, Maxterm, Canonical forms, Conversion between canonical forms, Karnaugh map Minimization.

Unit-III: COMBINATIONAL CIRCUITS: Design Adders, Subtractors, Multiplexer/Demultiplexer, encoder/decoder, and code converters. Implementation of combinational logic using MUX.

Unit-IV: SEQUENTIAL CIRCUITS: Flip flops SR, JK, T, D and Master-slave, Excitation table, Edge triggering, Level Triggering, Realization of one flip flop using other flip flops. Shift registers.

Unit-V: A/D & D/A CONVERTORS: Analog & Digital signals, A/D and D/A conversion techniques (Weighted type, R-2R Ladder type, Counter Type, Successive Approximation type.

Suggested Readings/ Books:

1. Morris Mano, Digital Design, Prentice Hall of India Pvt. Ltd
2. Donald P. Leach and Albert Paul Malvino, Digital Principles and Applications, 5 ed., Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
3. R.P. Jain, Modern Digital Electronics, 3 ed., Tata McGraw–Hill publishing company limited, New Delhi, 2003.
4. Thomas L. Floyd, Digital Fundamentals, Pearson Education, Inc, New Delhi, 2003

Course Name: Fundamentals of Information Technology

1st Semester BSCE-102C L3 T0 P0 C3

Course Outcome: At the end of the course the student will be able to:

1. Identify of input and output devices of Computers
2. Utilize the functioning of various components of the computer system
3. Define the role of the Operating system
4. Prepare documents using word processing, Spreadsheet, and Presentation Graphics Software.
5. Highlight Internet safety, legal, and other issues.

Unit-I: Human-Computer Interface: Concepts of Hardware and Software; Data and Information.
Functional Units of Computer System: CPU, registers, system bus, main memory unit, cache memory, Inside a computer, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips, processors.
Devices: Input and output devices (with connections and practical demo), keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, web camera, monitor, printer, and plotter.
Memory: Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks.
Data Representation: Bit, Byte, Binary, Decimal, Hexadecimal, and Octal Systems, Conversions, and Binary Arithmetic (Addition/ Subtraction/ Multiplication) Applications of IT.

Unit-II: Concept of Computing, Types of Languages: Machine, assembly and High level Language; Operating system as user interface, utility programs.
Word processing: Editing features, formatting features, saving, printing, table handling, page settings, spell-checking, macros, mail-merge, equation editors.

Unit-III: Spreadsheet: Workbook, worksheets, data types, operators, cell formats, freeze panes, editing features, formatting features, creating formulas, using formulas, cell references, replication, sorting, filtering, functions, Charts & Graphs.
Presentation Graphics Software: Templates, views, formatting slide, slides with graphs, animation, using special features, presenting slide shows.

Unit-IV: Electronic Payment System: Secure Electronic Transaction, Types of Payment System: Digital Cash, Electronic Cheque, Smart Card, Credit/Debit Card E-Money, Bit Coins and Crypto currency, Electronic Fund Transfer (EFT), Unified Payment Interface (UPI), Immediate Payment System (IMPS), Digital Signature and Certification Authority.
Introduction to Bluetooth, Cloud Computing, Big Data, Data Mining, Mobile Computing and Embedded Systems and Internet of Things (IoT)

Suggested Readings/ Books:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education
2. Computer Fundamentals, A. Goel, 2010, Pearson Education.
3. Fundamentals of Computers, P. K.Sinha & P. Sinha, 2007, BPB Publishers.
4. IT Tools, R.K. Jain, Khanna Publishing House
5. “Introduction to Information Technology”, Satish Jain, Ambrish Rai & Shashi Singh, Paperback Edition, BPB Publications, 2014.

Course Name: Problem Solving using C
1st Semester BSCE-103C L3 T1 P0 C4

Course Outcome: At the end of the course, the student will be able to:

1. Express the logical flow used in Programming.
2. Design algorithms for solving various real life problems
3. Implement programs using C.
4. Choose the right data type and statements for programs.
5. Explain various concepts of C programming language.

Unit-I: Logic Development: Data Representation, Flowcharts, Problem Analysis, Decision Trees/Tables, Pseudo code and algorithms. Fundamentals: Character set, Identifiers and Key Words, Data types, Constants, Variables, Expressions, Statements, Symbolic Constants.
Operations and Expressions: Arithmetic operators, Unary operators, Relational Operators, Logical Operators, Assignment and Conditional Operators, Library functions.

Unit-II: Data Input and Output: formatted & unformatted input output.
Control Statements: While, Do–while and For statements, Nested loops, If–else, Switch, Break – Continue statements.

Unit-III: Functions: Brief overview, defining, accessing functions, passing arguments to function, specifying argument data types, function prototypes, recursion.
Arrays: Defining, processing arrays, passing arrays to a function, multi– dimensional arrays
Strings: String declaration, string functions and string manipulation Program Structure Storage Class: Automatic, external and static variables.

Unit-IV: Structures & Unions: Defining and processing a structure, user defined data types, structures and pointers, passing structures to functions, unions. Pointers: Understanding Pointers, Accessing the Address of a Variable, Declaration and Initialization of Pointer Variables, Accessing a Variable through its Pointer, Pointers and Arrays; File Handling: File Operations, Processing a Data File

Suggested Readings/ Books:

1. Programming in ANSI C, E. Balagurusami, Fourth Edition, Tata McGraw Hill.
2. Programming in C, Third Edition, Stephen G Kochan, Pearson.
3. The C Programming Language, Kernighan & Richie, Second Edition, PHI Publication.

Course Name: Problem Solving using C Laboratory
1st Semester BSCE-104C L0 T0 P4 C2

Course Outcome: At the end of the course, the student will be able to:

1. Select the right statement for the program.
2. Experiment with different input values.
3. Test the output with boundary conditions.
4. Distinguish between various control statements and data types.
5. Implement programs for various problems.

Assignments: Develop all programs in C programming language.

1. Write a program to display your name. Write another program to print message with inputted name.
2. Write a program to add two numbers.
3. Write a program to find the square of a given number.
4. Write a program to calculate the average of three real numbers.
5. Write a program to find ascii value of a character 6. Write a program to find the size of int, float, double and char
7. Write a program to compute quotient and remainder
8. Write a program to accept the values of two variables.
9. Write a program to find the simple interest, inputs are amount, period in years and rate of interest.
10. Basic salary of an employee is input through the keyboard. The da is 25% of the basic salary while the hra is 15% of the basic salary. Provident fund is deducted at the rate of 10% of the gross salary (bs+da+hra). Write a program to calculate the net salary.
11. Write a program to find area of a circle using pi as constant.
12. Write a program to find volume of a cube using side as input from user.
13. Write a program using various unformatted input functions.
14. Write a program to find area of rectangle and print the result using unformatted output functions.
15. Write a program to find the larger of two numbers.
16. Write a program to find greater of three numbers using nested if.
17. Write a program to find whether the given number is even or odd.
18. Write a program to generate multiplication table using for loop
19. Write a program to generate multiplication table using while loop
20. Write a program to make a simple calculator using switch...case
21. Write a program to find whether the given number is a prime number.
22. Write a program using function to find the largest of three numbers
23. Write a program using function to print first 20 numbers and its squares.
24. Write a program to find the factorial of a given number.
25. Write a program to print the sum of two matrices
26. Write a program to find the length of a string
27. Write a program to copy string using strcpy ()
28. Write a program to compare a string
29. Write a program to reverse a string
30. Write a program to reverse a string
31. Write a program to multiply two numbers using pointers.
32. Write a program to display address of variable using pointers
33. Write a program to show the memory occupied by structure and union
34. Write a program to create student i-card using a structure

35. Write a program to read data from a file from a file
36. Write a program to save employee details in a file using file handling

Course Name: Fundamentals of IT Laboratory
1st Semester BSCE-105C L0 T0 P4 C2

Course Outcome: At the end of the course the student will be able to:

1. Highlight the features of word processing, spreadsheet and presentation tools
2. Identify the right componets for its documents on editor, spread sheet and presentation software.
3. Prepare documents and apply formatting.
4. select the right tool for different requirements.
5. Apply various operations.

Word Orientation: The instructor needs to give an overview of word processor. Details of the four tasks and features that would be covered Using word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter.

1. Using word to create Resume Features to be covered: - Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.
2. Creating an Assignment Features to be covered: - Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.
3. Creating a Newsletter Features to be covered :- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs
4. Creating a Feedback form Features to be covered :- Forms, Text Fields, Inserting objects, Mail Merge in Word.

Excel Orientation: The instructor needs to tell the importance of Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered Excel – Accessing, overview of toolbars, saving excel files,
1. Creating a Scheduler Features to be covered :- Gridlines, Format Cells, Summation, auto fill, Formatting Text
2. Calculations Features to be covered :- Cell Referencing, Formulae in excel – average, std.deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP
3. Performance Analysis Features to be covered :- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting
4. Game (like Cricket, badminton) Score Card Features to be covered :- Pivot Tables, Interactive Buttons, Importing Data, Data Protection, Data Validation

Presentation Orientation:
1. Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows
2. This session helps students in making their presentations interactive. Topics covered includes : Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

3. Concentrating on the in and out of Microsoft power point. Helps them learn best practices in designing and preparing power point presentation. Topics covered includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides. Auto content wizard, Slide Transition, Custom Animation, Auto Rehearsing
4. Power point test would be conducted. Students will be given model power point presentation which needs to be replicated

Internet and its Applications The instructor needs to tell the how to configure Web Browser and to use search engines by defining search criteria using Search Engines
1. To learn to setup an e-mail account and send and receive e-mails
2. To learn to subscribe/post on a blog and to use torrents for accelerated downloads
3. Hands on experience in online banking and Making an online payment for any domestic bill

Suggested Readings/ Books:

1. IT Tools, R.K. Jain, Khanna Publishing House.
2. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
3. Introduction to information technology, Turban, Rainer and Potter, John Wiley and Sons.
4. Problem Solving Cases in Microsoft Excel, Joseph Brady & Ellen F Monk, Thomson Learning.

Course Name: Digital Electronics Lab

1st Semester BSCE-106C L0 T0 P4 C2

BSCE-106C

Course Outcomes: At the end of this course student will demonstrate the ability to:

1. Realize combinational circuits using logic gates.
2. Realize sequential circuits using logic gates.

List of Experiments:

1. To verify the Truth-tables of all logic gates.
2. To verify NAND and NOR as Universal gates.
3. To realize and verify the half & full adder circuits using logic gates.
4. To realize half & full Subtractor circuits using logic gates.
5. To realize Encoder and Decoder circuits.
6. To realize multiplexer circuits.
7. To Realize De-multiplexer circuits.
8. To realize Full adder circuit using multiplexers.
9. To design Full subtractor circuit using decoders.
10. To design and verify the Truth tables of all flip-flops.

Course Name: English
1st Semester BPHU-103C L1 T0 P0 C1

Course Outcomes:

1. To know the theory, fundamentals, and tools of communication.
2. To become the independent users of English language.
3. To develop vital communication skills which are integral to their personal, social and professional interactions.
4. To know about the issues relating to the Language of communication.
5. To become proficient in professional communication such as interviews, group discussions, office environments, important reading- and writing- skills.

Unit I: **Introduction**

1. Theory of Communication
2. Types and modes of Communication

Unit II: Language of Communication

1. Verbal and Non-verbal
2. (Spoken and Written)
3. Personal, Social and Business
4. Barriers and Strategies
5. Intra-personal, Inter-personal and Group communication

Unit III: Reading and Understanding

1. Close Reading
2. Comprehension
3. Summary Paraphrasing
4. Analysis and Interpretation
5. Translation (from Hindi/Punjabi to English and vice-versa)
6. OR Precis writing /Paraphrasing (for International Students); Literary/Knowledge Texts.

Unit IV: Writing Skills

1. Documenting
2. Report Writing
3. Making notes
4. Letter writing

Suggested Readings/ Books:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.
4. Language through Literature (forthcoming) ed. Dr. Gauri Mishra, Dr Ranjana Kaul, Dr Brati Biswas
5. On Writing Well. William Zinsser. Harper Resource Book. 2001
6. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.

Course Name: English Practical/Laboratory
1st Semester BPHU-104C L0 T0 P2 C1

Course Outcomes:

1. To know the theory, fundamentals, and tools of communication.
2. To become the independent users of English language.
3. To develop vital communication skills which are integral to their personal, social and professional interactions.
4. To know about the issues relating to the Language of communication.
5. To become proficient in professional communication such as interviews, group discussions, office environments, important reading- and writing- skills.

The recommended readings given at the end are only suggestive; the students and teachers have the freedom to consult other materials on various units/topics given below. Similarly, the questions in the examination will be aimed towards assessing the skills learnt by the students rather than the textual content of the recommended books

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Interactive practice sessions in Language Lab on Oral Communication

1. Listening Comprehension
2. Self-Introduction, Group Discussion and Role Play
3. Common Everyday Situations: Conversations and Dialogues
4. Communication at Workplace
5. Interviews
6. Formal Presentations
7. Monologue
8. Effective Communication/ Mis- Communication
9. Public Speaking

Suggested Readings/ Books:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Practical English Usage. Michael Swan. OUP. 1995.
4. Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
5. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Course Name: Human Values, De-addiction and Traffic Rules
1st Semester HVPE-101C L3 T0 P0 C3

Course Outcomes:

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.

2. To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of 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 satisfying human behavior and mutually enriching interaction with Nature.

Unit-I

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self-Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels

Unit-II

Understanding Harmony in the Human Being - Harmony in Myself

1. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
2. Understanding the needs of Self ('I') and 'Body' - *Sukh* and *Suvidha*
3. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
4. Understanding the characteristics and activities of 'I' and harmony in 'I'
5. Understanding the harmony of I with the Body: *Sanyam* and *Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail
6. Programs to ensure *Sanyam* and *Swasthya*

Practice Exercises and Case Studies will be taken up in Practice Sessions.

Unit-III

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

1. Understanding harmony in the Family- the basic unit of human interaction
2. Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*;
3. Trust (*Vishwas)* and Respect (*Samman)* as the foundational values of relationship
4. Understanding the meaning of *Vishwas*; Difference between intention and competence
5. Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship
6. Understanding the harmony in the society (society being an extension of family): *Samadhan, Samridhi, Abhay, Sah-astitva* as comprehensive Human Goals
7. Visualizing a universal harmonious order in society- Undivided Society (*Akhand Samaj),* Universal Order (*Sarvabhaum Vyawastha)*- from family to world family!

- Practice Exercises and Case Studies will be taken up in Practice Sessions.

Unit-IV

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

1. Understanding the harmony in the Nature
2. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
3. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space
4. Holistic perception of harmony at all levels of existence

Practice Exercises and Case Studies will be taken up in Practice Sessions

Unit-V

Implications of the above Holistic Understanding of Harmony on Professional Ethics

1. Natural acceptance of human values
2. Definitiveness of Ethical Human Conduct
3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
4. Competence in professional ethics:

a) Ability to utilize the professional competence for augmenting universal human order,
b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
c) Ability to identify and develop appropriate technologies and management patterns for above production systems.

5. Case studies of typical holistic technologies, management models and production systems
6. Strategy for transition from the present state to Universal Human Order:

a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers
b) At the level of society: as mutually enriching institutions and organizations.

Suggested Readings/ Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, *A Foundation Course in Value Education*.
2. Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and Harper Collins, USA.
3. E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
4. A Nagraj, 1998, *Jeevan Vidya ek Parichay*, Divya Path Sansthan, Amarkantak.
5. Sussan George, 1976, How *the Other Half Dies*, Penguin Press. Reprinted 1986, 1991.
6. PL Dhar, RR Gaur, 1990, *Science and Humanism*, Common wealth Publishers.
7. A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.
8. Subhas Palekar, 2000, *How to practice Natural Farming*, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
9. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *Limits to Growth – Club of Rome's report*, Universe Books.
10. E G Seebauer & Robert L. Berry, 2000, *Fundamentals of Ethics for Scientists & Engineers*, Oxford University Press
11. M Govindrajran, S Natrajan & V.S. Senthil Kumar, *Engineering Ethics (including Human Values)*, Eastern Economy Edition, Prentice Hall of India Ltd.
12. B P Banerjee, 2005, *Foundations of Ethics and Management*, Excel Books.
13. B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008.

