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Programme: **Bachelor of Technology**   Semester –III

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBCS-301	Data Communication	3	1	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance Max. Marks: 10
Practical Internal Max Marks:Nil	Lab Performance /Attendance / Quiz - Max. Marks: Nil	

Pre-Requisite	Students should have basic knowledge of network & internet.
Course Objective	To provide a solid conceptual understanding of the fundamentals of data communications.
Course Outcomes	**Student will be able to learn:** 1. Describe the role of data networking in the human network .Student will able to troubleshoot simple business network design errors. 2. Involves a communication system which is made up of hardware and software. 3. Define and apply the basic concepts of information theory (entropy, channel capacity etc. 4. Understand the mathematical ideas underlying the theory of error- detection and error correction using linear codes. 5. Troubleshoot simple business network design errors.

Unit	Contents(Theory)	Marks Weightage
I	**Introduction to Data Communication :** Data Communication System, Elements of Data Comm. System, Introduction to Transmission Modes, Types, Line Configuration Types, Introduction to Serial Transmission, Parallel Transmission, Synchronous Transmission v/s Asynchronous Transmission, Introduction to Topology and Types, Introduction to Multiplexing, FDM and TDM Types, WDM and CDMA.	14
II	**Transmission Medium and Modulation :** Introduction to Transmission Medium, STP, UTP, Co-Axial Cables, Optical Fiber Cables, Introduction to Wireless Mediums and Satellite Communication, Introduction to Data Compression, Data Compression Techniques, Run Length Encoding, Lampel Ziv Welch Encoding, Introduction to Modulation, AM, FM, PM, Introduction to Shift Keying Techniques, ASK, BSK, PSK, QAM and PCM.	14
III	**Encodings & Information Theory:** Introduction to Encoding Techniques, Polar, Unipolar and Bipolar Encoding Techniques, Introduction to Spread Spectrum, Direct Sequence Spread Spectrum and Frequency Hopping Spread Spectrum, Introduction to Channel, Channel Capacity, S/N Ratio, Shannon Fano's Coding Technique and Huffman's Coding Techniques	14
IV	**Error Correction & Detection :** Introduction to Errors, Types, Error Correction, Error Detection, VRC, CRC, LRC, Checksum, Internet Checksum and Hamming Codes, Introduction to Modems and DTE-DCE Interfaces, RS232 and Other Interfacing Devices.	14
V	**Error Control & Flow Control :** Introduction to Error Control and Flow Control, Flow Control Techniques, Stop & Wait Protocol, Go Back N Protocol, ENQ / ACK, Polling, Selecting, Sliding Window Protocol, Selective Repeat, Selective Reject, ARQ and its Techniques, Introduction to Congestion Control and Congestion Control Techniques.	14

Text Book/References Books/ Websites:
1. William Stallings; Data Communication; Prentice Hall.

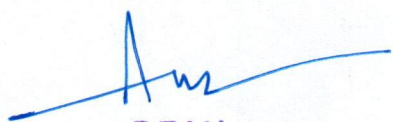School of Research and Technology   Department: Computer Science and Engineering

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2. Forouzan; Data Communications; Tata McGraw Hill Publications.
3. Singh & Sapre; Communication Systems; Tata McGraw Hill Publications.
4. B.P. Lathi; Communication Systems; Oxford University Press.
5. Sanjay Sharma; Data Communication and Computer Network; S.K.Kataria and sons

Suggested List of Laboratory Practical (Expandable): Nil

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SubjectCode	Subject Title	Credit			Theory			Practical		
		L	**T**	**P**	**End Sem (70)**	**Internal (30)**	**Total (100)**	**End Sem (Nil)**	**Internal (Nil)**	**Total**
CBCS-302	Computer Architecture	3	1	-			**Min: 40 (D Grade)**			(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal– Max Marks: 30	Best of Two Mid Semester Test –Max Marks: 20	Assignment/Quiz/Attendance Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance /Attendance / Quiz - Max. Marks: Nil	

Pre-Requisite	Students should have basic knowledge of computer.
Course Objectives	To understand the structure, function and characteristics of computer systems.
Course Outcomes	**Student will be able to learn:** 1. Understand the design of a basic computer. 2. Basic knowledge on the architecture and local control unit of system. 3. Various concepts of input and output organization. 4. Identify and compare different methods for computer I/O. 5. Understand the Concept of Parallel Processing and its applications.

Unit	Contents (Theory)	Marks Weightage
I	**Computer Basics and CPU Von Neumann model**: Various subsystems, CPU, bus organization, computer memory, Memory registers, I/O, Register Transfer Language, Instruction Fetch, decode and execution, data movement and manipulation, Instruction formats and addressing modes of basic computer, Flynn's and Handler's Classification of parallel computing structures.	14
II	**Control Unit:** Organization, Hardwired control unit, Micro and nano programmed control unit, Control Memory, Address Sequencing, Micro Operations & Instruction formats, horizontal and vertical micro instruction, Micro program sequencer, Data and control hazards and method to resolve them, Arithmetic and Logic Unit, Arithmetic Processor, Addition, subtraction, multiplication and division, Floating point and decimal arithmetic and arithmetic units and design of arithmetic unit.	14
III	**Input Output Organization**: Modes Of Data Transfer Program controlled, interrupt driven & direct memory access, I/O Interface, programmed I/O, I/O addressing & instruction, I/O processor, I/O Synchronization, I/O processors, DMA, Data transfer – Serial / parallel, synchronous / asynchronous, simplex / half duplex and full duplex, Interconnection networks, Parallel Algorithms for array processors and Search algorithms.	14
IV	**Memory & 8085 Microprocessor Memory Hierarchy:** Cache Memory - Organization and mappings, Associative memory, Virtual memory, semiconductor memories (RAM, ROM), memory allocation and management policies, 8085 I/O structure, Assembly Language, instruction set and basic programming and Data communication.	14
V	**Multiprocessors Pipeline and Vector processing**: Instruction and arithmetic pipelines, Vector and array processors, Interconnection structure and inter-processor communication structure of multiprocessors, parallel processing and pipeline processing, SIMD & MIMD multiprocessor.	14

Text Book/References Books/ Websites:

1. Morris Mano; Computer System Architecture; PHI.
2. Hwang and Briggs; Computer Architecture and Parallel Processing; TMH.

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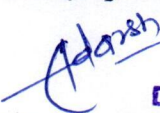Programme: **Bachelor of Technology**   Semester –III
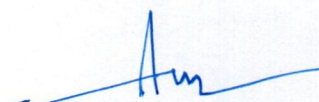
3. Tanenbaum; Structured Computer Organization; Pearson Education.
4. R. S. Gaonkar; Microprocessor Architecture: Programming and Applications with the *8085*/8080A; Penram International Publishing.
5. Rajaraman; Computer Organization & Architecture; PHI Learning.

Suggested List of Laboratory Practical (Expandable): Nil

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	**T**	**P**	**End Sem (70)**	**Internal (30)**	**Total (100)**	**End Sem (35)**	**Internal (15)**	**Total (50)**
CBCS-303	**Data Structure**	**3**	**1**	**1**			**Min: 40 (D Grade)**			**Min: 20 (D Grade)**

Duration of Theory (Externals): 3 Hours

Theory Internal– Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance /Attendance / Quiz - Max. Marks: 15	