Relevant CDs, Movies, Documentaries & Other Literature

1. Value Education website, http://uhv.ac.in
2. Story of Stuff, http://www.storyofstuff.com

3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charlie Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story

Course Name: Human Values, De-addiction and Traffic Rules (Lab/ Seminar)
1st Semester HVPE-102C L0 T0 P2 C1

One each seminar will be organized on Drug De-addiction and Traffic Rules. Eminent scholar and experts of the subject will be called for the Seminar at least once during the semester. It will be binding for all the students to attend the seminar.

Course Name: Mentoring and Professional Development
1st Semester BMPD-101C L0 T0 P2 C1

Guidelines regarding Mentoring and Professional Development

Course Outcome:

1. Overall Personality
2. Aptitude (Technical and General)
3. General Awareness (Current Affairs and GK)
4. Communication Skills
5. Presentation Skills

The course shall be split in two sections i.e. outdoor activities and class activities. For achieving the above, suggestive list of activities to be conducted are:

Part – A: Class Activities

1. Expert and video lectures
2. Aptitude Test
3. Group Discussion
4. Quiz (General/Technical)
5. Presentations by the students
6. Team building Exercises

Part – B: Outdoor Activities

1. Sports/NSS/NCC
2. Society Activities of various student's chapter i.e. ISTE, SCIE, SAE, CSI, Cultural Club, etc.

Evaluation shall be based on rubrics for Part – A & B Mentors/Faculty in-charges shall maintain proper record student wise of each activity conducted and the same shall be submitted to the department.

Bridge Course: Fundamentals of Mathematics
1st Semester BSCE-107C L2 T0 P0 C:Non Credit

Course Outcome: At the end of the course the student will be able to:

1. Define various mathematical notions.
2. Explain different terms used in basic mathematics
3. Illustrate various operations and formulas used to solve mathematical problems.
4. Organize data in various models
5. Prepare solutions for various real life problems.

Unit-I

Set Introduction, Objectives, Representation of Sets (Roster Method, Set Builder Method), Types of Sets (Null Set, Singleton Set, Finite Set, Infinite Set, Equal Set, Equivalent Set, Disjoint Set, Subset, Proper Subset, Power Set, Universal Set) and Operation with Sets (Union of Set, Intersection of Set, Difference of Set, Symmetric Difference of Set) Universal Sets, Complement of a Set.

Unit-II

Logic Statement, Connectives, Basic Logic Operations (Conjunction, Disjunction, Negation) Logical Equivalence/Equivalent Statements, Tautologies and Contradictions

Unit -III

Matrices Introduction, Types of Matrix (Row Matrix, Column Matrix, Rectangular Matrix, Square Matrix, Diagonal Matrix, Scalar Matrix, Unit Matrix, Null Matrix, Comparable Matrix, Equal Matrix), Scalar Multiplication Negative of Matrix, Addition of Matrix, Difference of two Matrix, Multiplication of Matrices, Transpose of a Matrix.

Unit-IV

Progressions Introduction, Arithmetic Progression, Sum of Finite number of quantities in A.P, Arithmetic Means, Geometric Progression, Geometric Mean

Suggested Readings/ Books:

1. Discrete Mathematics and Its Applications by Kenneth H. Rosen, Mc Graw Hill, 6th Edition.
2. College Mathematics, Schaum's Series, TMH.
3. Elementary Mathematics, Dr. RD Sharma
4. Comprehensive Mathematics, Parmanand Gupta
5. Elements of Mathematics, ML Bhargava

2nd Semester

Course Name: Mathematics

2nd Semester BSCE-201C L3 T1 P0 C4

Course Outcome: At the end of course, the student will be able to:

1. Demonstrate knowledge of several trigonometric identities and use them to verify other identities
2. Understand the idea of differentiation and the variation of the function w.r.t given variable.
3. Add or add up the parts to find the original function or summation of the whole.
4. Understand the key concepts of dispersion and calculate mean, median, mode, and range.

Unit-I: Positive and negative angles, Measuring angles in radians and in degrees and conversion from one measure to another, Truth of the identity $\sin^2 x + \cos^2 x = 1$, for all x, Signs of trigonometric functions, Expressing sin (x±y) and cos (x±y) in terms of sinx, siny, cosx & cosy and their simple applications.

Unit-II: Derivative introduced as rate of change both as that of distance function and geometrically. Intuitive idea of limit, Limits of polynomials and rational functions trigonometric, exponential and logarithmic functions. Definition of derivative relate it to scope of tangent of the curve, derivative of sum, difference, product, polynomial and trigonometric functions.

Unit-III: Integration as inverse process of differentiation, Integration of a variety of functions by substitution, by partial fractions and by parts, Evaluation of simple integrals.

Unit-IV: Measures of Dispersion: Range, Mean deviation, variance and standard deviation of ungrouped/grouped data.

Suggested Readings/ Books:

1. Mathematics Textbook for Class XI, NCERT Publications
2. Mathematics Part I - Textbook for Class XII, NCERT Publication
3. Mathematics Part II - Textbook for Class XII, NCERT Publication

Course Name: Computer Architecture

2nd Semester BSCE-202C L3 T1 P0 C4

COURSE OUTCOME: At the end of course the student will be able to:

1. Know the role of various components of computer system
2. Represent the data in different formats.
3. Identify instructions and instruction formats.
4. Learn the common bus system
5. Understand the concept of pipelining and its performance metrics

Unit-I:

Introduction to Computer Organization: Introduction to Computer and CPU (Computer Organization, Computer Design and Computer Architecture), Stored Program Concept- Von Neumann Architecture, Harvard Architecture, RISC and CISC Architecture.

Unit-II:

Data representation: signed number representation, fixed and floating point representations, Computer arithmetic – integer addition and subtraction, ripple adder

Unit-III:

Register Transfer and Micro operations : Introduction to Registers, Instruction Format, Types of Instructions- Memory Reference Instructions, Register Reference Instructions and Input-Output Instructions.

Unit-IV:

Common Bus System: Introduction to Common Bus System, Types of Buses (Data Bus, Control Bus, and Address Bus), 16-bit Common Bus System--Data Movement among registers using Bus

Unit-V:

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

Suggested Readings/ Books:

1. Computer System Architecture, M.M. Mano, Third Edition, PHI.
2. Digital Computer Electronics, Malvino, Second Edition, Mc-Graw Hill
3. Computer Organization and Architecture, Stallings, Eighth Edition, PHI.
4. Computer Organization and Architecture, J.P.Hayes, Third Edition, TMH.
5. Computer Organization and Architecture: Designing for Performance, 10th Edition by William Stallings, Pearson Education.
6. Computer System Design and Architecture, 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education

Course Name: Object Oriented Programming using C++
2nd Semester BSCE-203C L3 T1 P0 C4

Course Outcome: At the end of the course the student will be able to:

1. Outline the role of programming for solving real world problems.
2. Explain Object oriented approach for finding Solutions to various problems with the help of C++ language.
3. Implement computer based solutions to various real-world problems using C++
4. Select the right Object Oriented Concept for optimal solution.
5. Review different solutions for a common problem.

Unit-I

Principles of object oriented programming

Introduction to OOP and its basic features, Basic components of a C++, Program and program structure, Compiling and Executing C++ Program. Difference between Procedure Oriented Language(C) and Object Oriented Language

Unit-II

Classes & Objects and Concept of Constructors

Defining classes, Defining member functions, Declaration of objects to class, Access to member variables from objects, Different forms of member functions, Access specifiers (Private, public, protected), Array of objects. Introduction to constructors, Parameterized constructors, Copy Constructor, Multiple constructors in class, Dynamic initialization of objects, Destructors

Unit-III

Inheritance and Operator overloading

Introduction to Inheritance, Types of inheritance: - Single inheritance, Multiple inheritance, Multilevel inheritance, Hierarchical inheritance, Hybrid inheritance, Defining operator overloading, Overloading of Unary and Binary operators, Rules for overloading operators

Unit-IV

Polymorphism and File Handling

Early Binding, Late Binding, Virtual Functions, pure virtual functions, Abstract Classes.
Opening and Closing File, Reading and Writing a file

Suggested Readings/ Books:

1. Object Oriented Programming with C++, E. Balagurusami, Fourth Edition, Tata Mc-Graw Hill.
2. Object Oriented Programming in Turbo C++, Robert Lafore, Fourth Edition Galgotia Publications.
3. The C++ Programming Language, Bjarna Stroustrup, Third Edition, Addison-Wesley Publishing Company.
4. Object Oriented Programming Using C++, Salaria, R. S, Fourth Edition, Khanna Book Publishing.

Course Name : Computer Architecture Lab

2nd Semester BSCE-204C L0 T0 P4 C2

Course Outcomes: At the end of this course student will be able to:

1. Assemble personal computer;
2. Implement the various assembly language programs for basic arithmetic and logical operations
3. Demonstrate the functioning of microprocessor based systems with I/O interface

List of Experiments:

1. Computer Anatomy- Memory, Ports and Motherboard.
2. Dismantling and assembling PC.
3. Introduction to 8085 kit.
4. Addition of two 8 bit numbers, sum 8 bit.
5. Subtraction of two 8 bit numbers.
6. Find 1's complement of 8-bit number.
7. Find 2's complement of 8-bit number.
8. Shift an 8-bit no. by one bit.
9. Find Largest of two 8 bit numbers.
10. Sum of series of 8 bit numbers.

Course Name: Object Oriented Programming using C++ Laboratory
2nd Semester BSCE-205C L0 T0 P4 C2

Course Outcome: At the end of the course the student will be able to:

1. Design the classes
2. Illustrate the concept of memory representation for objects
3. Implement programs using OOP concepts for various problems.
4. Implement file handling in C++
5. Select the right data types to represent class properties

Assignments: Develop all program in C++

1. Write a program to enter mark of 6 different subjects and find out the total mark (Using cin and cout statement)
2. Write a function using reference variables as arguments to swap the values of pair of integers.
3. Write a function to find largest of three numbers.
4. Write a program to find the factorial of a number.
5. Define a class to represent a bank account which includes the following members as Data members:
   Name of the depositor b) Account Number c) Withdrawal amount d) Balance amount in the account
   Member Functions:
   a) To assign initial values b) To deposit an amount c) To withdraw an amount after checking the balance d) To display name and balance.
6. Write the above program for handling n number of account holders using array of objects
7. Write a C++ program to compute area of right angle triangle, equilateral triangle, isosceles triangle using function overloading concept.
8. Consider a publishing company that markets both book and audio cassette version to its works. Create a class Publication that stores the title (a string) and price (type float) of a publication. Derive the following two classes from the above Publication class: Book which adds a page count (int) and Tape which adds a playing time in minutes(float). Each class should have get_data() function to get its data from the user at the keyboard. Write the main () function to test the Book and Tape classes by creating instances of them asking the user to fill in data with get_data() and then displaying it using put_data().
9. Consider an example of declaring the examination result. Design three classes student, exam and result. The student has data members such as rollno, name. Create the lass exam by inheriting the student class. The exam class adds data members representing the marks scored in 5 subjects. Derive the result from exam-class and it has own data members like total, avg.
10. Write a program for overloading of Unary ++ operator.
11. Write a program for overloading of Binary + operator.
12. Write a program of Virtual Functions.
13. Write a program of Abstract Classes.
14. Write a program to read and write from file.

Suggested Readings/ Books:

1. Object Oriented Programming with C++, E. Balagurusami, Fourth Edition, Tata Mc-Graw Hill.
2. Object Oriented Programming in Turbo C++, Robert Lafore, Fourth Edition Galgotia Publications.
3. The C++ Programming Language, Bjarna Stroustrup, Third Edition, Addison-Wesley Publishing Company.
4. Object Oriented Programming Using C++, Salaria, R. S, Fourth Edition, Khanna Book Publishing

Course Name: Environmental Studies
2nd Semester EVS-101C L2 T0 P0 C2

Course Outcomes:

1. Students will enable to understand environmental problems at local and national level through literature and general awareness.
2. The students will gain practical knowledge by visiting wildlife areas, environmental institutes and various personalities who have done practical work on various environmental Issues.
3. The students will apply interdisciplinary approach to understand key environmental issues and critically analyze them to explore the possibilities to mitigate these problems.
4. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world

UNIT I: Introduction to Environmental Studies

Multidisciplinary nature of Environmental Studies: Scope & Importance; Need for Public Awareness

UNIT II: Ecosystems
Concept of an Ecosystem: Structure & functions of an ecosystem (Producers, Consumers & Decomposers); Energy Flow in an ecosystem: Food Chain, Food web and Ecological Pyramids
Characteristic features, structure & functions of following Ecosystems:

- Forest Ecosystem
- Aquatic Ecosystem (Ponds, Lakes, River & Ocean)

UNIT III: Natural Resources
Renewable & Non-renewable resources:
Forest Resources: their uses, functions & values (Biodiversity conservation, role in climate change, medicines) & threats (Over-exploitation, Deforestation, Timber extraction, Agriculture Pressure), Forest Conservation Act.
Water Resources: Their uses (Agriculture, Domestic & Industrial), functions & values, Overexploitation and Pollution of Ground & Surface water resources (Case study of Punjab), Water Conservation, Rainwater Harvesting,
Land Resources: Land as a resource; Land degradation, soil erosion and desertification
Energy Resources: Renewable & non-renewable energy resources, use of alternate energy resources (Solar, Wind, Biomass, Thermal), Urban problems related to Energy

UNIT IV: Biodiversity & its conservation

Types of Biodiversity: Species, Genetic & Ecosystem, India as a mega biodiversity nation, Biodiversity hot spots and biogeographic regions of India, Examples of Endangered & Endemic species of India, Red data book.

UNIT V: Environmental Pollution & Social Issues

Types, Causes, Effects & Control of Air, Water, Soil & Noise Pollution; Nuclear hazards and accidents & Health risks; Global Climate Change: Global warming, Ozone depletion, Acid rain, Melting of Glaciers & Ice caps, Rising sea levels; Environmental disasters: Earthquakes, Floods, Cyclones, Landslides.

UNIT VI: Field Work

1. Visit to a National Park, Biosphere Reserve, Wildlife Sanctuary
2. Documentation & preparation of a Biodiversity (flora & fauna) register of campus/river/forest
3. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural

4. Identification & Photography of resident or migratory birds, insects (butterflies)
5. Public hearing on environmental issues in a village

Suggested Readings/ Books:

1. Bharucha, E. Text Book for Environmental Studies. University Grants Commission, New Delhi.
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India, Email:mapin@icenet.net (R)
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
5. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
8. Down to Earth, Centre for Science and Environment (R)
9. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
10. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
11. Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
12. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection & Laws. Himalaya Pub. House, Delhi 284p.
13. Mckinney, M.L. & School, R.M. 1996. Environmental Science systems & Solutions, Web enhanced edition. 639p.
14. Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
15. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
16. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
17. Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
18. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
19. Survey of the Environment, The Hindu (M)
20. Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science (TB)
21. Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
22. Wanger K.D., 1998 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p

Course Name: Mentoring and Professional Development
2nd Semester BMPD-201C L0 T0 P2 C1

Guidelines regarding Mentoring and Professional Development

Course Outcome:

1. Overall Personality
2. Aptitude (Technical and General)
3. General Awareness (Current Affairs and GK)
4. Communication Skills
5. Presentation Skills

The course shall be split in two sections i.e. outdoor activities and class activities. For achieving the above, suggestive list of activities to be conducted are:

Part – A: Class Activities

1. Expert and video lectures
2. Aptitude Test
3. Group Discussion
4. Quiz (General/Technical)
5. Presentations by the students
6. Team building Exercises

Part – B: Outdoor Activities

1. Sports/NSS/NCC
2. Society Activities of various student's chapter i.e. ISTE, SCIE, SAE, CSI, Cultural Club, etc.

Evaluation shall be based on rubrics for Part – A & B Mentors/Faculty in-charges shall maintain proper record student wise of each activity conducted and the same shall be submitted to the department.

Course Name: Introduction to Shaheed Bhagat Singh and his co-patriots
2nd Semester SBS-101C L1 T0 P0 C: Non credit

Unit I: **Introduction to Shaheed Bhagat Singh as a person through the eyes of his collogues:**
Family background and childhood, Education and participation in National Freedom Movement, His visits to Jallianwala Bagh and Nankana Sahib.

Unit II: **His contribution to National Freedom Moment:**
Building of Youth Movement, His contribution through his writing, National college Movement and his comrades, Dwarka Das Library and Lahore Science movement, List of books Shaheed Bhagat Singh.