Pre-Requisite	Students should have basic knowledge of Computer & Programming
Course Objective	To introduce the fundamental concept of data structures and to emphasize the importance of data structures in developing and implementing efficient algorithms.
Course Outcomes	**Student will be able to learn:** 1. Explain fundamental concepts of Data structures, space complexity and time complexity. 2. Apply appropriate data structure for a given application. 3. Assess how the choice of data structures and algorithm design methods impacts the performance of programs. 4. Implement different searching and sorting techniques. Compare different searching and sorting techniques. 5. Solve problems using data structures such as linear lists, stacks, queues, hash tables, heaps, graphs and writing programs for these solutions.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction to Data Structure:** Basic terminology, Data types and its classification, Algorithm complexity notations like big O, Ω, Φ. Application: Storage pools, Garbage collection and compaction Complexity of algorithm (Best, worst, average), Asymptotic analysis.	14
II	**Linear data Structure:** Array Definition, Representation and Analysis of Arrays, Single and multidimensional arrays, Address calculation, Arrays as parameters, Ordered list and operations, sparse and matrices, and garbage collection ,Stack, Array implementation of stack, Linked Representation of stack, Application of stack, Conversion of infix to prefix and postfix Expressions and expression evaluation, Queue Array and linked implementation of queues, Circular Queues, D- queues and priority Queues, Linked list in array.	14
III	**Trees :** Basic terminology, Binary trees, property of binary tree, binary search property/s heap property, binary search tree, Algebraic expressions, complete binary tree, Extended binary trees, Array and linked representation of binary trees, traversing Binary trees, Threaded Binary trees, Binary search trees (BST), AVL Tress, and B trees. Application: Algebraic Expression.	14
IV	**Sorting & Searching Techniques:** Searching Techniques (Linear search, binary search) Sorting – Internal Sorting – Bubble Sort, Insertion Sort, Quick Sort, Heap Sort, BinSort, Radix Sort – External Sorting – Merge Sort, Multi-way Merge Sort, Polyphase Sorting - Design Techniques - Divide and Conquer - Dynamic Programming - Greedy Algorithm Backtracking - Local Search searching and hashing: Sequential search, Binary search, Hash table implementation, Symbol table, Static tree table, Dynamic tree table.	14
V	**Graph:** Introduction, sequential representations of graphs, adjacency Matrices, Traversal, Connected Component and spanning trees, Minimum cost of spanning trees, Dijkstras algorithm.	14

Text Book/References Books/ Websites:

1. Lipschutz; Data structure (Schaum); TMH.
2. Horowitz and Sahani; Fundamentals of data Structures; Galgotia Publication.

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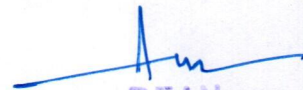Programme: **Bachelor of Technology**   Semester –III

3. Aho, Hopcroft, Ullman; Data Structures and Algorithms; Pearson Education.
4. Jean – Paul Trembly, Paul Sorenson; An Introduction to Structure with application; TMH.
5.https://www.tutorialspoint.com/data_structures_algorithms/index.html

Suggested List of Laboratory Practical (Expandable):

1. Write a program to show Array in C
2. Write a program to implement Stack using array.
3. Write a program to implement stack using linked list.
4. Write a program to implement Queue using array.
5. Write a program to implement Binary Tree.
6. Write a program to implement Binary Search Tree.
7. Write a program to implement bubble sort algorithm.
8. Write a program to implement linear search algorithm.
9. Write a program to implement Binary Search Algorithm.
10. Write a program to implement BFS and DFS Algorithm.

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	**T**	**P**	**End Sem (70)**	**Internal (30)**	**Total (100)**	**End Sem (35)**	**Internal (15)**	**Total (50)**
CBCS-304	Digital Circuits and Systems	3	1	1			**Min: 40 (D Grade)**			**Min: 20 (D Grade)**

Duration of Theory (Externals): 3 Hours

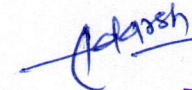| Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance /Attendance / Quiz - Max. Marks: 15	

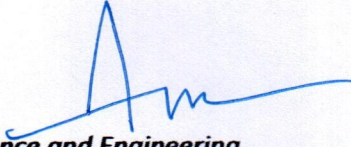| Pre-Requisite	Students have basic knowledge of circuit analysis.
Course Objective	The objective of this course is to provide the fundamental concepts associated with the digital logic and circuit design.
Course Outcome	**Student will be able to learn:** 1. Develop a digital logic and apply it to solve real life problems. 2. Learn concept of Boolean algebra and Number system. 3. Analyze, design and implement combinational logic circuits. 4. Analyze, design and implement sequential logic circuits. 5. Develop analog pulse modulation techniques and digital modulation technique.

Unit	Contents (Theory)	Marks Weightage
I	**Number Systems & Logic Gates:** Number systems & codes, Binary arithmetic, Boolean algebra and switching function, Error types, correction and detection, Hamming code, De Morgan's Theorem, Introduction to logic gates, Universal gate, Combination and sequential circuits.	14
II	**Minimization & Combinational Logic Circuits :** Minimization of switching function, Concept of prime implication, Karnaugh map method, Cases with don't care terms, Half adder, Half subtractor, Full adder, Full subtractor Circuits, serial & parallel addition, BCD adders, Look-ahead carry generator and Logic circuit design	14
III	**Flip Flops & Combinational Circuits :** Flip flops, RS, JK, D, T, Master slave flip flop, Diode, Transistor, Diode as a switch, Transistor as a switch, Decoders, Encoders, Multiplexers, Demultiplexers and Designing of Combinational circuits like code converters.	14
IV	**Combinational Circuits & Multivibrators :** Introduction to various semiconductor Memories, PLA, Introduction to Shift Registers, Counters, Synchronous & asynchronous counters, Astable, Monostable & Bitable multivibrator, Schmitt trigger, IC 555 Timer, Introduction to Logic families and CMOS.	14
V	**Modulation Techniques:** Introduction to Modulation and Modulation Techniques, Introduction to Analog to Digital & Digital to Analog conversion.	14

Text Book/References Books/ Websites:
1. M. Mano; Digital Logic & Computer Design; PHI.
2. Kapoor; Digital Electronics; Macmillan Publishers India LTD.
3. A. Anand Kumar; Fundamental of Digital Circuits; PHI.
4. R.P. Jain; Modern Digital Electronics, 2nd Edition; Tata Mc Graw Hill.
5. R. K. Gaur; Digital Electronics & Microcomputer; Dhanpat Rai Publication.

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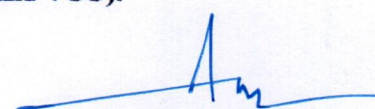
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Suggested List of Laboratory Practical (Expandable):

1. To test and study of operation of all logic Gates.
2. To implementation of basic Gates using Universal Gates.
3. To Study the binary addition by half adder and full adder circuit.
4. To Study the binary subtraction by half subtractor and full subtractor circuit.
5. To Design a BCD to Excess-3 code convertor.
6. To study the verification of Demorgan's Theorem.
7. To Study the operation of R-S Flip Flop.
8. To Study the operation of J-K Flip Flop.
9. To Study the operation of MUX/DEMUX.
10. To Study the applications of 555 timer (Astable, Monostable, Schmitt trigger and VCO).

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SubjectCode	SubjectTitle	Credit			Theory			Practical		
		L	T	P	End Sem(35)	Internal(15)	Total(50) Min:40(DGrade)	End Sem (35)	Internal(15)	Total (50) Min: 20 (D Grade)
CBCS-305	Internet Technology	1	-	1						

Durationof Theory(Externals): 2Hours

TheoryInternal–MaxMarks: 15	Best ofTwo MidSemesterTest– MaxMarks: 10	Assignment/Quiz/Attendance- Max.Marks:5
Practical InternalMax Marks: 15	LabPerformance/Quiz/Attendance – MaxMarks: 15	

Pre-Requisite	Students should have basic knowledge of internet, wireless networks.
Course Objective	Understand basic web technology concepts that are required for developing web applications.
CourseOutcome	**Student will be able to learn:** 1. Analyze a web page and identify its elements and attributes. 2. Build dynamic web pages using JavaScript (client side programming). 3. Create interactive web applications using ASP.NET and C#. 4. Provide a hands-on experience and some programming in an Internet environment. 5. Understand the information systems for business and management.