Unit III: **Shaheed Bhagat Singh's experiences at Kanpur:**
As journalist and joining Hindustan Republican Association.

Unit IV: **His return to Punjab:**
Jaito Morcha, His first experience of underground life, Shaheed Bhagat Singh at Kiriti Magazine, Establishment Hindustan Socialist Republican Association.

Unit V: Shaheed Bhagat Singh's attack on British rule:
Saunders case, Assembly bomb case, Hunger strike for Jail Reforms, 'Cut Short Justice' system of the British.

Unit VI: Overall contributions and his vision of free India.

Suggested Readings/ Books:

1. Sardar Bhagat Singh by Jatinder Nath Sanyal, National Book Trust, New Delhi
2. Bhagat Singh Enduring Legacy for Justice, Libert and Equality, Published by SocialChange Papers New Delhi
3. Shaheed Bhagat Singh and his comrades by Prof Jagmohan Singh Chetna Parkashan,Punjabi Bhawan Ludhiana.
4. Yash ki Dhrohar Edited by Banarsi Das Chaturvedi Published by Atama Ram and Sons,Delhi
5. Samaritian By Shiv Verma Published by Lok Parkashan Greh, Delhi
6. Amar Shaheedon ke Sansmarn by Raja Ram Shashtri Published by Sadhana Sahitya Mander Parkashan Kanpur
7. Bhagat Singh; The Eternal Rebal by Malwinderjit Singh Waraich, Published by UnistarBook Pvt. Ltd.
8. www.shaheed bhagatsingh.org

Bridge Course: Physics
2nd Semester BSCE-206C L4 T0 P0 C: Non credit

Course Outcome: At the end of course the student will be able to:

1. Understand the concept of static charges and Electric Field.
2. Know the relationship between resistance, current and voltage
3. Know the concepts of electromagnetic induction and alternating current.
4. Know the basics of semiconductor devices and characteristics

Unit-I: Electric Charges and Fields: Electric charges, Conservation of charge, Coulomb's law-force between two point charges, forces between multiple charges, Electric field, electric field due to a point charge, electric field lines, Electric flux, statement of Gauss's theorem, Electric potential, potential difference, electric potential due to a point charge, capacitors and capacitance, combination of capacitors in series and in parallel.

Unit-II: Current Electricity: Electric current, flow of electric charges in a metallic conductor, drift velocity, mobility and their relation with electric current; Ohm's law, V-I characteristics (linear and non-linear), electrical energy and power, electrical resistivity and conductivity

Unit-III: Electromagnetic Induction and Alternating Currents: Electromagnetic induction, Faraday's laws, induced EMF and current, Lenz's Law, Self and mutual induction, Alternating Current Alternating currents, peak and RMS value of alternating current/voltage; reactance and impedance; LCR series circuit (phasors only), resonance, power in AC circuits, power factor, Transformer.

Unit-IV: Semiconductor Electronics: Energy bands in conductors, semiconductors and insulators (qualitative ideas only) Intrinsic and extrinsic semiconductors- p and n type carrier concentration in intrinsic and extrinsic semiconductors, electrical conductivity and conduction mechanism in semiconductors, Theory of p-n junction diode, forward bias, reverses bias, V-I characteristics, Bipolar junction transistor, p-n-p and n-p-n transistors: principle and modes of operation, Symbol, truth table and functions of logic gates.

Suggested Readings/ Books:

1. Physics, Class XI, Part -I and II, Published by NCERT.
2. Physics, Class XII, Part -I and II, Published by NCERT

3rd Semester

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Application and Electronics

Semester 3rd
Subject Code BSCE-301C
Subject Name Computer Networks
Contact Hours L: 03 T: 00 P: 00 Credits: 03

Course Objective

This course deals with basic concepts of computer networks, the performance of different network media, and different network topologies.

Course Outcomes

At the end of this course, the students will be able to

CO1 Highlight the characteristics of various protocols.
CO2 Define different network technologies and their application.
CO3 Identify Hardware and software components for designing network.
CO4 Compare the performance of different network media
CO5 Implement various configuration settings

Detailed Contents	Contact hours
Unit-I **Data communications concepts:** Digital and analog transmissions-Modem, parallel and serial transmission, synchronous and asynchronouscommunication. Modes of communication: Simplex, half duplex, full duplex. **Types of Networks:** LAN, MAN, WAN **Network Topologies:** Bus, Star, Ring, Mesh, Tree, Hybrid **Communication Channels: Wired transmissions:** Telephone lines, leased lines, switch line, coaxial cables-base band, broadband, optical fibertransmission. **Communication Switching Techniques**: Circuit Switching, Message Switching, Packet Switching.	12
Unit-II **Network Reference Models**: OSI Reference Model, TCP/IP Reference Model,Comparison of OSI and TCP/IP Reference Models. Transmission impairments – Attenuation, Distortion, Noise. Multiplexing – Frequency division, Time division, Wavelength division. **Data Link Layer Design Issues**: Services provided to the Network Layer, Framing, Error Control (error detection and correction code), Flow Control, Data Link Layer in the Internet (SLIP, PPP)	10

Unit-III **MAC sub layer:** CSMA/CD/CA, IEEE standards **Network Layer:** Design Issues, Routing Algorithms: Shortest Path Routing, Congestion Control Policies, Concept of Internetworking.	12
Unit-IV **Transport Layer**: Design issues, Elements of transport protocols – Addressing, Connection establishment and release, Flow control and buffering,Introduction to TCP/UDP protocols. **Session, Presentation and Application Layers**: Session Layer – Design issues, remote procedure call. Presentation Layer – Design issues, Data compression techniques, Domain Name System (DNS), E-mail, File Transfer Protocol (FTP)	10

Text Books:

1. Computer Networks, Tanenbaum, Andrew, Fifth Edition, PHI.
2. Data Communication and Networking, Behrouz A. Forouzan, Fourth Edition.
3. Computer Today, S.K. Basandra, First Edition, Galgotia.

Reference Books:

1. Data Communication System, Black, Ulysse, Third Edition, PHI.
2. Data and Computer Communications, Stalling, Ninth Edition, PHI.
3. James F. Kurose and Keith W. Ross, “Computer Networking”, PearsonEducation.
4. Douglas E. Comer, “Internetworking with TCP/IP”, Volume-I, Prentice Hall,India.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Application and Electronics

Semester 3rd
Subject Code BSCE-302C
Subject Name Programming in Python
Contact Hours L: 03 T: 00 P: 00 Credits: 03

Course Objective

This course deals with basic concepts related to data types and the operators used in Python.

Course Outcomes

At the end of this course, student will be able to:

CO#	Course Outcomes
CO1	Explain the environment, data types, and operators used in Python.
CO2	Compare Python with other programming languages.
CO3	Outline the use of control structures and numerous native data types with their methods.
CO4	Design user-defined functions, modules, files, and packages and exception handling methods.

Detailed Contents	Contact hours
Unit-I **Introduction to Python Programming Language:** Programming Language,History and Origin of Python Language, Features of Python, Limitations, Major Applications of Python, Getting, Installing Python, Setting up Path and Environment Variables, Running Python, First Python Program, Python Interactive Help Feature, Python differences from other languages. **Python Data Types & Input/Output:** Keywords, Identifiers, Python Statement, Indentation, Documentation, Variables, Multiple Assignment, Understanding Data Type, Data Type Conversion, Python Input and Output Functions, Import command. **Operators and Expressions:** Operators in Python, Expressions, Precedence, Associativity of Operators, Non-Associative Operators.	12
Unit-II **Control Structures:** Decision-making statements, Python loops, Pythoncontrol statements. **Python Native Data Types:** Numbers, Lists, Tuples, Sets, Dictionary, Functions & Methods of Dictionary, Strings (in detail with their methods andoperations).	10
Unit-III **Python Functions:** Functions, Advantages of Functions, Built-in Functions, User defined functions, Anonymous functions, Pass by value Vs. Pass by Reference, Recursion, Scope and Lifetime of Variables. **Python Modules:** Module definition, Need of modules, Creating a module, Importing module, Path Searching of a Module, Module Reloading, StandardModules, Python Packages.	12

Unit-IV **Exception Handling:** Exceptions, Built-in exceptions, Exception handling, User-defined exceptions in Python. **File Management in Python:** Operations on files (opening, modes, attributes, encoding, closing), read () & write () methods, tell () & seek () methods, renaming & deleting files in Python, directories in Python. **Classes and Objects:** The concept of OOPS in Python, designing classes, creating objects, Accessing attributes, Editing class attributes, Built-in class attributes, Garbage collection, and Destroying objects.	10

Text Books:

1. Programming in Python, Pooja Sharma, BPB Publications, 2017.
2. Core Python Programming, R. Nageswara Rao, 2nd Edition, Dreamtech.

Reference Books:

1. Python, The complete Reference, Martin C. Brown, Mc Graw Hill Education.
2. Python in a Nutshell, A. Martelli, A. Ravenscroft, S. Holden, OREILLY.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Application and Electronics

Semester 3rd
Subject Code BSCE-303C
Subject Name Data Structures
Contact Hours L: 03 T: 00 P: 00 Credits: 03

Course Objective

This course deals with concepts related to data structures and operations on data structures.

Course Outcomes

At the end of this course student will be able to:

CO#	Course outcomes
CO1	Apply appropriate constructs of Programming language, coding standards for application development
CO2	Select appropriate data structures for problem solving and programming
CO3	Illustrate the outcome of various operations on data structures.
CO4	Identify appropriate searching and/or sorting techniques for wide range of problems and data types.

Detailed Contents	Contact hours
Unit-I **Introduction to Data Structures:** Algorithms and Flowcharts, Basics Analysis on Algorithm, Complexity of Algorithm, Introduction and Definition of Data Structure, Classification of Data, Arrays, Various types of Data Structure, Static and Dynamic Memory Allocation, Function, Recursion. **Arrays, Pointers and Strings:** Introduction to Arrays, Definition, One Dimensional Array and Multi- Dimensional Arrays, Pointer, Pointer to Structure, various Programs for Arrayand Pointer. Strings. Introduction to Strings, Definition, Library Functions of Strings.	10
Unit-II **Stacks and Queue** Introduction to Stack, Definition, Stack Implementation, Operations of Stack, Applications of Stack and Multiple Stacks. Implementation of Multiple Stack Queues, Introduction to Queue, Definition, Queue Implementation, Operations of Queue, Circular Queue, De-queue and Priority Queue.	8

Unit-III **Linked Lists and Trees** Introduction, Representation and Operations of Linked Lists, Singly Linked List, Doubly Linked List, Circular Linked List, And Circular Doubly Linked List. **Trees** Introduction to Tree, Tree Terminology Binary Tree, Binary Search Tree, Strictly Binary Tree, Complete Binary Tree, Tree Traversal, Threaded Binary Tree, AVL Tree B Tree, B+ Tree.	14
Unit-IV **Graphs, Searching, Sorting and Hashing** **Graphs:** Introduction, Representation to Graphs, Graph Traversals ShortestPath Algorithms. **Searching and Sorting:** Searching, Types of Searching, Sorting, Types of sorting like quick sort, bubble sort, merge sort, selection sort. **Hashing:** Hash Function, Types of Hash Functions, Collision, Collision Resolution Technique (CRT), Perfect Hashing	12

Text Books:

1. Brijesh Bakariya. Data Structures and Algorithms Implementation through C, BPBPublications.
2. Kruse R.L. Data Structures and Program Design in C; PHI
3. Aho Alfred V., Hopperoft John E., UIlman Jeffrey D., “Data Structures andAlgorithms”, AddisonWesley

Reference Books:

1. Horowitz & Sawhaney: Fundamentals of Data Structures, Galgotia Publishers.
2. Yashwant Kanetkar, Understanding Pointers in C, BPB Publications.
3. Horowitz, S. Sahni, and S. Rajasekaran, Computer Algorithms, Galgotia Pub. Pvt.Ltd., 1998.

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Bachelor of Science
Computer Application and Electronics

Semester 3rd
Subject Code BSCE-304C
Subject Name Electronic Devices and Circuits
Contact Hours L: 03 T: 00 P: 00 Credits: 03

Course Objective

This is the most fundamental course on electronics devices and circuits meant for understanding of structures, characteristics of semiconductor devices and their use in circuits.

Course Outcomes

At the end of this course student will be able to:

CO#	Course outcomes
CO1	Understand the concept of PN junction diode and various other diodes with their V-I characteristics
CO2	Know about various types of transistors and various biasing circuits.
CO3	Know and classify power amplifiers, feedback amplifiers and oscillators.
CO4	Design h-parameter circuit and hybrid model of transistor amplifiers.

Detailed Contents	Contact hours
Unit-I : Semiconductor Physics Semiconductors: energy bands, diffusion current, drift current, mobility and resistivity, carrier generation and recombination, Poisson and continuity equations; PN junction diode: depletion region, avalanche and Zener breakdowns, V-I Characteristics, Switching characteristics of diode, Temperature Dependence of PN diode	10
Unit-II Transistors Bipolar Junction Transistors: Construction, transistor current components, V-I characteristics in CB, CE and CC, switching characteristics of transistor; BJT biasing techniques: fixed bias circuit, collector to base bias circuit, biasing circuit with emitter resistor, voltage divider biasing circuit, emitter bias circuit	8
Unit-III Power Amplifiers Transformer coupled audio amplifier: construction, working, efficiency; Classifications: class-A, class-B, class-AB and class-C amplifiers, efficiency; Complementary push-pull amplifier working	14
Unit-IV Feedback Amplifiers Feedback concepts: theory, advantages & disadvantages of feedback; Classification: current-series, current-shunt, voltage-series, voltage-shunt feedback amplifier; Oscillators: Barkhausen's Criteria, General form of oscillator circuit,RC phase shift, Wein Bridge,	12

Unit-V Low frequency Amplifiers Low frequency: BJT amplifier analysis using h-model in CE, CB and CC configurations, simplified BJT h-model, emitter follower.	08

Reference Books:

1. Millman, Halkias, Electronic Devices & Circuits, Tata Mcgraw Hill
2. Boylested, Electronic Devices & Circuits Theory, Pearson Education
3. J.D. Ryder, Electronic Fundamentals & Application, PHI
4. Floyd, Electronic Devices, Pearson Education
5. J.B. Gupta, Electronics Devices & Circuits, Katson
6. Millman and Halkias, Integrated Electronics-Analog and Digital Circuits & Systems, McGraw Hill
7. Mottershed, Electronic Devices and Circuits, McGraw Hill

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Semester **3rd**
Subject Code **BSCE-305C**
Subject Name **Electronic Devices and Circuits Laboratory**
Contact Hours **L: 00** **T: 00** **P: 04** **Credits: 02**

Course Objective

The main aim of this course is to make the students familiar with basic electronic components & devices to understand their working and limitations for further use in various application circuits.

Course Outcomes

At the end of this course student will be able to:

CO#	Course outcomes
CO1	Understand and verify the functioning of diodes & their applications
CO2	Explore the VI characteristics of transistor in various configuration
CO3	Design and analyse practical behaviour of power amplifiers
CO4	Design oscillators and compute their oscillation frequency

List of assignments:

1.	Design and study the Zener regulator as voltage regulator on breadboard
2.	Design and study half-wave, full-wave & Bridge rectifiers using breadboard
3.	To plot input and output characteristics of CE and CB configuration
4.	To plot input and output characteristics of CE, CB and CC configuration using simulation tools
5.	To study the characteristics and working of a Class-A amplifier
6.	To study the characteristics and working of Class-B amplifier.
7.	To study the characteristics and working of Class-B push-pull amplifier.
8.	To study the response of Wien Bridge oscillator and determine frequency of oscillation
9.	To study the response of RC phase shift oscillator and determine frequency of oscillation.

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Semester **3rd**
Subject Code **BSCE-306C**
Subject Name **Programming in Python Laboratory**
Contact Hours **L: 00** **T: 00** **P: 04** **Credits: 02**

Course Objective

This is one of the fundamental courses deals with implementation of different modules and functions using python.

Course Outcomes

At the end of this course student will be able to:

CO#	Course outcomes
CO1	Outline various programming constructs like data types and control structures of Python.
CO2	Implement different data structures.
CO3	Implement modules and functions.
CO4	Illustrate concept of object-oriented programming.
CO5	Implement file handling.