Unit	Contents(Theory)	Marks Weightage
I	**Introduction To Internet :** Internet Evolution, Concepts, Internet Vs Intranet, Internet Services USENET, GOPHER, WAIS, ARCHIE (WWW) - History, Working, Web Browsers, Its Functions, URLs, Web Sites, Domain Names, Concept of Search Engines, Search Engines types, Web Servers, E-Mail: Sending & Receiving Email, Free E-Mail Services, Introduction to Blogs, Information Communication Technologies (ICT), Accessing ICT and Information Societies.	07
II	**HTML :**Concepts of Hypertext, Static and Dynamic Pages, HTML Introduction, Features, Uses & Versions Using Various HTML Tags, Elements of HTML Syntax, Head & Body Sections, , Inserting Texts, Text Alignment.	07
III	**CSS With HTML:** Using Images In Pages, Hyperlinks Text and Images, Bookmarks, Backgrounds and Color Controls, Creating and Using Tables in HTML, Use of Font Size & Attributes, List Types and its Tags. Introduction to WYSIWYG Design tools for HTML, Overview of MS- FrontPage, and Introduction to CSS, its Types and its Application for Formatting of HTML Pages.	07
IV	**Java Script:** JavaScript Overview, JavaScript and the WWW, JavaScript vs. Java, JavaScript versions, JavaScript Comments, Variables: Variables overview, declaring variables, Types of variables, Casting variables. JavaScript Alert box, Prompt & confirm. Expressions, Operators, Precedence, Statements: If statement, For statement, While statement, Break/Continue, Introduction to XML, AJAX and their Applications	07
V	**E-Commerce :** E - Commerce an Introductions, Concepts, Advantages and Disadvantages, Internet & E-Business, Applications, Electronic Payment Systems: Introduction, Types of Electronic Payment Systems, Smart Cards and Credit Card-Based Payment Systems, Introduction E-Governance and its applications	07

Text Book/References Books/ Websites:

1. V.K Jain; Level Module - M 1.2 - Internet & Web Page Designing; Bpb Publications.

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2. P.T. Joseph; E-Commerce- An Indian Perspective (Second Edition); S.J. Presentice Hall of India.
3. Alexis Leon and Mathews Leon; Internet For Everyone; Vikas Publishing House Pvt. Ltd.
4. ITL Solutions; Internet and Web Design; Macmillan Publishers India Ltd.
5. https://www.tutorialspoint.com/internet_technologies/index.htm

Suggested List of Laboratory Practical (Expandable):

1. Study of Internet and its Services.
2. Study of Search Engines.
3. Designing of a Blog.
4. Study of ICT.
5. Designing a Web Page using Basic HTML Tools.
6. Designing Web Page using Table Attributes.
7. Designing Web Page using Forms.
8. Designing Web Page with Formatting by CSS.
9. Designing a Page using Microsoft Office Front Page.
10. Implementation of Conditional and Looping Statements in Java Scripts.

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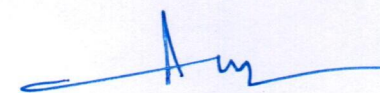FACULTY OF ENGINEERING
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Subject Code		Credit			Theory			Practical		
		L	**T**	**P**	**End Sem**	**Internal**	**Total**	**End Sem**	**Internal**	**Total (50)**
CBCS-306	**Programming with C++**	-	-	1	**(Nil)**	**(Nil)**	**(Nil)**	**(Nil)**	**(50)**	**Min: 20 (D Grade)**

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/ Quiz/Attendance - Max. Marks: 50	

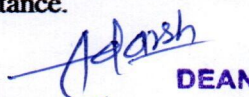| Pre-Requisite	Nil
Course Objective	To learn the fundamental programming concepts and methodologies which are essential to building good C/C++ program.
Course Outcomes	**Student will be able to learn:** 1. Analyze a web page and identify its elements and attributes. 2. Understand basic concepts of C++ programming. 3. Understand theconcepts of Inheritance.

Unit	Contents (Theory)	Marks Weightage
I	Brief History of C++,Features, Structure of a C++ Program, Comments, Keywords, Variables, Identifiers, Data types, User defined data types, Declaration of variables, Initialization of variables, Scope of variables, Constants. Operator and Control Structures ,C++ Functions, Object & Class ,OOPs Concepts, Constructor, Default Constructor, Parameterized Constructor, Copy Constructor, Destructor, this Pointer, static keyword, Enumeration, Friend Function C++Inheritance ,Function Overloading, Operators Overloading, Function Overriding, virtual function, Pure Virtual Function Abstract class , C++ Strings, C++ Files and Streams, C++ Templates, Exception handling.	50

Text Book/References Books/ Websites:
1. E. Balaguruswamy; Object Oriented programming with C++; TMH.
2. Yashwant Kanetkar; Let us C++; BPB Publications.
3. Radha Ganesan; Object Oriented Programming with C++"; Scitech Publication PVT.LTD. Chennai
4. Padam Gulwani &Anshuman Sharma; Elementary Concepts of Computer Design and Hardware; I K International Publishing House Pvt. Ltd.
5.https://www.w3schools.com/cpp/cpp_intro.asp.

Suggested List of Laboratory Experiments :- (Expandable):
1. Write a program in C++ to search the largest element in an array.
2. Write a program in C++ to search the smallest element in an array.
3. Write a program in C++ to exchange the content of two variables using call by reference
4. Write a program in C++ to demonstrate the Constructor Overloading, assume desired parameters.
5. Write a program in C++ to create the class shape, and overload the function to return the perimeters of the different shapes.
6. Write a program in C++ demonstrating the public, protected and private parameters.
7. Write a program in C++ using inheritance.

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8. Write a program in C++ to demonstrate multiple inheritances.
9. Write a program in C++ to create a file. (Assume suitable data)
10. Write a program in C++ to demonstrate virtual function.
11. Write a program in C++ to demonstrate friend function.
12. Write a program to implement a Class Matrix that adds subtracts and initializes the matrix.
13. Write a C++ program to implement a student class having roll no, name, rank, and addresses as data members.
14. Write a C + + program to implement matrix class. Add member function to transpose the matrix.

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School of Research and Technology   *Department: Computer Science and Engineering*

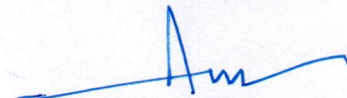# PEOPLE'S UNIVERSITY, BHOPAL
(Applicable for Admitted from Academic Session 2021-22 onwards)

Programme: **Bachelor of Technology**   Semester –III

Subject Code	Subject Title	Credit			Theory			Practical		
		L	**T**	**P**	**End Sem** **(35)**	**Internal** **(15)**	**Total (50)** **Min: 20** **(D Grade)**	**End Sem** **(35)**	**Internal** **(15)**	**Total (50)** **Min: 20** **(D Grade)**
CBTE-307	**NCC-III**	**1**	**-**	**6**						

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks:15	Best of Two Mid Semester Test – Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05
Practical Internal Max Marks: 15	Lab Performance/ Quiz/Attendance - Max. Marks: 15	

Pre-Requisite	Nil
Course Objective	1. Understand the life history and leadership qualities of great leaders, sportspersons &entrepreneurs. 2. Understand the various aspects of types of mindset. 3. Understand public speaking methods &qualities. 4. Understand the organizations related to disaster management and their functioning. 5. Understand the role of NCC cadets in disaster management. 6. Understand the various types of adventure activities. 7. Understand the History, Geography & Topography of Border/ Coastal Areas.
Course Outcomes	**Student will be able to learn:** 1. Admire and get inspired from the accomplishments of leaders from various walks of life. 2. Develop public speaking skills. 3. Understand the importance of positive mindset and optimistic attitude in life. 4. Appreciate the need & requirement for disaster management and his role in disaster management activities. 5. Know the history & geographical peculiarity of our borders & coastal regions.

Unit	Contents (Theory)	Marks Weightage
I	**Personality Development** 1. Group Discussions - Change your Mindset 2. Public Speaking.	07
II	**Leadership Development:**Case Studies - APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murthy.	07
III	**Disaster Management** 1. Disaster Management Capsule. 2. Organization. 3. Types of Disasters. 4. Essential Services. 5. Assistance. 6. Civil Defence Organization.	07
IV	**Adventure:** Adventure activities.	07
V	**Border & Coastal Areas:**History, Geography & Topography of Border/ Coastal	07

 # Note: For NCC-III 05 credits will be allotted after successful completion of camp.

Text Book/References Books/ Websites:

1. Cadet's handbook, NCC Directorate, MP, CG.

2. Supplementary cadet's handbook, NCC Directorate, MP, CG.

Suggested List of Laboratory Practical (Expandable):

1. **Drill**
   - ArmDrill.

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- Rifleke saathSavdhan,Vishram aurAramse.
- RiflekesaathParadeParaurSaj,RiflekesaathVisarjan,LineTod.
- BhumiShastraaurUthao Shastra,BagalShastra aurBajuShastra.

2. **Weapon Training**
- ShortRangefiring.

3. **MapReading**
- Settingof Map.
- FindingsNorth andOwnPosition.

4. **Field Craft&BattleCraft**
- Observation.
- Camouflage.
- Concealment.

5. **Social Service and Community Development**

Cadetswillparticipateinvariousactivitiesthroughoutthesemestere.g.,Blooddonation Camp, Swachhata Abhiyan, Constitution Day, Jan Jeevan Hariyali Abhiyan,Beti Bachao Beti Padhao etc as per the requirement and similar announced days-Nationaland Statelevel.
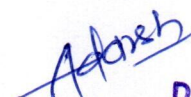
6. **ObstacleTraining**
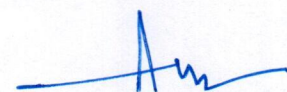- Obstacletraining-Introduction,Safety-measures,Benefits.
- Obstacle Course- Straight balance, Clear Jump, Gate Vault, Zig- ZagBalance, HighWall

Note: Examination of this NCC course will be conduct as per NCC head quarter norms in consultation with office of COE, PU.

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PEOPLE'S UNIVERSITY, BHOPAL
(Applicable for Admitted from Academic Session 2021-22 onwards)

Programme: Bachelor of Technology   **Semester –III**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)
CBTE-308	Introduction to Internet of Things	2	-	1	End Sem (70)	Internal (30)		End Sem (35)	Internal (15)	

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance /Attendance / Quiz - Max. Marks: 15	

Pre-Requisite	Nil
Course Objective	Internet of Things is a course that deals with the study of how devices are connected and how it helps to stay connected over the Internet. The course teaches the individuals on how the Internet of Things is helpful in our daily lives and how to stay connected over the Internet.
Course Outcomes	**Student will be able to learn:** 1. Fundamental of Internet of Things and its technology. 2. Recognize the factors that contributed to the emergence of IoT. 3. Design and program IoT devices. 4. Use real IoT protocols for communication. 5. Security elements of an IoT device.

Unit	Contents (Theory)	Marks Weightage
I	**IoT** - What is the IoT and why is it important? Elements of an IoT ecosystem, Technology drivers, Business drivers, Trends and implications, Overview of Governance, Privacy and Security Issues.	14
II	**IoT Protocols** - Protocol Standardization for IoT – Efforts – M2M , WSN Protocols SCADA and RFID Protocols ,Issues with IoT Standardization – Unified Data Standards Protocols – IEEE802.15.4,BACNet Protocol– Modbus ,KNX , Zigbee, Network layer , APS layer – Security	14
III	**IoT Architecture** - IoT Open source architecture (OIC) - OIC Architecture & Design Principles- IoT Devices and deployment models- IoTivity: An Open source IoT stack - Overview- IoTivity stack architecture- Resource model and Abstraction.	14
IV	**Web of Things**- Web of Things versus Internet of Things – Two Pillars of the Web – Architecture StandardizationforWoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence.	14
V	**IoT Applications** - IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications. Study of existing IoT platforms /middleware, IoT- A, Hydra etc.	14

Text Book/References Books/ Websites:

1. Arshdeep Bahga;Vijay Madisetti; Internet of Things (A Hands-on Approach); University Press.
2. Raj Kamal; Internet of things- Architecture and Design Principles; McGraw Hill.
3. Cuno Pfister;Getting Started with the Internet of Things; O"Reilly Media.
4. Francis daCosta; Rethinking the Internet of Things: A Scalable Approach to ConnectingEverything;Apress Open.

Suggested List of Laboratory Practical (Expandable):

1. Starting Raspbian OS, Familiarizing with Raspberry Pi Components and interface, connecting to ethernet, Monitor, USB.
2. Displaying different LED patterns with Raspberry Pi.

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3. Displaying Time over 4-Digit 7-Segment Display using Raspberry Pi.
4. Raspberry Pi Based Oscilloscope.
5. Setting up Wireless Access Point using Raspberry Pi.
6. Controlling Raspberry Pi with WhatsApp.

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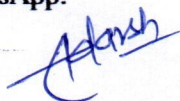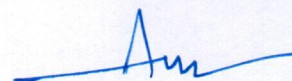
Programme: **Bachelor of Technology**   Semester –III

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (50)	Total (50)	End Sem (Nil)	Internal (Nil)	Total
CBTE-309	**Quantitative Aptitude & Logical Reasoning**	1	-	-			Min: 20 (D Grade)			(Nil)

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: 50	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: 50
Practical Internal Max Marks: Nil	Lab Performance / Attendance/Quiz -Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	The logical reasoning and quantitative ability represent a systematic way to judge a candidate's mental capability as how he/she performs certain tasks and reacts to different situations.
Course Outcomes	**Student will be able to learn:** 1. Solve the problem of number system. 2. Discuss basic concept of algebra, geometry and complex number. 3. Elaborate the concept of probability, set theory and trigonometry. 4. Analyze actively to do logical reasoning such as binary logic, family tree, logical sequence, reflecting on their work. 5. Explore and apply key concepts in logical and quantitative thinking to business problems.

Unit	Contents (Theory)	Marks Weightage
I	**Quantitative Aptitude I:**LCM and HCF, Percentages, Profit and Loss, Interest (Simple and Compound), Speed, Time and Distance; Time and Work; Averages; Ratio and Proportion, Number System	10
II	**Quantitative Aptitude II:**Algebra, Geometry/Mensuration, Pure Math, Venn diagrams, Linear Equations, Quadratic Equations, Complex Numbers, Logarithm, Progressions	10
III	**Quantitative Aptitude III:**Permutation and Combination, Binomial Theorem, Surds and Indices, Inequalities, Probability Functions, Set Theory, Mixtures and Allegations, Co-ordinate Geometry, Trigonometry	10
IV	**Logical Reasoning, I:** Clocks, Calendars, Binary logic, Seating Arrangement, Blood Relations (Family Tree), Logical Sequence, Assumption, Premise, Conclusion	10
V	**Logical Reasoning II:** Linear and matrix arrangement, Team Formation, Direction Sense and Decision Making, Syllogism, Cubes, Rows, Quantitative Reasoning, Puzzles, Logical Reasoning based on Rankings, Critical Reasoning	10

Text Book/References Books/ Websites:
1. Dr. R.S. Aggarwal;Quantitative Aptitude for Competitive Examinations; S. Chand Publication.
2. Dr. R.S. Aggarwal;A Modern Approach To Logical Reasoning; S. Chand Publication.
3. Arun Sharma;How to Prepare for QUANTITATIVE APTITUDE for CAT;Mc Graw Hill.
4. Arun Sharma;How to Prepare for LOGICAL REASONING for CAT;Mc Graw Hill.
5. Sarvesh K Verma; Quantitative Aptitude Quantum CAT;Arihant Publication.
6. Jaikishan, Premkishan; How to Crack Test of Reasoning; Arihant Publication.