List of assignments:

1.	Compute sum, subtraction, multiplication, division and exponent of given variables input by the user.
2.	Compute area of following shapes: circle, rectangle, triangle, square, trapezoid and parallelogram.
3.	Compute volume of following 3D shapes: cube, cylinder, cone and sphere.
4.	Compute and print roots of quadratic equation $ax^2+bx+c=0$, where the values of a, b, and c are input by the user.
5.	Print numbers up to N which are not divisible by 3, 6, 9,, e.g., 1, 2, 4, 5, 7,….
6.	Write a program to determine whether a triangle is isosceles or not?
7.	Print multiplication table of a number input by the user.
8.	Compute sum of natural numbers from one to n number.
9.	Print Fibonacci series up to n numbers e.g. 0 1 1 2 3 5 8 13…..n
10.	Compute factorial of a given number.
11.	Count occurrence of a digit 5 in a given integer number input by the user.
12.	Print Geometric and Harmonic means of a series input by the user.
13.	Evaluate the following expressions: a. $x-x^2/2!+x^3/3!-x^4/4!+\ldots x^n/n!$ b. $x-x^3/3!+x^5/5!-x^7/7!+\ldots x^n/n!$
14.	Print all possible combinations of 4, 5, and 6.
15.	Determine prime numbers within a specific range.
16.	Count number of persons of age above 60 and below 90.
17.	Compute transpose of a matrix.
18.	Perform following operations on two matrices.1) Addition 2) Subtraction 3) Multiplication

19.	Count occurrence of vowels.
20.	Count total number of vowels in a word.
21.	Determine whether a string is palindrome or not.
22.	Perform following operations on a list of numbers: 1) Insert an element 2) delete an element 3) sort the list 4) delete entire list
23.	Display word after Sorting in alphabetical order.
24.	Perform sequential search on a list of given numbers.
25.	Perform sequential search on ordered list of given numbers.
26.	Maintain practical note book as per their serial numbers in library using Python dictionary.
27.	Perform following operations on dictionary 1) Insert 2) delete 3) change
28.	Check whether a number is in a given range using functions.
29.	Write a Python function that accepts a string and calculates number of upper case letters and lower case letters available in that string.
30.	To find the Max of three numbers using functions.
31.	Multiply all the numbers in a list using functions.
32.	Solve the Fibonacci sequence using recursion.
33.	Get the factorial of a non-negative integer using recursion.
34.	Write a program to create a module of factorial in Python.
35.	Design a Python class named *Rectangle*, constructed by a length & width, also design a method which will compute the area of a rectangle.
36.	Design a Python class named *Circle* constructed by a radius and two methods which will compute the area and the perimeter of a circle.
37.	Design a Python class to reverse a string 'word by word'.
38.	Write a Python program to read an entire *text file*.
39.	Design a Python program to read first n lines of a *text file*.
40.	Construct a Python program to write and append text to a file and display the text.

Text Books:

1. Programming in Python, Pooja Sharma, BPB Publications, 2017.
2. Core Python Programming, R. Nageswara Rao, 2nd Ediiton, Dreamtech.

Reference Books:

1. Python, The complete Reference, Martin C. Brown, Mc Graw Hill Education.
2. Python in a Nutshell, A. Martelli, A. Ravenscroft, S. Holden, OREILLY.

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Semester **3rd**
Subject Code **BSCE-307C**
Subject Name **Data Structure Laboratory**
Contact Hours **L: 00** **T: 00** **P: 04** **Credits: 02**

Course Objective

This is one of the fundamental courses deals with implementation of various operations and implementation of different algorithms .

Course Outcomes

At the end of this course student will be able to:

CO#	Course outcomes
CO1	Implement Dynamic memory allocation.
CO2	Create different data structures in C/ C++
CO3	Implement various operations of all data structures
CO4	Illustrate the outcome of various operations with the help of examples.
CO5	Write programs to implement various types of searching and sorting algorithms

List of assignments:

1	Program for using Dynamic Functions (malloc(), calloc(), realloc() and free()) functions.
2	Program to insert, delete and traverse an element from an array
3	Program to merge one dimensional arrays
4	Program for addition and subtraction of two matrices.
5	Program for implementing multiplication of two matrices
6	Implement linear search using one and two dimensional array.
7	Program for implementing selection sort.
8	Program for implementing insertion sort.
9	Program for implementing quick sort.
10	Program for implementing merge sort.
11	Program to calculate length of the string using user defined function.
12	Program to concatenate and compare two strings using user defined function.
13	Program for using the concept of pointer to string.
14	Program to reverse a sentence by recursion.
15	Program to delete all repeated words in string.
16	Program to find the number of vowels, consonants, digits and white space in a string.
17	Program to find the length of the longest repeating sequence in a string.
18	Program to find highest and lowest frequency character in a string.
19	Program for implementing Stack using array.
20	Program for implementing Stack using pointer.
21	Program for implementing multiple stack.
22	Program for converting infix to postfix form.
23	Program for implementing Queue using array.
24	Program for dynamic implementation of queue.

25	Program for implementing circular queue.
26	Program for implementing dequeue.
27	Program for implementing priority queue.
28	Program for implementing Singly Linked list.
29	Program for implementing Doubly Linked list.
30	Program for implementing Binary Search Tree.
31	Program for Breadth First Search (BFS) for graph traversal.
32	Program for Depth First Search (DFS) for graph traversal.

Reference Books:

1. Brijesh Bakariya. Data Structures and Algorithms Implementation through C, BPBPublications.
2. Aho Alfred V., Hopperoft John E., UIlman Jeffrey D., “Data Structures andAlgorithms”, AddisonWesley
3. Horowitz & Sawhaney: Fundamentals of Data Structures, Galgotia Publishers.

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Semester 3rd
Subject Code BSCE-308C
Subject Name PC Assembly & Troubleshooting
Contact Hours L: 03 T: 00 P: 00 Credits: 03

Course Objective

This is the most fundamental course deals with the identification of various components and their installation.

Course Outcomes

At the end of this course student will be able to:

CO#	Course outcomes
CO1	Identify various components of computer systems.
CO2	Differentiate between types of processors required for different computer systems.
CO3	Explain the steps to install, connect and configure various peripheral devices
CO4	Execute the troubleshooting issues in Computer Systems
CO5	Explain how resources can be shared over network

Detailed Contents	Contact hours
Unit I: Brief history of computer on the basis Hardware. Computer system modules/ components and its operations, need of hardware and software for computer to work, different hardware components within a computer and connected to a computer as peripheral devices, different processors used for personalcomputers	9
Unit II: Perform installation, configuration, and upgrading of microcomputer/ computer: Hardware and software requirement, Assemble/setup microcomputer/ computer systems, accessory boards, types of motherboards, selection of right motherboard, Installation,replacement of motherboard.	8
Unit III: Install/connect associated peripherals: Working of printers and scanners, Installation of printers and scanners, sharing a printer over a local areanetwork, troubleshooting printer and scanner problems.	8
Unit IV: Diagnose and troubleshooting of microcomputer/ computer systems hardware& software and other peripheral equipment: Approaches to solve a PC problem, troubleshooting a failed boot before the OS is loaded, different approaches to installing and supporting I/O device.	8

Reference Books:

1. The Indispensable PC Hardware Book (4th Edition) Hans-Peter Messmer
2. PC Hardware: A Beginner's Guide by Ron Gilster.

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Semester **3rd**
Subject Code **BSCE-309C**
Subject Name **PC Assembly & Troubleshooting Laboratory**
Contact Hours **L: 00** **T: 00** **P: 04** **Credits: 02**

Course Objective

This is the most fundamental course on assembling, installation and configuration of computer systems.

Course Outcomes:

CO#	Course outcomes
CO1	Identify key component of computer system while assembling a system.
CO2	Implement installation and configuration of computer system
CO3	Perform installation, configuration and sharing of peripheral devices.
CO4	Solve troubleshooting issues in Computer Systems
CO5	Execute dual booting.

List of assignments:

1.	Assembling and De Assembling of Computer System
2.	Loading and configuration procedure of Microsoft Client O/S Win XP /Win 7 and Windows 8
3.	Installation of utility tools (Software)
4.	Installation of utility tools (Drivers)
5.	Firewall configuration, Antivirus/Internet security loading and configuration Procedure
6.	Installation and configuration of I/O devices – Printers, Webcams, Scanners.
7.	Installation and configuration of I/O devices – Digital Camera, USB Wi-fi, USB BT, USB Storages, Projectors
8.	Multiple OS loading and trouble shooting

Reference Books:

1. The Indispensable PC Hardware Book (4th Edition) Hans-Peter MessmerPC Hardware:
A Beginner's Guide by Ron Gilster

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Semester	**3rd**			
Subject Code	**BMPD-301C**			
Subject Name	**Mentoring and Professional Development**			
Contact Hours	**L: 00**	**T: 00**	**P: 02**	**Credits: 01**

Guidelines regarding Mentoring and Professional Development

Course Outcome:

6. Overall Personality
7. Aptitude (Technical and General)
8. General Awareness (Current Affairs and GK)
9. Communication Skills
10. Presentation Skills

The course shall be split in two sections i.e. outdoor activities and class activities. For achieving the above, suggestive list of activities to be conducted are:

Part – A: Class Activities

1. Expert and video lectures
2. Aptitude Test
3. Group Discussion
4. Quiz (General/Technical)
5. Presentations by the students
6. Team building Exercises

Part – B: Outdoor Activities

1. Sports/NSS/NCC
2. Society Activities of various student's chapter i.e. ISTE, SCIE, SAE, CSI, Cultural Club, etc.

Evaluation shall be based on rubrics for Part – A & B Mentors/Faculty in-charges shall maintain proper record student wise of each activity conducted and the same shall be submitted to the department.

4th Semester

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Semester **4th**
Subject Code **BSCE-401C**
Subject Name **Linear Integrated Circuits**
Contact Hours **L: 03** **T: 00** **P: 00** **Credits: 03**

Course Objective

To teach the basic concepts in the design of electronic circuits using linear integrated circuits and their applications.

Course Outcomes

At the end of this course student will be able to:

CO#	Course outcomes
CO1	Analyze different differential amplifier configurations and its current stabilization.
CO2	Classify ICs and define the stages of Op-amp, its electrical parameters
CO3	Various oen loop and close loop configurations of an Op-Amp
CO4	Identify and explain the various applications of an Op-amp

Detailed Contents	Contact hours
Unit-I Differential and Cascade Amplifiers**:** Introduction, Differential Amplifier, Differential Amplifier Circuit Configuration, Dual Input-Balanced output Differential Amplifier, Dual Input-Unbalanced output Differential Amplifier, Single Input-Balanced output Differential Amplifier, Single Input-unbalanced output Differential Amplifier with their DC and AC analysis, Constant current bias, Cascaded differential Amplifier Stages, Level Translator	12
Unit-II Introduction to Operational Amplifiers: Block diagram of a typical Op-Amp, Schematic symbol, integrated circuits and their types, IC package types, Pin Identification and temperature range, Characteristics and performance parameters of an Op-Amp, Ideal Op-Amp, Equivalent circuit of an Op-Amp, Ideal voltage transfer curve, Practical Op-Amp: Input offset voltage, Input bias current, Input offset current, total output offset voltage, Thermal drift,Noise, Common Mode configuration and common mode rejection Ratio.	10
Unit-III Open loop and close loop configurations: Open loop configurations: Differential, Inverting & Non Inverting. Feedback configurations : Voltage series, voltage shunt, current series ,current shunt	12
Unit-IV Applications of Op-Amp: DC and AC amplifiers, Peaking Amp, Summing, Scaling and Averaging Amp, Instrumentation Amplifier, V to I and I and to V converter, Active filters: First order LP Butterworth filter, First order HP Butterworth filter, Band pass filter, Band reject filters, All pass filter, Basic comparator, Zero crossing detector, Schmitt trigger, window detector, Peak Detector, Sample and Hold Circuit.	10

Reference Books & Text Books:

1. RamakantA.Gayakwad, OP-AMP and Linear IC's, Prentice Hall / Pearson Education.
2. Robert F.Coughlin, Frederick F.Driscoll, Operational Amplifiers and Linear Integrated Circuits, PHI

3. D.Roy Choudhry, Shail Jain, Linear Integrated Circuits, New Age International Pvt. Ltd.
4. William D.Stanley, Operational Amplifiers with Linear Integrated Circuits, Pearson Education
5. B.S.Sonde, System design using Integrated Circuits , New Age Publication
6. S.Salivahanan & V.S. KanchanaBhaskaran, Linear Integrated Circuits, TMH

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Semester **4th**
Subject Code **BSCE-402C**
Subject Name **Database Management Systems**
Contact Hours **L: 03** **T: 00** **P: 00** **Credits: 03**

Course Objective

To teach the basic concepts of DBMS and Advance DBMS.

Course Outcomes

At the end of this course student will be able to:

CO#	Course outcomes
CO1	Define the basic concepts of DBMS.
CO2	Design SQL queries.
CO3	Illustrate the concept of data normalization with the help of real life examples.
CO4	Explain the concept of transaction management.
CO5	Outline features of advanced database management systems.

Detailed contents	Contact hours
Unit-I Introduction of DBMS, Data Modeling for a Database, Three levelArchitecture of DBMS, Components of a DBMS. Introduction to Data Models, Hierarchical, Network and Relational Model,Comparison of Network, Hierarchical and Relational Model, Entity Relationship Model.	10
Unit-II Relational Database, Relational Algebra and Calculus, SQL Fundamentals, DDL, DML, DCL, PL/SQL Concepts, Cursors, Stored Procedures, Stored Functions, Database Triggers. [CO2]	12
Unit-III Introduction to Normalization, First, Second, Third Normal Forms, Dependency Preservation, Boyce-Codd Normal Form, Multi-valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth NormalForm, Domain-key normal form (DKNF). [CO3]	12
Unit-IV Database Recovery, Concurrency Management, Database Security, Integrity and Control. Structure of a Distributed Database, Design of DistributedDatabases. [CO4] [CO5]	10

Text and Reference Books:

1. "An Introduction to Database System", Bipin C. Desai, Galgotia Publications PvtLtd-New Delhi, Revised Edition, (2012).
2. "Database System Concepts", Abraham Silberschatz, Henry F. Korth, S. Sudharshan,Tata McGraw Hill, 6th Edition, (2013).
3. "SQL, PL/SQL The Programming Language of Oracle", Ivan Bayross, BPBPublications, 4th Revised Edition (2009)
4. "An Introduction to Database Systems", C. J. Date, A. Kannan, S. Swamynathan, 8thEdition, Pearson Education, (2006).
5. Database Management Systems, Raghu Ramakrishnan, McGraw-Hill, Third Edition,2014.

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Semester **4th**
Subject Code **BSCE-403C**
Subject Name **Operating Systems**
Contact Hours **L: 03** **T: 00** **P: 00** **Credits: 03**

Course Objective

To teach the basic concepts related to evaluation of operation systems and their properties .

Course Outcomes

At the end of this course student will be able to:

CO#	Course outcomes
CO1	Discuss the evaluation of operating systems.
CO2	Explain different resource managements performed by operating system.
CO3	Describe the architecture in terms of functions performed by different types of operating systems.
CO4	Analyze the performance of different algorithms used in design of operating system components.
CO5	Compare the key properties of different types of Operating Systems.

Detailed contents	Contact hours
Unit-I **Fundamentals of Operating system**: Introduction to Operating system,Functions of an operating system. Operating system as a resource manager. Structure of operating system (Role of kernel and Shell). Views of operating system. Evolution and types of operating systems. **Process & Thread Management**: Program vs. Process; PCB, State transition diagram, Scheduling Queues, Types of schedulers, Concept of Thread, Benefits, Types of threads, Process synchronization. **CPU Scheduling**: Need of CPU scheduling, CPU I/O Burst Cycle, Pre- emptive vs. Non-pre-emptive scheduling, Different scheduling criteria's, scheduling algorithms (FCSC, SJF, Round-Robin, Multilevel Queue).	12
Unit-II **Memory Management**: Introduction, address binding, relocation, loading, linking, memory sharing and protection; Paging and segmentation; Virtual memory: basic concepts of demand paging, pagereplacement algorithms.	12
Unit-III **I/O Device Management**: I/O devices and controllers, device drivers;disk storage. **File Management**: Basic concepts, file operations, access methods,directory structures and management, remote file systems; file protection.	08
Unit-IV **Advanced Operating systems:** Introduction to Distributed Operating system, Characteristics, architecture, Issues, Communication & Synchronization; Introduction Multiprocessor Operating system, Architecture, Structure, Synchronization & Scheduling; Introduction toReal-Time Operating System, Characteristics, Structure & Scheduling. Case study of Linux operating system	12

Text Books:

1. Operating System Principles by Abraham Silberschatz and Peter Baer Galvin,Seventh Edition, Published by Wiley-India.
2. Principals of Operating System by Naresh Chauhan, Published by OXFORDUniversity Press, India.

Reference Books:

1. “Operating Systems by Sibsankar Haldar and Alex A. Aravind, Published byPearson Education.
2. Operating system by Stalling, W., Sixth Edition, Published by Prentice Hall(India)

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Semester **4th**
Subject Code **BSCE-404C**
Subject Name **Internetworking & Protocols**
Contact Hours **L: 03** **T: 00** **P: 00** **Credits: 03**

Course Objective

The main aim of this course is to understand the concepts of Internetworking and IP protocols.

Course Outcomes

At the end of this course student will be able to:

CO#	Course outcomes
CO1	Basics of Networks
CO2	Concepts of Internetworking
CO3	Understanding Internet Protocol (IP)
CO4	Understand and analyze congestion control and mobile IP

Detailed contents	Contact hours
Unit-I **Introduction:** Principis Of Internetworking, Connectionless Internetworking: Application Level Interconnections, Network Level Interconnection, Internet Architecture, Wired LANS, Wireless Lans, Connecting Devices,	10
Unit-II **Internetworking concepts:** TCP/IP Protocol Suite. PI Address: Classful Addressing: Introduction, Classful Addressing, Other Issues, Sub-Netting And Super-Netting IP Address: Classless Addressing: - Variable Length Blocks, Sub-Netting, Address Allocation. Delivery. Forwarding, And Routing Of PI Packets: Delivery, Forwarding, Routing, Structure Of Router . ARP And RARP.	10
Unit-III **Internet Protocol (IP):** Datagram, Fragmentation, Options, Checksum, PI V.6. Transmission Control Protocol (TCP): TCP Services, TCP Features, Segment, A TCP Connection, State Transition Diagram, Flow Control, Error Control, Congestion Control.TCP Times. Stream Control Transmission Protocol (SCTP): SCT Services, SCT Features, Packet Format, Flow Control, Error Control	10
Unit-IV **Congestion Control (CC):** Congestion Control. Mobile IP: Addressing. Agents, Three Phases, Inefficiency in Mobile IP. Classical TCP Improvements: Indirect TCP. Snooping TCP, Mobile TCP, Fast Retransmit/ Fast Recovery, Transmission/ Time Out Freezing, Selective Retransmission, Transaction Oriented TCP.	10

Text and Reference Books:

1. TCP/IP Protocol Suite- Behrouz A. Forouzan, Third Edition, MH.
2. Internetworking with TCP/IP Comer 3rd edition PHI.
3. High performance TCP/IP Networking- Mahbub Hassan, Raj Jain, PHI, 2005
4. Data Communications & Networking - B.A. Forouzan - 2n Edition – TMH
5. High Speed Networks and Internets- William Stallings, Pearson Education, 2002.

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Semester **4th**
Subject Code **BSCE-405C**
Subject Name **Network Security**
Contact Hours **L: 03** **T: 00** **P: 00** **Credits: 03**

Course Objective

The main aim of this course is to understand the concept of network security and related issues.

Course Outcomes

At the end of this course student will be able to:

CO#	Course outcomes
CO1	Understand the fundamental principles of authentication and secure system design
CO2	Understanding of different cryptographic protocols
CO3	Understanding various methods for authentication
CO4	Identify various security techniques in networks

Detailed contents	Contact hours
Unit-I Introduction: Introduction to Cryptography, Security Threats, Vulnerability, Active and Passive attacks, Security services and mechanism.	12
UNIT 2: Cryptography Dimensions of Cryptography, Classical Cryptographic Techniques Block Ciphers (DES, AES) : Modes of Operations Public-Key Cryptography : Principles Of Public-Key Cryptography, RSA Algorithm.	08
UNIT 3 Hash Algorithm Authentication Requirement, Functions, Message Authentication Code, Hash Functions, Security Of Hash Functions, Digital Signatures, Key Management : Key Distribution Techniques.	12
UNIT 4 Security in Networks Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, , Firewalls – Design and Types of Firewalls.	08

Text and Reference Books:

1. Cryptography and Network Security: Principles and Practice - Wiliam Stallings, 2000, PE.
2. Principles of Network and SystemsAdministration, Makr Burges,John Wiely.

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Semester **4th**
Subject Code **BSCE-406C**
Subject Name **Linear Integrated Circuit Laboratory**
Contact Hours **L: 00** **T: 00** **P: 04** **Credits: 02**

Course Objective

The main aim of this course is to make the students familiar with performance, behaviour of linear ICs and their applications..

Course Outcomes

At the end of this course student will be able to:

CO#	Course outcomes
CO1	Analyze the performance of Integrated Circuits.
CO2	Evaluate the close loop gain of an Op-amp.
CO3	To use Op-amp as summer, Subtractor, filters and various other applications.

List of Experiments

1.	To study differential amplifier configurations.
2.	To measure the performance parameters of an Op-amp.
3.	Application of Op-amp as Inverting and Non Inverting amplifier.
4.	To study frequency response of an Op-amp
5.	To use the Op-amp as summing, scaling & averaging amplifier.
6.	To use the Op-amp as Instrumentation amplifier
7.	Application of Op-amp as Low pass, High pass and Band pass 1st order butterworth active filters using Op-amp.
8.	Application of Op-amp as Zero Crossing detector and window detector.
9.	Application of Op-amp as Schmitt Trigger.

Important Note

1. From above given list at least 8 experiments will be performed by the students in a group of maximum three in the laboratory.

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Semester **4th**
Subject Code **BSCE-407C**
Subject Name **Database Management Systems Laboratory**
Contact Hours **L: 00** **T: 00** **P: 04** **Credits: 02**

Course Objective

The main aim of this course to design different databases and implementation using SQL.

Course Outcomes

At the end of this course student will be able to:

CO#	Course outcomes
CO1	Differentiate between DDL, DML and DCL commands
CO2	Implement DDL, DML and DCL commands
CO3	Write integrity constraints on a database
CO4	Design Databases and Tables in relational model for some project related to society welfare
CO5	Implement PL/SQL.

Instructions:

1.	Used Of Create, Alter, Rename and Drop Statement In The Database Tables (Relations)
2.	Used Of Insert Into, Delete and Update Statement In The Database Tables (Relations)
3.	Use of simple select statement.
4.	Use of select query on two relations
5.	Use of nesting of queries.
6.	Use of aggregate functions.
7.	Use of substring comparison.
8.	Use of order by statement.
9.	Consider the following schema for a Library Database: BOOK (*Book_id, Title, Publisher_Name, Pub_Year*) BOOK_AUTHORS (Book_id, Author_*Name*) PUBLISHER (*Name, Address, Phone*) BOOK_COPIES (*Book_id, Branch_id, No-of_Copies*) BOOK_LENDING (*Book_id, Branch_id, Card_No, Date_Out, Due_Date*) LIBRARY_BRANCH (*Branch_id, Branch_Name, Address*) Write SQL queries to 1. Retrieve details of all books in the library_id, title, name of publisher, authors,number of copies in each branch, etc. 2. Get the particulars of borrowers who have borrowed more than 3 books between Jan 2018 to Jun 2018

	3. Delete a book in BOOK table. Update the contents of other tables to reflect this datamanipulation operation. 4. Partition the BOOK table based on year of publication. Demonstrate its working witha simple query. 5. Create a view of all books and its number of copies that are currently available in the Library.
10.	Consider the following schema for Order Database: SALESMAN (*Salesman_id, Name, City, Commission*) CUSTOMER (*Customer_id, Cust_Name, City, Grade, Salesman_id*) ORDERS (*Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id*)Write SQL queries to 1. Count the customers with grades above Amritsar's average. 2. Find the name and numbers of all salesmen who had more than one customer. 3. List all salesmen and indicate those who have and don't have customers in their cities(Use UNION operation.) 4. Create a view that finds the salesman who has the customer with the highest order ofa day. 5. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.
11.	Write a PL/SQL code to add two numbers and display the result. Read the numbers during run time.
12.	Write a PL/SQL code to find sum of first 10 natural numbers using while and for loop.
13.	Write a program to create a trigger which will convert the name of a student to upper case before inserting or updating the name column of student table.
14.	Write a PL/SQL block to count the number of rows affected by an update statement using SQL%ROWCOUNT
15.	Write a PL/SQL block to increase the salary of all doctors by 1000.

Reference Books:

1. "SQL, PL/SQL The Programming Language of Oracle", 4th Revised Edition, IvanBayross (2009).
2. "Oracle PL/SQL Programming", 5th Edition, Steven Feuerstein and Bill Pribyl(2009).

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Application and Electronics

Semester **4th**
Subject Code **BSCE-408C**
Subject Name **Operating Systems Laboratory**
Contact Hours **L: 00** **T: 00** **P: 04** **Credits: 02**

Course Objective

The main aim of this course deal with the implementation and installation of different operating systems.

Course Outcomes

At the end of this course student will be able to:

CO#	Course outcomes
CO1	Implement the installation and configuration of different operating systems.
CO2	Write programs for different scheduling algorithms.
CO3	Execute various commands in Vi editor
CO4	Implement the dual boot installation
CO5	Execute commands in shell programming

Instructions:

1	Installation of windows OS.
2	Installation of Linux OS.
3	Dual boot installation of Operating systems.
4	Implementation of FCFS Scheduling algorithm
5	Implementation of SJF Scheduling algorithm
6	Implementation of Round-Robin Scheduling algorithm
7	Vi Editor & its commands
8	Shell Commands
9	Shell Scripting- Using variables
10	Shell Scripting- Input & Output
11	Shell Scripting- Data types
12	Shell Scripting- Use of arithmetic operators
13	Shell Scripting- if control statement programs
14	Shell Scripting- while control statement
15	Shell Scripting- for control statement

Reference Books:

1. Linux: The complete reference by Richard Petersen, Published by Tata McGraw-Hill Publication.
2. Operating System Principles by Abraham Silberschatz and Peter Baer Galvin,Seventh Edition, Published by Wiley-India.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Application and Electronics

Semester **4TH**
Subject Code **BMPD-401C**
Subject Name **Mentoring and Professional Development**
Contact Hours **L: 00** **T: 00** **P: 02** **Credits: 01**

Guidelines regarding Mentoring and Professional Development

Course Outcome:

1. Overall Personality
2. Aptitude (Technical and General)
3. General Awareness (Current Affairs and GK)
4. Communication Skills
5. Presentation Skills

The course shall be split in two sections i.e. outdoor activities and class activities. For achieving the above, suggestive list of activities to be conducted are:

Part – A: Class Activities

1. Expert and video lectures
2. Aptitude Test
3. Group Discussion
4. Quiz (General/Technical)
5. Presentations by the students
6. Team building Exercises

Part – B: Outdoor Activities

1. Sports/NSS/NCC
2. Society Activities of various student's chapter i.e. ISTE, SCIE, SAE, CSI, Cultural Club, etc.

Evaluation shall be based on rubrics for Part – A & B Mentors/Faculty in-charges shall maintain proper record student wise of each activity conducted and the same shall be submitted to the department.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester V **Contact Hours = 33**

Course Code	Course Type	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
			L	T	P	Internal	External		
BSCE-501C	Core Theory	Microprocessors and Microcontrollers	3	0	0	40	60	100	3
BSCE-502C	Core Theory	Multimedia and Animation Technology	3	0	0	40	60	100	3
BSCE-503C	Core Theory	Digital Marketing	3	0	0	40	60	100	3
BSCE-5XXC	Department Elective-I	--	3	0	0	40	60	100	3
BSCE-504C	Skill Enhancement Course-II	Web Designing	3	0	0	40	60	100	3
BSCE-505C	Skill Enhancement Course- II Lab.	Web Designing Lab	0	0	4	60	40	100	2
BSCE-506C	Core Practical/Lab.	Microprocessors and Microcontrollers Lab	0	0	4	60	40	100	2
BSCE-507C	Core Practical/Lab.	Digital Marketing Lab	0	0	4	60	40	100	2
BSCE-508C	Project & Seminar	Minor Project & Seminar	0	0	4	60	40	100	2
BMPD-501C		Mentoring and Professional Development	0	0	2	25	--	25	1
	TOTAL		**15**	**0**	**18**	**465**	**460**	**925**	**24**

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester VI **Contact Hours = 26**

Course Code	Course Type	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
			L	T	P	Internal	External		
BSCE-601C	Core Theory	Digital Signal Processing	3	0	0	40	60	100	3
BSCE-602C	Core Theory	Analog and Digital Communication	3	0	0	40	60	100	3
BSCE-6XXC	Department Elective-II	--	3	0	0	40	60	100	3
BSCE-6XXC	Department Elective-III	--	3	0	0	40	60	100	3
BSCE-603C	Core Practical/Lab.	Digital Signal Processing Lab	0	0	4	60	40	100	2
BSCE-604C	Core Practical/Lab.	Analog and Digital Communication Lab	0	0	4	60	40	100	2
BSCE-605C	Project	Major Project	0	0	4	120	80	200	2
BMPD-601C		Mentoring and Professional Development	0	0	2	25	--	25	1
	TOTAL		**12**	**0**	**14**	**425**	**400**	**825**	**19**

List of Department Electives

Department Elective-I (Sem-5)	
Course Code	**Course Title**
BSCE-511C	Wireless Sensor Networks
BSCE-512C	Cloud Computing
BSCE-513C	Biomedical Instrumentation
BSCE-514C	Sensors and Transducers
Department Elective-II (Sem-6)	
Course Code	**Course Title**
BSCE-611C	Cyber Laws & IPR
BSCE-612C	Wireless Communication
BSCE-613C	Internet of Things
Department Elective-III (Sem-6)	
Course Code	**Course Title**
BSCE-614C	Neural Networks and Fuzzy Logic
BSCE-615C	Artificial Intelligence
BSCE-616C	Machine Learning

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Open Elective Courses of Bachelor of Science (Computer Applications and Electronics)

List of Open Elective Subjects to be offered to the students of the programs of other departments from Department of Electronics and Communication Engineering, as per coding scheme given below:

SN	Course Code	Course Title	L	T	P	Hours/Week	Credits
1	BSCE-901C	Fundamentals of Information Technology	3	0	0	3	3
2	BSCE-902C	Computer Networks	3	0	0	3	3
3	BSCE-903C	Digital Electronics	3	0	0	3	3
4	BSCE-904C	Microprocessors and Microcontrollers	3	0	0	3	3
5	BSCE-905C	Electronics Devices and Circuits	3	0	0	3	3
6	BSCE-906C	Biomedical Instrumentation	3	0	0	3	3
7	BSCE-907C	Wireless Sensor Networks	3	0	0	3	3
8	BSCE-908C	Internet of Things	3	0	0	3	3
9	BSCE-909C	Wireless Communication	3	0	0	3	3
10	BSCE-910C	Sensors and Transducers	3	0	0	3	3

Semester – 5th

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester : 5th
Subject Code: BSCE-501C
Subject Name: Microprocessors and Microcontrollers
Contact Hours L: 03 T: 00 P: 00 Credits: 03

Course Objective:

The objective of this course is to enable students to understand the concepts underlying Microprocessors and Microcontrollers based systems design and programming.

Course Outcomes:

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

1. Understand architecture & functionalities of different building block of 8085 microprocessor.
2. Understand working of different building blocks of 8051 microcontroller.
3. Comprehend and apply programming aspects of 8051 microcontroller.
4. Interface & interact with different peripherals and devices.

Unit 1: Microprocessor 8085

History of microprocessors; microprocessor 8085 Architecture, Pin configuration; Memory Interfacing; microprocessor programming model; 8085 instructions; Addressing modes; programming techniques, Counting and time delays; Basics of stack and subroutines; interrupts.

Unit 2: Microcontroller 8051 - Building Blocks

Microprocessor vs microcontroller; RISC vs CISC architectures; microcontroller 8051: architecture, pin configuration, flag-bits and PSW register, input-output ports, register banks and stack; semiconductor memories: ROM, SRAM, DRAM, virtual memory, cache memory; memory organization.