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: **Bachelor of Technology**   Semester –III

Subject Code	Subject Title	Credit			Theory				Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total		End Sem (Nil)	Internal (50)	Total (50)
CBTE-310	NSS-II/NSO-II	-	-	1			Nil				Min: 20 (D Grade)

Duration of Theory (Externals): Nil

Theory Internal– Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/ Quiz/Attendance - Max. Marks: 50	

Pre-Requisite	Nil
Course Objective	1. The purpose of this course is to understand the community in which they work. 2. To understand themselves in relation to their community. 3. Identify the needs and problems of the community and involve them in problem solving process.
Course Outcomes	**Student will be able to learn:** 1. The quality of educated manpower by fostering social responsibility. 2. Raising society to a higher material and moral level by preparing students for final dedication in the service of nation. 3. Introduce urban students to rural life by living in contact with the community in whose midst their institution is located. 4. Making campus relevant to the needs of the community. 5. To work for community services.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction and Basic Concepts of NSS:** History and Philosophy & Definition of NSS, Aims& Objectives of NSS, Emblem, flag, Motto, Song, Badge, NSS day etc, Organizational structure (from national to regional level) , Roles and responsibilities of various NSS functionaries.	
II	**NSS Programmes and Activities:** Concept of regular activities (one day camp), special seven-day conduction camping, day and night camps and relevance of celebration of important days recognized by united nations, Centre, State Govt. & University, Basis of adoption of village/slums, methodology of conduction survey,financial pattern of the scheme, Coordination with different agencies, Maintenance of the diary	50
III	**Community Mobilizationand Adoption of village:** Functioning of community stakeholders, Designing the message in the context of the problem and the culture of the community, Identifying methods of mobilization,Concept of Community development and village adoption.	
IV	**Volunteerism and Shramdan:** Indian tradition of volunteerism, Value system of volunteerism, Motivation and constraints of volunteerism, Shramdan as a part of volunteerism, Role of NSS volunteers in Swatch Bharat Abhiyan, Role of NSS volunteers in Digital India	
V	**Project Work/Practical:** The Project should be related from the above topics.	

Text Book/References Books/ Websites:Nil

Suggested List of Laboratory Practical (Expandable):
Project Work/Practical: The Project should be related from the above topics.

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Programme: **Bachelor of Technology**   **Semester –III**

Subject Code	Subject Title	Credit			Theory				Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total		End Sem (Nil)	Internal (50)	Total (50)
CBTE-311	Music Vocal-II/ Music Instruments-II	-	-	1			Nil				Min: 20 (D Grade)

Duration of Theory (Externals): -Nil

Theory Internal– Max Marks: -Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/ Quiz/Attendance - Max. Marks:50	

Pre-Requisite	Basic knowledge of rag tal and musical instruments.
Course Objective	Impart a basic knowledge of music sound, sangeet and folk songs (Vocal and Instruments)
Course Outcome	**Student will be able to learn:** 1. Basic knowledge of Sound. 2. Basic Knowledge of Rabindra &Karnatak Sangeet. 3. Knowledge of various Indian Folk Songs

Unit	Contents (Theory)	Marks Weightage
I	Elementary Study of medium Sound, musical sound and Noise. Study of Vibratory motion, frequency, pitch, magnitude and timber quality duration. Study of Interval, scale, Octave, major tone, minor tone and semi tone & value of each of the three tones. General Knowledge of Rabindra Sangeet. General Knowledge of various folk songs as kajri, Baul, Chaiti, Bhatialimand, Garba, lavni, Hori, etc.	50

Text Book/References Books/ Websites:
1. Pt. Harishchandra Srivastava ;'Raga Parichay' (Part 1, 2, 3 & 4).
2. Dr. Geeta Banerjee 'Raga Shashtra' (Part 1 & 2)
3. Shanti Govardhan 'Sangeet Shashtra Darpan' (Part 1 & 2)
4. Vasant Sangeet Visharad

Suggested List of Laboratory Experiments: -(Expandable):
1. Practices on of Rabindra Sangeet and any one folk songs (Vocal and Instrumental)

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Programme: **Bachelor of Technology**   **Semester –III**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (50)	Total (50)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-312	Social Engineering	1	-	-			Min: 20 (D Grade)			

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: 50	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: 50
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	The program's framework was inspired by the realization that an integrated systems approach is the best way to address the set of competencies needed to address societal problems. Numerous opportunities in the business world, the social sector, and government will arise as a result of this integrated programme.
Course Outcomes	**Student will be able to learn:** 1. Function effectively in teams to accomplish a common goal. 2. An understanding of professional and ethical responsibility. 3. Ability to self-learn and engage in life-long learning. 4. Understanding of the impact of solutions in an economic, societal, and environment context. 5. Psychological manipulation and human behavior of students into performing actions or divulging confidential information.

Unit	Contents (Theory)	Marks Weightage
I	Social engineering is one of the most prolific and effective means of gaining access to secure systems and obtaining sensitive information yet requires minimal technical knowledge. Social engineering works by manipulating normal human behavioral traits and as such there are only limited technical solutions to guard against it. As a result, the best defense is to educate users on the techniques used by social engineers, and raising awareness as to how both humans and computer systems can be manipulated to create a false level of trust. This can be complemented by an organizational attitude towards security that promotes the sharing of concerns, enforces information security rules and supports users for adhering to them. **Contents are as follows:** **Introduction of Social Engineering**: Definition; Types; Psychology in Social Engineering; The Social Engineering Life Cycle; Human Behavior; Weapons of a Social Engineer; Defense against Social Engineering; Social Engineering Attacks; Examples of Social Engineering Attacks; guidelines to Stay Protected Against Social Engineering Attacks; Reverse Social Engineering.	50

Text Book/References Books/ Websites:
1. Kevin Mitnick; The book of the Art of Deception.
2. www.socialengineer.com/wpcontent/uploads/2017/02/AdvancedPracticalSocialEngineering-Syllabus.pdf.
3. https://www.exploit-db.com/docs/english/18135-social-engineering---the-human-factor.pdf.
4. https://www.jigsawacademy.com/blogs/cyber-security/what-is-social-engineering/

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: **Bachelor of Technology**   Semester –IV

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (Nil)	Internal (Nil)	Total
CBTE-401	Entrepreneurship and IPR	3	-	-			Min: 40 (D Grade)			(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal– Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	The course's major objectives are to educate students with various concepts that are essential to comprehend the processes involved in entrepreneurship, grow small and medium-sized businesses, and promote the entrepreneurial spirit of self-employment. To recognize the importance of IP and to educate the students on basic concepts of Intellectual Property Rights.
Course Outcomes	**Student will be able to learn:** 1. Create and exploit innovative business ideas and market opportunities. 2. Turn market opportunities into a business plan. 3. Demonstrate and present successful work, collaboration and division of tasks in a multidisciplinary and multicultural team. 4. Entrepreneurship and Innovation minors will be able to find problems worth solving. Students advance their skills in customer development, customer validation, competitive marketing and financial analyses, and iteration. 5. Enhanced capability to secure new intellectual properties through Patents and Copyrights.

Unit	Contents (Theory)	Marks Weightage
I	**Entrepreneurship:** Definition and Functions of an Entrepreneur, Qualities of a good entrepreneur; Role of Entrepreneur in Economic Development; Theories of entrepreneur, Socio, Economic, Cultural and Psychological; Entrepreneur Traits and Behavior, Roles in economic growth, employment, social stability, export promotion and indigenization, Creating A Venture, Opportunity Analysis Competitive and Technical Factors, Sources of Fund. Forms of Business Organizations/Ownership – Formation of a Company – procedures and formalities for setting up of New Industry-Sources of information to contact for what and where.	14
II	**Management:** Importance, Definition and functions; Dimensions of Organizations, Size/Specialization, Behavior Formalization, Authority Centralization, Departmentalization, Spam and Line of Control, Technology and Minzberg Organization Typology, Line, Staff & Matrix Organization. **Motivation Theories**– Maslow, Mc Cullen – Motivation model – need, want, motive and Behavior-Attitude Towards work – Self Assessment and Goal Setting – Achievement, Motivation and Behavior Measurement, SWOT analysis and TA analysis – Stress and Conflict Management; with uncertainty; Creativity and Innovation.	14
III	**Marketing:** Importance, Definition, Core Concepts of need want and Demand, Project identification and formulation: Sources of Information – Opportunity Guidance – Choice of Technology and its evaluation; Consumer Behavior; Market Survey and research; Preliminary Project Report, Detailed Project Report, Assessing Viability and feasibility of a report. Exchange & Relationships, Product Value, Cost and satisfaction (goods and services) Marketing Environment; Selling, Marketing and Societal Marketing Concepts; Four P's, Product, Price,	14

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Programme: **Bachelor of Technology**   **Semester –IV**