Unit 3: Microcontroller 8051 - Programming

Assembly language programming; data types and directives; jump loop and call instructions; I/O port programming; addressing modes and accessing memory using various addressing modes; arithmetic instructions and programs; logic instructions and programs; single bit instructions and programming, 8051 interrupts; timer/counter programming in the 8051.

Unit 4: Microcontroller 8051 - Interfacing

Concept of Parallel and Serial interfacing, ADC& DAC interfacing, LCD interfacing, Keyboard interfacing, sensor interfacing, interfacing with external memory, matrix keypad, stepper motor interfacing, DC motor interfacing

Recommended Books

1. R S Gaonkar, Microprocessor Architecture, Programming and Application with 8085, Penram International Publishing Pvt. Ltd.
2. Kenneth Ayala, The 8051 Microcontroller, Cengage Learning
3. Douglas Hall, Microprocessors Interfacing, Tata McGraw Hill
4. Subrata Ghoshal, 8051 Microcontroller: Internals, Instructions, Programming and Interfacing, Pearson Education
5. K Uma Rao, Andhe Pallavi, The 8051 Microcontrollers: Architecture, Programming and Applications, Pearson Education.

Note: At least one question must be set from each unit/course outcome.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: 5th
Subject Code: BSCE-502C
Subject Name: Multimedia and Animation Technology
Contact Hours L: 03 T: 00 P: 00 Credits: 03

Course Objective:

To equip students with knowledge of multimedia systems and animation technologies, for designing, editing, and optimizing multimedia content.

Course Outcomes:

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

1. Define and describe multimedia functions
2. Identify and explain the hardware devices
3. Understanding of software components of multimedia systems
4. Understanding of the concepts of animations
5. Understanding of concepts underlying designing, planning and integration of multimedia components

Unit-1: Introduction to Multimedia Systems

What is Multimedia, History of Multimedia, Elements of Multimedia Systems, Classes of Multimedia Systems and different multimedia file formats, Multimedia components: text, graphics, audio, video, animation, File formats (e.g., JPEG, MPEG, PNG, MP3) and their properties, Applications of multimedia Systems.

Unit-2: Multimedia Hardware Essentials

System requirements for multimedia projects, Hardware overview: capture, storage, display, and communication devices, Input/output devices (scanners, cameras, VR headsets), Quality Criteria and specifications of different Capturing Devices, Communication Devices, Storage Devices, Display Devices.

Unit-3: Multimedia Software Essentials

Software tools: Adobe Suite, Blender, Audacity, Multimedia Authoring : Types and Tools – Icon based, Time based, Storyboarding, Scripting, Object-oriented working in software tools, Working with drawing and painting tools, Applying colour viewing and manipulating time line, Layers, Importing and editing of images audio, text, video and graphics, Introduction of Photo-shop: image editing, specifying and adjusting colors, using gradient tools, selection and move tools, transforming path drawing and editing tools, using channels, layers, filters and actions

Unit-4: Animation Technology

Definition, History of Animation, Types of animation- 2D and 3D, Basic principles of animation, Character design, Animation Drawings, Layout, Model Sheet, Key Drawings and in Betweens, Master Background, Concept Piece, 2D Animation Design Concepts: Vector vs. raster graphics, Key framing, tweening, and bone rigging, Sound synchronization techniques, 3D Modeling & Animation Principles: Polygon modeling basics, Materials, lighting, and rendering, Key frame animation in 3D space, Introduction of software tools for animations creation.

Unit-5: Content and Project Planning, Designing and development

Planning steps and process, Concept of data compression, Encoding: Text, Image, Audio, Video and Animation encoding and techniques, Navigation and user interface designing, Multimedia Integration & Trends, AI in multimedia, AR/VR fundamentals and tools, Ethical considerations: copyright, digital privacy

Recommended Books:

1. Principles of Multimedia by Parikh, Tata McGraw Hill Education Pvt Ltd, New Delhi.
2. Multimedia Technologies by Banerji, Tata McGraw Hill Education Pvt Ltd, New Delhi.
3. Multimedia an Introduction by Villam Casanova and Molina; Prentice Hall of India, New Delhi.
4. Photo-shop for Windows Bible by Deke Maclelland IDG Books India Pvt. Ltd., New Delhi.
5. The complete animation course by Chris Patmore Pub.-Baron's Educational Series. (New York).
6. Animation Unleashed by Ellen Bessen, Michael Weise Productions, 2008(U.S.A).

Note: At least one question must be set from each unit/course outcome.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: **5th**
Subject Code: **BSCE-503C**
Subject Name: **Digital Marketing**
Contact Hours: **L: 03 T: 00 P: 00 Credits: 03**

Course Objective:

The main aim of this course is to acquaint the students with the knowledge of growing integration between the traditional and digital marketing concepts and practices in the digital era.

Course Outcomes:

At the end of this course student will be able to:

1. Understand the concept of digital marketing and its integration with traditional marketing.
2. Understand customer value journey in digital context and behaviour of online consumers.
3. Understand email, content and social media marketing and apply the learning's to create digital media campaigns.
4. Examine various tactics for enhancing a website's position and ranking with search engines.

Unit-1 Marketing in the Digital World

Digital marketing: Concept, Features, Difference between traditional and digital marketing, Moving from traditional to digital Marketing, Intent Based- SEO, Search Advertising; Brand Based-Display Advertising; Community Based-Social Media Marketing.

Unit-2 Content and Email Marketing

Content Marketing: Step-by-step Content Marketing Developing a content marketing strategy Email Marketing: Types of Emails in email marketing**.**

Unit-3 Social Media Marketing and Display Marketing

Social Media Marketing: Building Successful Social Media strategy; Social Media Marketing Channels; Facebook, LinkedIn, YouTube (Concepts and strategies) Display Advertising: Working of Display Advertising; Benefits and challenges.

Unit-4 Search Engine Marketing

Introduction of SEM: Working of Search Engine; SERP Positioning; online search behavior, DMI's 5P Customer Search Insights Model. Search Engine Optimization: Overview of SEO Process; Goal Setting-Types. On-Page Optimization: Keyword Research, SEO Process -Site Structure, Content, Technical Mechanics, Headings, Image & Alt text, Social Sharing, Sitemaps.

Recommended Books:

1. Dodson, I, “The art of digital marketing: the definitive guide to creating strategic, targeted, and measurable online campaigns. John Wiley & Sons, 2016.
2. Kartajaya, H., Kotler, P., & Setiawan, I,” Marketing 4.0: moving from traditional to digital. John Wiley & Sons, 2016.
3. Ryan, Damien: Understanding Digital Marketing - Marketing Strategies for Engaging the Digital Generation. Kogan Page Limited.
4. Moutusy Maity: Internet Marketing: A practical approach in the Indian Context: Oxford Publishing.
5. Seema Gupta: Digital Marketing: Mcgraw Hill.

Note: At least one question must be set from each unit/course outcome.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: 5th
Subject Code: BSCE-5XXC
Subject Name: Department Elective-I
Contact Hours L: 03 T: 00 P: 00 Credits: 03

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: 5th
Subject Code: BSCE-504C
Subject Name: Web Designing
Contact Hours L: 03 T: 00 P: 00 **Credits:** 03

Course Type: Skill Enhancement Course-II (Theory)

Course Objective

This course's primary objective is to understand the important concepts related to basics of Web Designing, build HTML pages, using java scripts and understand the fundamental web design elements.

Course Outcomes

At the end of this course, the student will be able:

1. To create pages with various tags in HTML.
2. To give details how to create links between webpages using hypertext or picture links.
3. To use HTML, create forms with unique controls.
4. To use java script, outline the fundamental web design elements.

Unit 1 Internet Basics & Introduction to HTML

Basic concepts

Communicating on the internet, internet domains, internet server identities, establishing connectivity on the internet client IP address.

Introduction to HTML

Information Files Creation, Web Server, Web Client/Browser, Hyper Text Markup Language (HTML Tags, Paired Tags, Singular Tags), Commonly Used Html Commands (Document Head, Document Body), Title and Footer, Text Formatting (Paragraph Breaks, Line Breaks), Emphasizing Material in a Web Page (Heading Styles, Drawing Lines).

Basic Formatting Tags

HTML Basic Tags, Text Formatting (Paragraph Breaks, Line Breaks), Emphasizing Material in a Web Page (Heading Styles, Drawing Lines), Text Styles (Bold, Italics, Underline), Other Text Effects (Centering (Text, Images etc.), Spacing (Indenting Text), HTML Color Coding.

Unit 2 Build HTML Pages with simple tags

Lists

Type of Lists (Unordered List (Bullets), Ordered Lists (Numbering), Definition Lists.

Adding Graphics to Html Documents

Using The Border Attribute, Using The Width And Height Attribute, Using The Align Attribute, Using The Alt Attribute.

Tables

Introduction (Header, Data rows, The Caption Tag), Using the Width and Border Attribute, Using the Cell padding Attribute, Using the Cell spacing Attribute, Using the BGCOLOR Attribute, Using the COLSPAN and ROWSPAN Attributes.

Frames

Introduction to Frames: The<FRAMESET> tag, The <FRAME> tag, Targeting Named Frames. DHTML: Cascading Style Sheets, Style Tag.

Linking Documents

Links (External Document References, Internal Document References), Image As Hyperlinks.

Unit 3 Forms Used by a Web Site

The Form Object, The Form Object's Methods (The Text Element, The Password Element, The Button Element, The Submit (Button) Element, The Reset (Button) Element, The Checkbox Element, The Radio Element, The Text Area Element, The Select and Option Element, The Multi Choice Select Lists Element).

Unit 4 Introduction to JavaScript

JS Introduction, Where To, Output, Statements, Syntax, Comments, Variables, Operators, Arithmetic, Assignment, Data Types, Functions, Objects, Events, Strings, String Methods, Numbers, Number Methods, Arrays, Array Methods, Array Sort, Array Iteration, Dates, Date Formats, Date Get Methods, Date Set Methods, Math, Random, Booleans, Comparisons, Conditions, Switch, Loop For, Loop While, Break, Type Conversion, Bitwise, RegExp, Errors, Scope, Hoisting, Strict Mode, JSON, Forms, Forms API.

Recommended Books:

1. Internet for Everyone: Alexis Leon, 1st Edition, Leon Techworld, Publication, 2009.
2. Greenlaw R; Heppe, "Fundamentals of Internet and WWW", 2nd Edition, Tata McGraw-Hill, 2007.
3. Raj Kamal, "Internet& Web Technologies", edition Tata McGraw-Hill Education.2009.
4. BayrossIvan, "HTML, DHTML, JavaScript, PERL, CGI", 3rd Edition, BPB Publication, 2009.
5. Chris Payne, "Asp in 21 Days", 2nd Edition, Sams Publishing, 2003 PDCA.

Note: At least one question must be set from each unit/course outcome.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester 5th
Subject Code BSCE-505C
Subject Name Web Designing Lab
Contact Hours L: 00 T: 00 P: 04 **Credits: 02**
Course Type: Skill Enhancement Course-II (Lab)

Course Objective

This course's primary objective is to understand the important concepts related to basics of Web Designing, build HTML pages, using java scripts and understand the fundamental web design elements.

Course Outcomes

At the end of this course, the student will be able:

1. To use HTML tags to create pages.
2. To create web pages with Audio and Video content in it.
3. To demonstrate the movement from one web page to another
4. To apply advanced web designing concepts using java script
5. To perform a small web based project for the benefit of society

List of Experiments

1. Create a simple HTML page to demonstrate the use of different tags.
2. Design index page of a book on web designing.
3. Display Letter Head of your college on a web page.
4. Create a Hyperlink to move around within a single page rather than to load another page.
5. Display letter using different Text formatting Tags.
6. Design Time Table of your department and highlights of most important periods.
7. Use Tables to provide layout to your web page.
8. Embed Audio and Video into your web page.
9. Divide a web page vertically and horizontally and display logo of your college in left pane and logo of university in right pane.
10. Create a student Bio- Data.
11. Design front page of hospital with different style sheets.
12. Design a web page and display two different pages at a time.
13. Write a program to create a login form. On submitting the form, the user should get navigated to a profile page using JavaScript.
14. Write a code to create a Registration Form. On submitting the form, the user should be asked to login with the new credentials using JavaScript.

Shaheed Bhagat Singh State University, Ferozepur
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Semester: 5th
Subject Code: BSCE-506C
Subject Name: Microprocessors and Microcontrollers Lab
Contact Hours: L: 00 T: 00 P: 04 Credits: 02

Course Objective:

This is laboratory course meant to write programs using 8085 microprocessor and learn interfacing using 8051 microcontroller for general operations.

Course Outcomes:

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

1. Write programs for common arithmetic operations with 8-bit/16-bit numbers using 8085.
2. Write programs for common arithmetic operations with 8-bit/16-bit numbers using 8051.
3. Write programs for transfer, sort block of data with 8085 processor(s).
4. Write programs for controlling peripheral devices using 8051 microcontroller.

List of Experiments

1. Study of 8085 microprocessor kit.
2. Study of 8085 simulators
3. Add two 8-bit numbers stored in registers or internal/External memory locations using 8085.
4. Multiply two 8-bit numbers using 8085.
5. Transfer block of data from internal memory locations to external memory locations using 8085
6. Finding maximum of given 10 numbers using 8085
7. Study of 8051 microprocessor kit.
8. Study of 8051 simulators
9. Add two 8-bit numbers stored in registers or internal/External memory locations using 8051.
10. Multiply two 8-bit numbers using 8051.
11. Transfer block of data from internal memory locations to external memory locations using 8051
12. Finding maximum of given 10 numbers using 8051
13. Interface and reading keys inputs with 8051
14. Interface LCD with 8051
15. Interface ADC with 8051
16. Interface DAC with 8051

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
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Semester: 5th
Subject Code: BSCE-507C
Subject Name: Digital Marketing Lab
Contact Hours: L: 00 T: 00 P: 04 Credits: 02

Course Objective

The main aim of this course is to understand the applications of Digital Marketing to undertake Marketing Campaigns in digital format and how to apply the tools of Digital Marketing to gain competitive advantage in the Market.

Course Outcomes

At the end of this course student will be able to:

1. Learn digital marketing tools like search engine optimization and associated analytics.
2. Apply digital marketing tools to
   a) Improve websites' rankings and optimize it in the process.
   b) Improve the brand's visibility.
   c) Improve brands reach which physically is relatively difficult and less effective.
3. Analyze relative importance of digital marketing strategies to optimize digital marketing campaign.
4. Evaluate the performance of different social media in conjunction with overall digital marketing plan.
5. Design search engine optimization and search engine marketing campaigns.

List of Experiments:

1. Digital Marketing Implementation in Business Scenario.
2. Create the Digital Marketing Webpage.
3. Conducting the Search Engine Optimization and Search Engine Marketing.
4. Using Google Analytics to analyze website performance.
5. Creating Promotional banner through Canva.
6. Facebook Promotion using banners.
7. Creating YouTube Channel for Marketing.
8. Twitter Marketing.
9. Instagram Marketing.
10. Email Marketing.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
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Semester: 5th
Subject Code: BSCE-508C
Subject Name: Minor Project & Seminar
Contact Hours: L: 00 T: 00 P: 04 Credits: 02

Course Type: Project & Seminar

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: **5th**
Subject Code: **BMPD-501C**
Subject Name: **Mentoring and Professional Development**
Contact Hours: **L: 00 T: 00 P: 02 Credits: 01**

Guidelines regarding Mentoring and Professional Development

Course Outcome:

1. Overall Personality
2. Aptitude (Technical and General)
3. General Awareness (Current Affairs and GK)
4. Communication Skills
5. Presentation Skills

The course shall be split in two sections i.e. outdoor activities and class activities. For achieving the above, suggestive list of activities to be conducted are:

Part – A: Class Activities

1. Expert and video lectures
2. Aptitude Test
3. Group Discussion
4. Quiz (General/Technical)
5. Presentations by the students
6. Team building Exercises

Part – B: Outdoor Activities

1. Sports/NSS/NCC
2. Society Activities of various student's chapter i.e. ISTE, SCIE, SAE, CSI, Cultural Club, etc.

Evaluation shall be based on rubrics for Part – A & B Mentors/Faculty in-charges shall maintain proper record student wise of each activity conducted and the same shall be submitted to the department.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: **5th**
Subject Code: **BSCE-511C**
Subject Name: **Wireless Sensor Networks (Department Elective-I)**
Contact Hours **L: 03** **T: 00** **P: 00** **Credits: 03**

Course Objective

This course's primary objective is to understand the important concepts related to basics of wireless sensor networks, different routing algorithms and the possible security issues.

Course Outcomes

At the end of this course, the student will be able:

1. To learn about the fundamental concepts and applications of WSN networks.
2. To demonstrate different Routing protocols of the WSN networks.
3. To understand the challenges of different security attacks and security issues of WSN networks.

Unit 1 Sensor Networks Introduction and Architectures:

Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks, WSN application examples, Single-Node Architecture – Hardware Components, Energy Consumption of Sensor Nodes, Network Architecture – Sensor Network Scenarios, Transceiver Design Considerations.

Unit 2 WSN Networking concept and MAC protocols:

Energy-efficient routing challenges and remedies, MAC Protocols for WSN Networks, low-duty cycle Protocols and Wakeup concepts, Schedule-based routing, Hierarchical or Clustering routing protocols, Location-based routing protocols, Hybrid Routing Protocols.

Unit 3Sensor Network Security-Network Security:

Security in Ad Hoc Wireless Networks - Network Security Requirements. Network Security requirements, issues, and Challenges in security provisioning the Network, Security Attacks. Layer-wise attack in wireless sensor networks, possible solutions for Jamming, tampering, black hole attack, Flooding attack, Key distribution and Management, Secure Routing -SPINS reliability requirements in sensor Networks. Sensor Network Platforms and Tools.

Recommended Books:

1. C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Pearson Education, 2008.
2. Labiod. H, “Wireless Adhoc and Sensor Networks”, Wiley, 2008.
3. Li, X, “Wireless ad-hoc and sensor Networks: theory and applications”, Cambridge University Press, 2008. Reference Books.
4. Carlos De MoraisCordeiro, Dharma Prakash Agrawal “Ad Hoc & Sensor Networks: Theory and Applications”, world Scientific Publishing Company, 2nd edition, 2011.
5. Feng Zhao and LeonidesGuibas, "Wireless Sensor Networks", Elsevier Publication.
6. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.(soft copy available).
7. www.wirelessnetworksonline.com.
8. www.securityinwireless.com.

Note: At least one question must be set from each unit/course outcome.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: 5th
Subject Code: BSCE-512C
Subject Name: Cloud Computing (Department Electives-I)
Contact Hours: L: 03 T: 00 P: 0 Credits: 03

Course Objective

The main aim of this course is to understand the concept of cloud computing and implementation of various security strategies for different cloud platforms.

Course Outcomes

At the end of this course student will be able to:

1. Understand the core concepts of the cloud computing paradigm.
2. Understand the importance of virtualization along with their technologies.
3. Analyze various cloud computing service and deployment models and apply them to solve problems on the cloud.
4. Implementation of various security strategies for different cloud platform.

Unit-1 Introduction

Definition of cloud, characteristics of cloud, historical developments & challenges ahead, the vision of cloud computing, Driving factors towards cloud, Comparing grid with utility computing, cloud computing and other computing systems, Applications of cloud computing.

Unit-2: Cloud computing concepts

Introduction to virtualization techniques, Characteristics of virtualization, Pros and Cons of virtualization Technology.

Unit-3: Cloud service and deployment models

Cloud service models, Infrastructure as a service (IaaS) architecture- details and example, Platform as a service (PaaS) architecture- details and example, Introduction to cloud deployment models, Public clouds, Private clouds, Hybrid clouds, Selection criteria for cloud deployment.

Unit-4: Security in cloud computing

Understanding security risks, Principal security dangers to cloud computing, Internal security breaches, User account and service hijacking, measures to reduce cloud security breaches.

Recommended Books:

1. Raj Kumar Buyya, James Broberg, Andrezei M.Goscinski, “Cloud Computing: Principles and Paradigms”,Wiley 2011
2. Anthony T. Velte, Toby J. Velte and Robert Elsenpeter, “Cloud Computing: A practical Approach”, McGraw Hill, 2010.
3. Barrie Sosinsky, “Cloud Computing Bible”, Wiley, 2011.
4. Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper, “Cloud Computing for dummies”, 2009.
5. Rajkumar Buyya, Christian Vecchiola, S.Thamarai Selvi, “Mastering Cloud Computing” TMH 2013.
6. George Reese “Cloud Application Architectures”, First Edition, O‟Reilly Media 2009.
7. Dr. Kumar Saurabh “Cloud Computing” 2nd Edition, Wiley India 2012.

Note: At least one question must be set from each unit/course outcome.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: 5th
Subject Code: BSCE-513C
Subject Name: Biomedical Instrumentation (Department Elective-I)
Contact Hours L: 03 T: 00 P: 00 Credits: 03

Course Objectives

The Primary Objectives of a biomedical instrumentation course is to introduce students to the fundamental principles and applications of medical devices and technologies.

Course Outcomes

1. Gain fundamental knowledge of various medical instruments.
2. Obtain knowledge of different types of bio-medical recorders.
3. Know working of various medical imaging equipment and electrical safety precautionary measurements.
4. To know about various medical laboratory test instruments.

Unit 1. Fundamentals of Medical Instruments

Fundamentals of medical instrumentation, Sources of biomedical signals ,Generalized medical instrumentation block diagram, Medical electrodes - ECG,EEG,EMG , Defibrillator , Medical transducers: Body temperature, Blood pressure, respiration rate, Classification of Medical instruments based on : Application - (diagnostic, therapeutic, Imaging, analytical), Physiological parameter and bio-potential, Biological system , Different departments in the hospital.

Unit 2. Biomedical Recorders

Electrocardiograph (ECG) machine: working of ECG machine, Bipolar and unipolar leads used for ECG, Einthoven's triangle, Phono-cardiograph, Electroencephalograph (EEG): 10-20 electrode placement methods, EEG readout device, Electromyograph (EMG) machine, Bio-feedback Instrumentation.

Unit 3. Medical Imaging Equipment and Electrical Safety

Working of different types of medical imaging equipment : X-ray machine, Characteristics of X-Ray, generation of an X-Ray, CT-Scan machine, Properties of ultrasound and its applications in medical instrumentation Echoencephalography machine, Echo-cardiograph machine, Colour Doppler ultrasound machine, Significance of electrical danger, Physiological effects of electrical current, Ground shock hazard, and methods of accident prevention.

Unit 4. Medical Laboratory Instruments

Introduction of pathological (clinical) test Instruments for medical diagnosis**,** Blood Cell Counter**,** Bio chemistry analyser, Auto analyzer. Blood gas analyzer.

Recommended Books:

1. Handbook of Biomedical instrumentation, “R S Khandpur”, TMH
2. Biomedical instrumentation and measurement, “Cromwell”, PHI
3. Introduction to Biomedical instrumentation, “S G Khalekar”.
4. Handbook of Biomedical instrumentation, “Webster”.

Note: At least one question must be set from each unit/course outcome.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: 5th
Subject Code: BSCE-514C
Subject Name: Sensors and Transducers (Department-Elective-I)
Contact Hours L: 03 T: 00 P: 00 Credits: 03

Course Objective:

The course will introduce the students to various sensors and transducers used for the measurement of various physical quantities.

Course Outcomes:

After undergoing this course, students will be able to

1. Understand the principle and requirements of sensing and transduction.
2. Acquire knowledge of various resistive & inductive transducers along with their working principles.
3. Have understanding of various Capacitive and Thermoelectric sensors.
4. Acquire knowledge about working of radiation and other miscellaneous sensors and obtain knowledge of applications of different sensors and transducers.

Unit 1: Introduction

Generalized instrumentation systems, block diagram representation, Difference between sensors and transducers, Basic requirement of transducers, Selection criteria of Transducers, Classification (active/passive, analog/digital), Performance parameters: Sensitivity, accuracy, resolution, linearity, hysteresis, Static and dynamic characteristics. Introduction to signal conditioning (amplifiers, filters)

Unit 2: Resistive, Capacitive & Inductive Sensors

Resistive: Strain gauges, RTDs, thermistors, potentiometers, **Capacitive:** Proximity sensors, humidity sensors. **Inductive:** LVDT, proximity sensors, eddy current sensors. Strain Gauges: Wire-wound, Foil type, Semi-conductor and capacitive types, Gauge Factor.

Unit 3: Piezoelectric, Optical & Magnetic Sensors

Piezoelectric: Principle, applications (force, pressure, accelerometers), Optical: Photodiodes, LDRs, IR sensors, fiber-optic sensors, Magnetic: Hall effect sensors, reed switches.

Unit 4: Photo-electric Sensors & Miscellaneous Sensors

Temperature: Thermocouples, RTDs, IC sensors (LM35), Thermostats and Resistance thermometers, **Motion:** Accelerometers (MEMS), gyroscopes, **Position:** Encoders, ultrasonic sensors, GPS, LDR, Photo-emissive cell, Photo-conductive type, photodiodes, Photo-electric Tachometer, Smart sensors, Fibre optic sensors, Film sensors, Nano sensors, Digital Transducers, **Chemical/Bio-sensors:** Gas sensors (MQ series), pH sensors.

Unit 5: Applications of sensors and transducers

Industrial Automation, Pressure sensors, Monitor hydraulic systems, Proximity sensors, Temperature sensors, Healthcare & Medical Devices, Automotive Systems, Smart Home & IoT: Motion sensors (PIR) for security lighting, Humidity sensors in smart thermostats. Gas leak detectors (MQ sensors) for safety, Environmental Monitoring, Agriculture.

Recommended Books:

1. Patranabis. D, Sensors and Transducers, Prentice Hall of India
2. H.K.P. Neubert, Instrument transducers, Oxford University press.
3. A.K. Sawhney, A Course in Electrical and Electronics Measurements and Instrumentation, Dhanpat Rai & Co.
4. S. Renganathan, Transducer Engineering, Allied Publishers. 5. Murthy.D.V.S, “Transducers and Instrumentation”, Prentice Hall of India,

Note: At least one question must be set from each unit/course outcome.

Semester – 6th

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: 6th
Subject Code: BSCE-601C
Subject Name: Digital Signal Processing
Contact Hours L: 03 T: 00 P: 00 Credits: 03

Course Objective:

The objective of this course is to enable students to understand the concepts underlying Digital Signal Processing.

Course Outcomes:

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

1. Understanding the concept of various types of signals
2. Understanding the concept of systems
3. Understanding the concept of various transforms used in DSP
4. Understanding the concept of Digital Filters and applications of DSP in various areas

Unit 1: Introduction to Signals

Basics of Signals, Types of Signals, Periodic and Aperiodic signals, Analog and digital signals, Sampling and reconstruction of signals, continuous and discrete time signals, Linear and nonlinear signals, Causal and non-causal signals, Even and odd signals, Signal representations, Basic discrete time signal operations: Shifting, Addition, Subtraction, Multiplication, Convolution.

Unit 2: Introduction to Digital Signal Processing Systems

Basic elements of digital signal processing systems, System Representations, Unit impulse response, Concepts of stability, causality, linearity, Difference equations, Linear Time Invariant Systems, Implementation of Discrete Time Systems, Basics of Digital Signal Processors.

Unit 3: Introduction of Various Transforms in Signal Processing

Introduction and need of various transforms, Frequency Response of system, Fourier Series, Fourier Transform, Discrete Time Fourier Transform, Discrete Fourier Transform, Z-Transform.

Unit 4: Digital Filters and Applications of Digital Signal Processing

Introduction of Digital Filters, FIR and IIR Filters, Realization of discrete time systems, Applications of DSP, Limitations of Analog signal processing, Advantages of Digital signal processing.

Recommended Books:

1. S.K.Mitra, Digital Signal Processing: A computer based approach.TMH, 2001.
2. A.V. Oppenheim and Schafer, Discrete Time Signal Processing, Prentice Hall, 1989.
3. John G. Proakis and D.G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, Prentice Hall, 1997.
4. L.R. Rabiner and B. Gold, Theory and Application of Digital Signal Processing, Prentice Hall, 1992.

Note: At least one question must be set from each unit/course outcome.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: 6th
Subject Code: BSCE-602C
Subject Name: Analog and Digital Communication
Contact Hours L: 03 T: 00 P: 00 Credits: 03

Course Objective:
This is one of the fundamental courses meant to know the concepts of Analog as well as Digital Communication and understand the working of common communication techniques.

Course Outcomes:
At the end of this course students will demonstrate the ability to:
1. Understand concepts of AM & FM transmission and reception.
2. Understand pulse code modulation and its modified techniques such as DM, adaptive DM and DPCM.
3. Acquire knowledge of digital carrier modulation and demodulation techniques.

Unit 1: Analog Communication
Electromagnetic Spectrum, Need of modulation. Introduction to Amplitude Modulation, Frequency Modulation, Phase Modulation, Mathematical representation of AM and Power relation in AM waves, Mathematical representation of FM, Frequency Spectrum of FM waves, Amplitude Modulation: Transmission and Reception of DSB, SSB and VSB, FM generation and reception.

Unit 2: Digital Communication
Analog to Digital: Need, Sampling process, Pulse Amplitude modulation and Concept of Time division multiplexing, Pulse code modulation (PCM), Differential pulse code modulation. Delta modulation and demodulation, Adaptive and Sigma Delta Modulation, Noise considerations in PCM, Digital Multiplexers. Baseband Pulse Transmission: Inter symbol Interference and Nyquist criterion.

Unit 3: Digital Modulation Techniques
Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying.

Recommended Books
1. Haykin S., "Communications Systems", John Wiley and Sons, 2001.
2. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
3. Taub H. and Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill, 2001.
4. Wayne Tomasi, Electronic Communication System Fundamentals through Advanced, Pearson Education

Note: At least one question must be set from each unit/course outcome.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: 6th
Subject Code: BSCE-6XXC
Subject Name: Department Elective-II
Contact Hours L: 03 T: 00 P: 00 Credits: 03

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester	**6th**			
Subject Code	**BSCE-6XXC**			
Subject Name	**Department Elective-III**			
Contact Hours	**L: 03**	**T: 00**	**P: 00**	**Credits: 03**

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester:	**6th**			
Subject Code:	**BSCE-603C**			
Subject Name:	**Digital Signal Processing Lab**			
Contact Hours	**L: 00**	**T: 00**	**P: 04**	**Credits: 02**

Course Objective:

This laboratory course deals with the Hands-on experiments related to the study of Digital Signal Processing and its applications.

Course Outcomes:

At the end of this course student will demonstrate the ability to:

1. Write programs to develop various signals and standard sequences.
2. Develop programs to verify signal operations.
3. Develop programs to verify various transforms.
4. Develop programs to understand design various filters and applications of DSP.

List of Experiments:

Perform the following exercises using MATLAB

1. To develop elementary signal function modules (m-files) for unit sample, unit step, exponential and unit ramp sequences.
2. Write a program in MATLAB to generate standard sequences.
3. To develop program modules based on operation on sequences like signal shifting, signal folding, signal addition and signal multiplication.
4. To develop program for finding magnitude and phase response of a system.
5. Implementation Linear Convolution.
6. To Find DFT of given time DT Signal.
7. Program to find Z transform of a given signal.
8. Digital Filter Design – FIR and IIR filters concepts understanding.
9. Loading of Image File in MATLAB.
10. Image File Operations.
11. Loading of Video File in MATLAB.
12. Image File Operations.
13. Loading of sound file in MATLAB.
14. Sound File Operations.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: 6th
Subject Code: BSCE-604C
Subject Name: Analog and Digital Communication Lab
Contact Hours L: 00 T: 00 P: 04 Credits: 02

Course Objective:

This laboratory course deals with the Hands-on experiments related to the study and investigate the outputs of various Analog and digital modulation techniques.

Course Outcomes:

At the end of this course student will demonstrate the ability to:

1. Study and verify the characteristics and output waveforms of AM & FM.
2. study and compare noise in AM and FM systems
3. Investigate the output responses of PAM, PCM, PSK, FSK, and MSK.