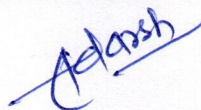|		
	Placement, Promotion. **Finance:** Nature and Scope, Forms of Business Ownerships, Balance Sheet, Profit and loss Account, Fund Flow and Cash Flow Statements, Breakeven Point (BEP) and Financial Ratio analysis, pay-back period, NPV and capital budgeting. Subsidies and concessions for SSI – role of State and Central Government Agencies in Promotion of Small-Scale Industry	
IV	**Concept of Property:** Theories of Property, Types of Intellectual Property- Origin and Development, Theories of Intellectual Property Rights, Need for Protecting Intellectual Property, Commercialization of Intellectual Property Rights by Licensing, Determining Financial Value of Intellectual Property Rights, Negotiating Payments Terms in Intellectual Property Transaction.	14
V	**Introduction to Patent Law,** (a) Paris Convention, (b) Patent Cooperation Treaty, (c) WTO-TRIPS, Indian Patent Law, The Patents Act, 1970, Patentable Subject Matter, Patentability Criteria, Procedure for Filing Patent Applications, Patent Granting Procedure, Revocation, Patent Infringement and Remedies, Relevant Provisions of the Biological Diversity Act, 2002, Access and Benefit Sharing Issues.	14

Text Book/References Books/ Websites:

1. Arvindrai N. Desai; Environment and Entrepreneur; Ashish Publishing House, New Delhi.
2. Dr. P. Saravanavel; Entrepreneurial Development;Learntech Press, Trichy.
3. P Narendra Singh.; Emerging Trends in Entrepreneurship Development Theories & Practices – Entrepreneurship.
4. Dr. S.R.Myneni; Law of Intellectual Property; 9th Ed, Asia law House, 2019.
5. Dr.G.B Reddy; Intellectual Property Rights and Law; Gogia Law Agency.

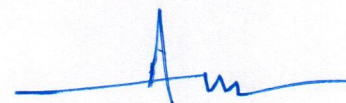**Suggested List of Laboratory Practical (Expandable): Nil**

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Programme: **Bachelor of Technology**   Semester –IV

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)
CBCS-402	Data Base Management System	3	-	1						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance/ Quiz/Attendance - Max. Marks: 15	

Pre-Requisite	Basic knowledge of computer and data.
Course Objective	To provide knowledge about the management of database systems and provide the understanding of the fundamentals of relational systems including data models, database architectures, and database manipulations.
Course Outcomes	**Student will be able to learn:** 1. Basic database concepts, including the structure and operation of the various data model. 2. To apply logical data base design including e-r diagrams and database normalization. 3. About relational data models and will learn the working of relational query languages. 4. To perform various operations on the database using SQL. 5. Concepts of transactions processing.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction & Basic Models**: DBMS Concepts, architecture & Advantages, Database approach v/s Traditional file accessing approach, Data models, Schemas and instances, Data independence, Data Base Language and interfaces, Functions of DBA and designer, types of database users. Various other data models object oriented data Model, Network data model, and Relational data model, Comparison Between the three types of models	14
II	**Design**: Introduction to ER modeling, entity, entity sets & types, attributes, relation and relationship sets in ER models, ER diagrams, and reducing ER diagrams to tables, generalization and aggregation in ER models, Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and lossless join, problems with null valued and dangling tuples, multivalued dependencies.	14
III	**Relational Data models**: Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Relational database, Referential integrity, Intension and Extension, Relational Query languages: SQL-DDL, DML, integrity constraints, Complex queries, various joins, indexing, triggers, assertions, deletion and modification anomalies. Relational algebra and relational calculus, Relational algebra operations like select, Project, Join, Division, outer union and Introduction to Query Optimization	14
IV	**Data Definitions in SQL:** Queries, update statements and views in SQL, QUEL and QBE, data and storage definition, data retrieval queries and update statements. Methods of storing relational database record in files, various types of files like sequential files, indexed files, indexed sequential files etc. buffer management, data dictionary, physical storage media etc. needed for these file. Introduction to indexing and hashing: indexing techniques using B -Trees, B+ -Trees etc., static hashing function, dynamic hashing function, overview of query processing and cost estimation.	14

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Programme: **Bachelor of Technology**   **Semester –IV**

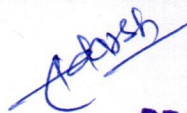|		
V	**Transaction Processing Concepts**: Transaction System, Testing of Serilizability, Serilizability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures. Log based recovery, Concurrency Control Techniques: - Concurrency Control, locking Techniques for concurrency control, time stamping protocols for concurrency control, validation based protocol, multiple granularity. Multi version schemes, Recovery with concurrent transaction.	14

Text Book/References Books/ Websites:
1. Elmasri & Navathe; Fundamentals of Database Systems; Pearson Education.
2. SilBErschatz, Korth &Sudarshan; Database System Concepts; Mc Graw Hill.
3. C.J. Date; An introduction to Database Systems; Mc Graw Hill.
4. Atul Kahat; Introduction to Database Management System; Pearson Education.
5. https://www.tutorialspoint.com/dbms/index.htm.

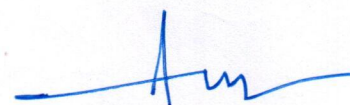**Suggested List of Laboratory Practical (Expandable):**
1. Study and implementation of Create table command.
2. Study and implementation of Insert command.
3. Study and implementation of Delete command.
4. Study and implementation of Drop Table Command.
5. Study and implementation of Alter Table Command.
6. Study and implementation of Update Command.
7. Study and implementation of Select Clause.
8. Study and implementation of From Clause.
9. Study and implementation of Join.
10. Study and implementation of count, avg, max clause.

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SubjectCode	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (35)	Internal (15)	Total (50)
CBCS-403	Analysis and Design of Algorithm	3	1	1			Min: 40 (D Grade)			Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance /Attendance / Quiz - Max. Marks: 15	

Pre-Requisite	Students should have basic knowledge of programming and data structures.
Course Objectives	The objective of this course is to design, analysis of algorithm.
Course Outcome	**Student will be able to learn:** 1. Able to choose appropriate algorithm design techniques for solving problems. 2. Capable to analyze the performance of algorithms. 3. Able to understand how the choice of data structures and the algorithm design methods impact the performance of programs. 4. Able to understand the concept of complexity. 5. They will also understand the different approaches for solving a complex problem.

Unit	Contents (Theory)	Marks Weightage
I	**Basics of Algorithms and Data Types**: Algorithms, Abstract Data Type, The Running Times of a Program, Use of the Big-Oh, small o, Big-omega and small omega notation, Inequalities involving such notation.	14
II	**Trees and Sorting**: Basic terminology, Implementation of tree, An Array Representation of Trees, Representation of Trees by List of Children, Binary trees, Deterministic selection and sorting, Optimality of algorithms for sorting and selection, Randomized algorithms like randomized quick sort, and expected linear time randomized selection.	14
III	**Divide and Conquer Technique**: Divide and Conquer with examples such as Sorting, Matrix Multiplication, Convex hull and Searching. Greedy methods with examples such as Optimal Reliability Allocation, Knapsack, Minimum Spanning trees – Prim's and Kruskal's algorithms, Single source shortest paths - Dijkstra's and Bellman Ford algorithms.	14
IV	**Dynamic Programming**: Dynamic programming with examples such as Knapsack, All pair shortest paths – Warshal's and Floyd's algorithms, Resource allocation problem. Backtracking, Branch and Bound with examples such as Travelling Salesman Problem, Graph Coloring, n-Queen Problem, Hamiltonian Cycles and Sum of subsets.	14
V	**NP Complete Problem**: Introduction to NP Problem, Polynomial-time, Abstract Problems, Encoding, NP-Completeness and Reducibility, NP-Completeness, Circuit Satisfiability, NP Complete Problems, The Vertex-cover Problem, The Subset-sum Problem, The Traveling-salesman Problem.	14

Text Book/References Books/ Websites:

1. Horowitz & Sahani; Analysis & Design of Algorithm; University Press.
2. V.V. Muniswamy; Design and Analysis of Algorithm; K International Pub. House PVT. LTD, New Delhi.
3. Sahani; Design and Analysis of Algorithm; Scitech Publication Pvt. Ltd. Chennai.