List of Experiments:

1. To study the output waveform of Amplitude Modulation and demodulation.
2. To study the output waveform of frequency Modulation and demodulation.
3. To Investigate and compare the outputs of SSB, DSB-SC Modulation systems.
4. To study and compare Noise Interference in AM and FM systems.
5. To study the output waveforms of different types of Sampling.
6. To Investigate the Output response of Pulse Code Modulation.
7. To Study Delta modulation and demodulation technique and observe effect of slope overload.
8. To Study the output response of Phase shift keying.
9. To Study the output response of Frequency shift keying.
10. To study the output response of QAM.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: 6th
Subject Code: BSCE-605C
Subject Name: Major Project
Contact Hours L: 00 T: 00 P: 04 Credits: 02

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Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: 6th
Subject Code: BMPD-601C
Subject Name: Mentoring and Professional Development
Contact Hours L: 00 T: 00 P: 02 Credits: 01

Guidelines regarding Mentoring and Professional Development

Course Outcome:

1. Overall Personality
2. Aptitude (Technical and General)
3. General Awareness (Current Affairs and GK)
4. Communication Skills
5. Presentation Skills

The course shall be split in two sections i.e. outdoor activities and class activities. For achieving the above, suggestive list of activities to be conducted are:

Part – A: Class Activities

1. Expert and video lectures
2. Aptitude Test
3. Group Discussion
4. Quiz (General/Technical)
5. Presentations by the students
6. Team building Exercises

Part – B: Outdoor Activities

1. Sports/NSS/NCC
2. Society Activities of various student's chapter i.e. ISTE, SCIE, SAE, CSI, Cultural Club, etc.

Evaluation shall be based on rubrics for Part – A & B Mentors/Faculty in-charges shall maintain proper record student wise of each activity conducted and the same shall be submitted to the department.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: 6th
Subject Code: BSCE-611C
Subject Name: Cyber Laws & IPR
Contact Hours L: 03 T: 00 P: 00 **Credits: 03**
Course Type: Department Elective –II

Course Objective:

The primary objectives of cyber laws and intellectual property rights (IPR) are to enable the students to obtain the basic knowledge about to protect individual rights, combat cybercrime, strengthen cyber security, and safeguard intellectual property in the digital realm. These laws aim to ensure a secure online environment by preventing unauthorized access, data breaches, and intellectual property theft.

Course Outcomes:

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

1. Highlight the basic concept, classification, History about IPR and their Protection. Know the Recent changes in IPR
2. Analyze and verify the procedure for Registration of trademark and Industrial Designs and also know the essential requirements and Infringement of trademark and Industrial Designs.
3. Demonstrate the procedure for registration, Characteristics, publication, infringement and term of copyright and also know the other forms of IP.
4. Use the provision of Cyber law to deal with Types of Cyber Crime,, Cyber crime Complaints, National cyber security policy

Unit 1: Introduction

Basic Concepts of Intellectual Property (IP), Classification of IP, Need for Protection of IP, History of IP law, WIPO- Objectives and Functions, TRIPS – objectives/ need and justifications, Recent Development in IP, National IPR policy – objectives and Achievement, Govt. Initiatives for IPR in academic institutions.

Unit 2: Trade Marks and Industrial Design

Definition of Trade Mark, Characteristics of Trade Mark, Essential for a good Trade Mark, Functions of Trade Mark, Term of Trade Mark, Other specific forms of Marks - Service Marks, Collective Marks, Certification Trade Marks, Well known Trade Marks and Internet Domain Name, Trade Dress, Domain names – Features, Rights of Trade Marks Holder, Infringement of Registered Trademark. Introduction to Industrial Designs, Essential requirements of Registration, Designs which are not registerable, who is entitled to seek Registration, Procedure for

Registration of Designs.

Unit 3: Copy Right & Other forms of IP

Meaning of Copy Right, Characteristics of Copyright, Who is Author, various rights of owner of Copyright, Procedure for registration, Publication and term of copyright Infringement of Copyright and Its remedies, Software Copyright, Copyright board – Functions and powers Others forms of IP- Introduction to Semiconductor integrated Circuits layout Design act 2000, The protection of plant and varieties and farmers rights act 2001, The Biological Diversity act 2002. Trade Secrets, Traditional Knowledge – Features and need for Traditional Knowledge Digital Library.

Unit 4: Cyber law

Cyber law introduction, Definition of Cyber Crime, Cyber Crime Types, Hacking, Ethical Hacking, Need and Importance of Cyber law, Cyber law Provision in India – cyber crimes under IT Act 2000, IPC & Special Laws, Cyber law and Information Technology Act 2000, Cyber crime Complaints, National cyber security policy – Objectives and Strategies.

Recommended Books:

1. Dr. M.K. Bhandari “Law relating to Intellectual property” January 2017 (Publisher By Central Law Publications).
2. Dr. R Radha Krishna and Dr. S Balasubramanain “Text book of Intellectual Property Right”. First edition New Delhi 2008. Excel books.
3. P Narayan “Text book of Intellectual Property Right”. 2017, Publisher: Eastern Law House
4. Dr. Anant D Chinchure “Cyberspace Cyber law & Cyber Security”
5. Nishith Desai Associates - Intellectual property law in India – Legal, Regulatory & Tax
6. AnirudhRastogi. Cyber Law, LexisNexis.
7. Vakul Sharma. Information Technology Law and Practice Cyber Laws and Laws Relating to E-Commerce, Universal Law Publishing.

Note: At least one question must be set from each unit/course outcome.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: 6th
Subject Code: BSCE-612C
Subject Name: Wireless Communication
Contact Hours L: 03 T: 00 P: 00 **Credits:** 03
Course Type: Department Elective –II

Course Objective:

This is one of the fundamental courses meant to understand the important concepts related to Wireless communication using suitable mathematical models.

Course Outcomes:

At the end of this course students will demonstrate the ability to:
1. Understand the basic elements of Cellular Radio Systems and its design
2. Learn about the concepts Digital communication through fading multipath channels
3. Understand various Multiple Access techniques for Wireless communication
4. Know about the Wireless standards and systems

Unit 1: Elements of Cellular Radio Systems Design

Basic cellular system, Performance criteria, Components and Operation of cellular systems, Planning a cellular system, Analog & Digital cellular systems, Concept of frequency reuse channels, Co-channel interference, Reduction factor, desired C/I for a normal case in an omni directional antenna system, Cell splitting.

Unit 2: Digital Communication through fading multipath channels

Fading channels and their characteristics- Channel modeling, Digital signaling over a frequency non selective slowly fading channel. Concept of diversity branches and signal paths. Combining methods: Selective diversity combining, Switched combining, Maximal ratio combining, Equal gain combining.

Unit 3: Multiple Access Techniques for Wireless Communications

Introduction, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Spread Spectrum Multiple Access, Space Division Multiple Access (SDMA), Packet Radio Protocols; Pure ALOHA, Slotted ALOHA.

Unit 4: Wireless Systems & Standards

AMPS and ETACS, United states digital cellular (IS- 54 & IS 136), IEEE Standards, Global system for Mobile (GSM): Services, Features, System Architecture and Channel Types, Frame Structure for GSM, Speech Processing in GSM, GPRS/EDGE specifications and features. 3G systems: UMTS & CDMA 2000 standards and specifications. CDMA Digital standard (IS 95): Frequency and Channel specifications, Forward CDMA Channel, Reverse CDMA Channel, Wireless Cable Television.

Unit 5: Evolution of Communication Generations

Introduction to Bluetooth, Zigbee, LTE-Advance systems, 4G & 5G Mobile techniques and Emerging technologies.

Recommended Books:

1. T.S. Rappaport, Wireless Communications: Principles and Practice, 2nd Edition, Pearson Education Asia, 2010.
2. William C Y Lee, Mobile Cellular Telecommunications, 2nd Edition, MGH, 2004.
3. Raj Pandya, ―Mobile and Personal Communication systems and services‖, Prentice Hall of India, 2001.
4. Wireless and Digital Communications; Dr. Kamilo Feher (PHI), 1998.

Note: At least one question must be set from each unit/course outcome.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: 6th
Subject Code: BSCE-613C
Subject Name: Internet of Things
Contact Hours L: 03 T: 00 P: 00 Credits: 03

Course Type: Department Elective –II

Course Objective

This course will enable the students to understand the concepts of IoT technology, its hardware and software constituents, various design and development issues.

Course Outcomes:

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

1. Understand basics of IoT Technology and its applications in various domains.
2. Have knowledge of IoT Hardware, devices and architectural designs.
3. Have understanding of the IoT softwares, programming frameworks and development techniques.
4. Learn about Security, challenges, solutions and vision of the IoT with supporting technologies

Unit 1: Basics of IoT Technology and its Applications

Introduction and History of IoT, Basic building blocks of IoT, Functional blocks, Standards considerations, Applications: Home automation, Industry applications, Surveillance applications, Other IoT applications, Overview of communication and networking technologies in IoT.

Unit 2: IoT Hardware and Architecture

IoT architecture outline, Physical and logical design of IoT, Service Oriented Architecture, API Oriented Architecture, IoT Sensors, Wearable Electronics, Standard Devices, IoT Resource Management, Data Management and Analytics.

Unit 3: Software and Development Techniques for IoTs

Introduction to IoT Programming frameworks and languages, Introduction to various IoT tools, Techniques for development of applications through IoT tools, Development of sensor based application through embedded system platforms.

Unit 4: IoT Challenges and Vision

Design challenges, Development challenges, IoT reliability, security and privacy issues, Understanding the risks, Modes of attack, Tools for achieving security, Interoperability and its need, Solutions for IoT, Vision of IoT.

Recommended Books:

1. R K Buyya, V Dastjerdi, Internet of Things, Principles and Paradigms, Morgan Kaufmann Imprint of Elsevier.
2. P Vaher, Learning Internet of Things, PACKT Publishing.
3. O Vermesan, P Friess, Internet of Things- From Research and Innovation to Market Deployment, River Publishers.
4. Vijay Madisetti, Arshdeep Bahga, Internet of Things: A Hands-On Approach, Universities Press.
5. W Dargie, C Poellabauer, Fundamentals of Wireless Sensor Networks: Theory and Practice, John Wiley & Sons.

Note: At least one question must be set from each unit/course outcome.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: 6th
Subject Code: BSCE-614C
Subject Name: Neural Networks and Fuzzy Logic
Contact Hours L: 03 T: 00 P: 00 **Credits:** 03
Course Type: Department Elective –III

Course Objective:
The objective of this course is to introduce students to the fundamental concepts of Neural Networks and Fuzzy Logic, focusing on their theoretical foundations and practical applications.

Course Outcomes:
At the end of this course students will demonstrate the ability to:

1. Understand the basic principles and architectures of artificial neural networks.
2. Comprehend the concepts of learning algorithms and training processes in neural networks.
3. Grasp the fundamentals of fuzzy logic, including fuzzy sets, membership functions, and fuzzy reasoning.
4. Apply neural networks and fuzzy logic to solve real-world problems in various domains.

Unit 1: Introduction to Neural Networks
Basics of artificial neural networks (ANNs), Biological vs. artificial neurons, Types of neural networks: Feed-forward, Recurrent, Single-layer vs. multi-layer networks, Activation functions and their roles, Applications of neural networks.

Unit 2: Learning in Neural Networks
Concept of learning in ANNs, Supervised vs. unsupervised learning, Perceptron learning rule, Back propagation algorithm (conceptual understanding), Hebbian learning, Applications in pattern recognition and classification.

Unit 3: Introduction to Fuzzy Logic
Basics of fuzzy logic, Crisp sets vs. fuzzy sets, Membership functions and their types, Fuzzy operations: union, intersection, complement, Fuzzy rules and inference systems, Applications of fuzzy logic in control systems.

Unit 4: Hybrid Systems and Applications
Neuro-fuzzy systems: Combining neural networks and fuzzy logic, Adaptive neuro-fuzzy inference systems (ANFIS), Practical applications in engineering, medicine, and decision-making, Limitations and advantages of neural networks and fuzzy logic.

Recommended Books:
1. Simon Haykin, *Neural Networks and Learning Machines*, Pearson
2. Timothy J. Ross, *Fuzzy Logic with Engineering Applications*, Wiley
3. Laurene Fausett, *Fundamentals of Neural Networks*, Prentice Hall
4. J.-S.R. Jang, C.-T. Sun, and E. Mizutani, *Neuro-Fuzzy and Soft Computing*, Prentice Hall

Note: At least one question must be set from each unit/course outcome.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: 6th
Subject Code: BSCE-615C
Subject Name: Artificial Intelligence
Contact Hours L: 03 T: 00 P: 00 **Credits: 03**

Course Type: Department Elective –III

Course Objective:

The objective of this course is to introduce students to the fundamental concepts of Artificial Intelligence (AI), focusing on theoretical foundations, key algorithms, and real-world applications.

Course Outcomes:

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

1. Understand the basic principles, goals, and scope of Artificial Intelligence.
2. Comprehend the core techniques of problem-solving, search algorithms, and knowledge representation in AI.
3. Grasp the fundamentals of machine learning, neural networks, and natural language processing.
4. Analyze the ethical implications and societal impact of AI technologies.

Unit 1: Introduction to Artificial Intelligence

What is intelligence? Foundations of artificial intelligence (AI), Definition and history of AI, Goals and applications of AI, Intelligent agents and their types (simple reflex, model-based, goal-based, utility-based), Turing Test and its significance, Ethical considerations in AI.

Unit 2: Problem-Solving and Search Techniques

Problem-solving approaches in AI, State space representation, Uninformed search strategies (BFS, DFS), Informed search strategies (A*, greedy search), Adversarial search (minimax algorithm), Constraint satisfaction problems, AI problems: Toy Problems, Real World problems- Tic-Tac-Toe, Water Jug, Question-Answering, 8-puzzle, 8-Queens problem. Formulating problems, Searching for Solutions.

Unit 3: Knowledge Representation and Machine Learning

Logical representations (propositional and predicate logic), Semantic networks and frames, Introduction to machine learning: supervised, unsupervised, and reinforcement learning, Decision trees and clustering (conceptual overview).

Unit 4: Neural Networks and AI Applications

Basics of artificial neural networks (ANNs), Perceptrons and multi-layer networks, Natural language processing (NLP) fundamentals, AI applications in robotics, healthcare, and gaming, Limitations and future trends in AI.

Recommended Books:

1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson, 2020.
2. Elaine Rich and Kevin Knight, Artificial Intelligence, McGraw Hill, 1991.
3. Stephen Lucci and Danny Kopec, Artificial Intelligence in the 21st Century, Mercury Learning, 2016.
4. Melanie Mitchell, Artificial Intelligence: A Guide for Thinking Humans, Pelican, 2019.

Note: At least one question must be set from each unit/course outcome.

Shaheed Bhagat Singh State University, Ferozepur
Bachelor of Science
Computer Applications and Electronics

Semester: 6th
Subject Code: BSCE-616C
Subject Name: Machine Learning
Contact Hours L: 03 T: 00 P: 00 **Credits: 03**
Course Type: Department Elective –III

Course Objective:
The objective of this course is to introduce students to the fundamental concepts and practical applications of Machine Learning**.**

Course Outcomes:
At the end of this course students will demonstrate the ability to:
1. Understand the core concepts, types, and real-world applications of Machine Learning.
2. Apply supervised and unsupervised learning algorithms to solve problems.
3. Implement and evaluate Machine Learning models using Python libraries.
4. Gain familiarity with tools and ethical considerations in Machine Learning.

Unit 1: Introduction to Machine Learning
Definition, scope, and importance of Machine Learning., Types of Machine Learning: Supervised, Unsupervised, Reinforcement Learning. - Applications in domains like healthcare, finance, and automation, Overview of the ML workflow: Data collection, preprocessing, model training, evaluation, and deployment.

Unit 2: Supervised Learning
Understanding types of datasets, labeled datasets, Algorithms: Linear Regression, Logistic Regression, Decision Trees, k-Nearest Neighbors (k-NN), Model evaluation: Accuracy, Precision, Recall, Confusion Matrix, Practical implementation using scikit-learn

Unit 3: Unsupervised Learning
- Understanding unlabeled datasets, Algorithms: k-Means Clustering, Hierarchical Clustering, Principal Component Analysis (PCA), Applications in customer segmentation and dimensionality reduction, Hands-on exercises with real-world datasets.

Unit 4: Neural Networks and Tools
Basics of Neural Networks: Perceptron, activation functions, Introduction to Deep Learning (high-level overview), Popular tools: Tensor Flow, Keras, and their use cases, Ethical considerations and limitations of Machine Learning.

Recommended Books:
1. Tom Mitchell, *Machine Learning*, McGraw Hill.
2. Aurelien Geron, *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow*, O'Reilly.
3. Ethem Alpaydin, *Introduction to Machine Learning*, MIT Press.
Note: At least one question must be set from each unit/course outcome

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