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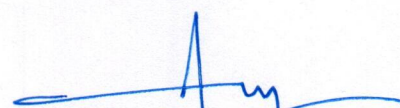
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4. Thomas, Leiserson CE, Rivets RL; Introduction to Algorithms, PHI.
5. https://www.javatpoint.com/

Suggested List of Laboratory Practical (Expandable):
1. Program for Recursive Binary & Linear Search.
2. Program for Heap Sort.
3. Program for Merge Sort.
4. Program for Selection Sort.
5. Program for Insertion Sort.
6. Program for Quick Sort.
7. Study of NP-Complete theory.
8. Write a program for traveling salesman problem
9. Write a program for Stassen's Matrix Multiplication.
10. Write a program for minimum spanning trees using Prim's algorithm and kruskal's algorithm

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	**T**	**P**	**End Sem** (70)	**Internal** (30)	**Total (100)** **Min: 40** **(D Grade)**	**End Sem** (35)	**Internal** (15)	**Total (50)** **Min: 20** **(D Grade)**
CBCS-404	Object Oriented Programming with Java	3	1	1						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance/ Quiz/Attendance - Max. Marks: 15	

Pre-Requisite	Students should have basic knowledge of programming.
Course Objective	To study about the object oriented programming using java language.
Course Outcomes	**Student will be able to learn:** 1. Able to understand the features of Java supporting object oriented programming. 2. Learn how to produce object-oriented software using Java. 3. Ability to understand advanced features of Java specifically stream I/O, templates and operator overloading. 4. Able to code in java language. 5. Gain the deep knowledge of OOP approach with java programming.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction to OOP :** Introduction to OOP paradigm, need for OOPS, differences Between OOP and Procedure Oriented Programming, Overview of OOP principles, Introduction to Objects, Objects as software units, Objects instantiations and interactions, Object lifetime, Static and dynamic objects, global and local objects, Modeling the real world objects and Modularity.	14
II	**Class :** Introduction to Classes, difference Between Structure & classes, Static data member, Static member function, Abstract data types, Friend function, Inline function, Scope resolution expression, Member Selection Expression, Metaclass, Introduction to Constructor, its Types and Destructor.	14
III	**Inheritance:** Introduction to Inheritance, Types of Inheritance, Introduction to Access Specifiers, Introduction to Specialization and Generalization, Introduction to Association and Aggregation, Introduction to Object Interaction and Message Passing Techniques.	14
IV	**Polymorphism:** Introduction to Polymorphism, Types of polymorphism, Static and dynamic Binding, Introduction to Overloading, Function overloading, Operator Overloading, Difference Between Overloading and Overriding, Introduction to Virtual Functions and Pure Virtual Functions, Generic Polymorphism and Templates.	14
V	**Java features :** Installation of JDK,packages in java,Multithreading, threads states priorities and thread scheduling , life cycle of a thread synchronization, creating and executing threads , multithreading with GUI , monitors and monitors lock Networking : Manipulating URLs , reading a file on a web server , socket programming , Security and the networks , RMI , Networking accessing database with JDBC.	14

Text Book/References Books/ Websites:
1. Naughton &Schildt; The complete reference java 2; Tata McGraw hill.
2. Deitel; JAVA – How to program; Pearson Education Asia.
3. Horstmann& Cornell; Core java 2 Vol (I & II); Sun micro system.

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4. Ivan B Nayross; Java 2.0; BPB publication.
5. Rambaugh James; Object Oriented Design and Modelling; PHI-1997.

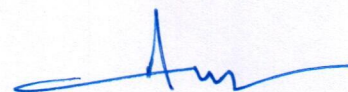**Suggested List of Laboratory Practical (Expandable):**

1. Program to Implement Object and Class.
2. Program to Access private members of a class using Friend Function.
3. Program to invoke member of a class using constructor.
4. Program to implement Parameterized Constructor.
5. Program to implement Single Inheritance.
6. Program to Implement Hybrid Inheritance.
7. Program to Implement Polymorphism using function overloading.
8. Program to implement Generic Polymorphism using Templates.
9. Program to implement Dynamic Memory Allocation using "new" and "delete" Operators.
10. Program to implement Virtual Functions to show Polymorphism.

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Subject Code	Subject Title	Credit			Theory				Practical		
		L	T	P	End Sem (35)	Internal (15)	Total (50)		End Sem (35)	Internal (15)	Total (50)
CBCS-405	Unix and Shell Programming	2	-	1			Min: 20 (D Grade)				Min: 20 (D Grade)

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks: 15	Best of Two Mid Semester Test – Max Marks: 10	Assignment/Quiz/Attendance- Max. Marks: 5
Practical Internal Max Marks: 15	Lab Performance/Attendance /Quiz - Max. Marks: 15	

Pre-Requisite	Fundamental knowledge of mathematics such as Algebra and Trigonometry
Course Objective	To gain knowledge of operating system and its commands.
Course Outcome	**Student will be able to learn:** 1. Able to understand UNIX operating system. 2. Also they will understand the workability of UNIX along with its commands. 3. Able to do network configuration and security management in UNIX. 4. Understand important aspects related to the shell and its process. 5. Develop the ability to formulate regular expressions and use them for pattern matching.

Unit	Contents (Theory)	Marks Weightage
I	**Features of UNIX/LINUX Operating System**: UNIX/LINUX Structure: Kernel and Shell, Basic commands, Accessing help in UNIX/LINUX, Filenames and using wild cards, Types of files, UNIX/LINUX File system: four block of file systems, directory hierarchy, Operations and utilities for directory and files.	07
II	**File Security**: Users, group and ownership of files, Security levels and shell customization: Environment variables, File permissions: File attribute, permissions and changing file permissions, User masks, changing ownership and groups, Job control.	07
III	**UNIX Shell**: Types and features of Shell; standard streams, redirection, pipes, command execution: sequenced, grouped, chained and conditional command, exit status of command, quotes and command substitution: backslash, double quotes and single quotes, command substitutions and eval command Special files: trace file and terminal files, environmental variables, startup scripts and command history.	07
IV	**Filters**: Introduction, using pipe with filters, Concatenating files, Display beginning and end of files, Splitting files, cut, paste, sorting and translating characters, Files with duplicate lines, counting character, words and lines and comparing files, Communication utilities.	07
V	**Basic Script Concept Shell Variable**: predefined variables and user defined variable, storing value in variable and accessing it, unsetting variables, storing filenames, content and command in variable. Input: reading word by word, line by line and from file, Expression, Decisions and repetition, Special parameters and variables, Changing positional parameters and argument validation.	07

Text Book/References Books/ Websites:

1. Behrouz A. Forouzan, Richard F. Gilberg; UNIX and Shell Programming: A Textbook; Brooks/ Cole-Thomson Learning.

2. Peterson; LINUX Complete Reference; Tata McGraw Hill Publications.

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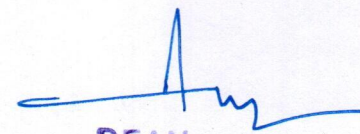PEOPLE'S UNIVERSITY, BHOPAL

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3. Sander van Vugt; Fundamentals of LINUX; O Reilly Publications.
4. Ron Gilster; PC Hardware A Beginners Guide; McGraw Hill Publications.
5. http://www.tutorial point.com

Suggested List of Laboratory Practical (Expandable):

1. Introduction to UNIX/LINUX Operating System.
2. Installation of UNIX/LINUX Operating System (Red Hat-5).
3. Study of general purpose utilities commands.
4. Study of user & session management commands.
5. Study of file system navigation commands, text processing tools and communication commands.
6. Study of VI editor.
7. Study of Shell Script.
8. Execute C & C++ programs in Linux.
9. Installation using RPM/YUM server.
10. Back up using TAR command.

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	**T**	**P**	**End Sem (Nil)**	**Internal (Nil)**	**Total**	**End Sem (Nil)**	**Internal (50)**	**Total (50)**
CBCS-406	Dot Net Technology Lab	-	-	1			**Nil**			**Min: 20 (D Grade)**

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/ Quiz/Attendance - Max. Marks: 50	

Pre-Requisite	Basic knowledge of software.
Course Objective	To gain the knowledge of Dot Net framework.
Course Outcomes	Student will be able to learn: 1. Create user interactive web pages using ASP.Net. 2. Perform Database operations for Windows Form and web applications 3. Create simple data binding applications using ADO.Net connectivity. 4. Develop about C# console. 5. Understand web application and web languages.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Introduction to DOT NET Framework, its Architecture, Components, Languages, Application Development, Requirements and Features, Installation of DOT NET, IIS Server, Introduction to C#, Comparison of C, C++, Java and C#. **C# Console** Introduction to C# Program Structure, Tokens, Expressions, Data Types, Conditional Statements, Loops, Switch Case, Functions, Strings, Arrays, File Handling, Exception Handling, C# as Object Oriented Language, Classes & Objects, Constructors, Inheritance, Polymorphism, C# Packages and Namespaces. **Windows Applications:** Introduction to HTML, HTML Tags, Introduction to CSS, Types, Introduction to Windows Applications, Use of C# Tools in Development of Windows Applications, Validation Controls, MDI Forms and Introduction to Crystal Reports. **Web Applications:** Introduction to ASP.NET, Introduction to Web Page Designing, Web Development, Static Pages, Dynamic Pages, Introduction to SQL, SQL Queries, SQL Server, Introduction to ADO.NET, Development of Applications with Data Base, Front End – Back End Connectivity, Types, Data Base Controls, Introduction to Content Management System and FCK Editor. **Additional Technologies:** Introduction to XML, Structure and Syntax of XML, Introduction to Java Scripts, Using Java Scripts on Web Forms, Introduction to AJAX, Application of AJAX in Web Design Applications and Development of a Small Project in ASP.NET using C#	50

Text Book/References Books/ Websites:

1. Imar Spaanjaars; Beginning ASP.NET 4.5.1: in C# and VB; Wrox Publications.
2. Harvey M. Deitel and Paul J. Deitel; DOT NET; 4.0. Pearson.
3. Daminni Grover; DOT NET Technology; IK Publications.

Suggested List of Laboratory Experiments :- (Expandable):

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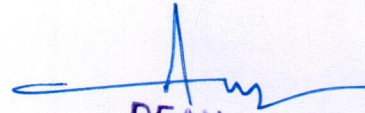Programme: **Bachelor of Technology**   **Semester –IV**

1. Program in C# to implement Conditional Statements, Looping Statements and Switch Case.
2. Program in C# to implement Arrays.
3. Program in C# to implement Exception Handling and File Handling.
4. Program in C# to implement Classes and Inheritance.
5. Program in C# to implement Polymorphism.
6. Creating a Simple Window Application.
7. Creating Static Web Pages using ASP.NET.
8. Creating Dynamic Web Pages using ADO.NET.
9. Study of XML and Java Script.
10. Programming in C# to implement Functions and its Types.

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (35)	Internal (15)	Total (50)	End Sem (35)	Internal (15)	Total (50)
CBTE -407	NCC-IV	2	-	1			Min: 20 (D Grade)			Min: 20 (D Grade)

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks:15	Best of Two Mid Semester Test – Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05
Practical Internal Max Marks: 15	Lab Performance/ Quiz/Attendance - Max. Marks: 15	

Pre-Requisite	Nil
Course Objective	1. Develop a sense of time management and social skills. 2. Understand the life history & leadership qualities of personalities who have contributed in Nation Building and Literature. 3. Understand the role of NCC cadets as 2nd line Defence in 1965 War. 4. Develop awareness about various types of Natural and manmade disasters. 5. Know about life saving tips during disasters. 6. Acquainted about Fire Services. 7. Understand importance of Environmental Awareness & conservation. 8. Understand importance of General Awareness. 9. Know about Armed Forces.
Course Outcomes	**Student will be able to learn:** 1. Effectively manage time. 2. Develop the qualities of social skills. 3. Imbibe leadership qualities. 4. Do group discussions effectively. 5. Be motivated to serve the nation by joining Armed forces. 6. Contribute in environmental awareness and conservation activities. 7. Keep abreast of current affairs & general awareness. 8. Effectively contribute in managing disaster relief tasks.

Unit	Contents (Theory)	Marks Weightage
I	**PersonalityDevelopment** : GroupDiscussions–SocialSkills &Timemanagement	07
II	**LeadershipDevelopment:** CaseStudies–RatanTata,RabindraNathTagore,Role of NCCcadetsin1965war.	07
III	**DisasterManagement:** (i) InitiativeTrg,OrganisingSkills. (ii) Do'sandDon'ts. (iii) NaturalDisasters. (iv) ManMade Disasters. (v) FireServicesandFireFighting.	07
IV	**Environmental Awareness:**AdventureEnvironmentalAwarenessandConservation. **GeneralAwareness:**GeneralAwareness.	07
V	**Armed Forces:** Army, Navy, Air Force and Central ArmedPolice Forces.	07

Text Book/References Books/ Websites:

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1. Cadet's handbook, NCC Directorate, MP, CG.
2. Supplementary cadet's handbook, NCC Directorate, MP, CG.

Suggested List of Laboratory Practical (Expandable):

1. **Drill**
   - Arm Drill.
   - Salami Shastra.
   - Squad Drill with Arms
2. **Weapon Training:** Short Range firing
3. **MapReading**
   - MaptoGround.
   - GroundtoMap.
4. **FieldCraft&Battle Craft**
   - FireandMoveCapsule.
   - Field signal-with hand,withWeapons,SignalwithWhistle.
   - Fieldsignalsasmeansofgivingorders.
   - Fieldsignals byday, Fieldsignals bynight.
   - SectionFormation.
5. **Social Service and Community Development:**Cadets will participate in various activities throughout the semester e.g., Blood donation Camp, SwachhataAbhiyan, Constitution Day, Jan Jeevan HariyaliAbhiyan, BetiBachaoBetiPadhaoetc as per the requirement and similar announced days- National and State level
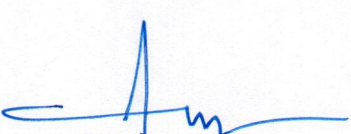6. **Health &Hygiene**
   - Hygiene& Sanitation(Hygiene-Personal&CampHygiene).
   - FirstAidincommonmedicalemergencies.
   - Treatment& Careof Wounds

Note: Examination of this NCC course will be conduct as per NCC head quarter norms in consultation with office of COE, PU.

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Subject Code	Subject Title	Credit			Theory			Practical		Total
		L	T	P	End Sem (Nil)	Internal (50)	Total (50)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-408	Research Methodology	1	-	-			Min: 20 (D Grade)			

Duration of Theory (Externals): Nil

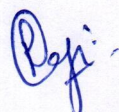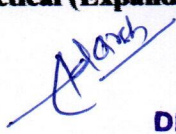| Theory Internal- Max Marks: 50	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: 50
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	To get to know about research and its analysis.
Course Outcomes	**Student will be able to learn:** 1. To understand the objective and types of research. 2. To understand basic concepts of research formulations. 3. About various design methods. 4. To know about how data is collected for analyzing process&thesis writing. 5. To understand report and thesis writing.

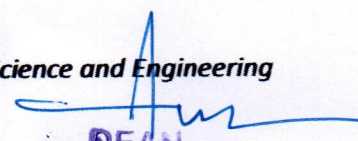| Unit	Contents (Theory)	Marks Weightage
I	**Objectives and Types of Research:** Motivation and objectives – Research methods vs.Methodology. Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical.	10
II	**Research Formulation:** Defining and formulating the research problem - Selecting the problem - Necessity of defining the problem - Importance of literature review in defining a problem.	10
III	**Research Design and Methods:** Research design – Basic Principles- Need of research design, Features of good design – Important concepts relating to research design – Observation and Facts. Developing a research plan - Exploration, Description, Diagnosis, and Experimentation.	10
IV	**Data Collection and Analysis:** Execution of the research - Observation and Collection of data - Methods of data collection – Sampling Methods- Data Processing and Analysis strategies - Data Analysis with Statistical Packages - Hypothesis-testing, Generalization and Interpretation.	10
V	**Reporting and Thesis Writing:** Structure and components of scientific reports - Types of report – Technical reports and thesis – Significance – Different steps in the preparation – Layout, structure and Language of typical reports – Illustrations and tables - Bibliography, referencing and footnotes.	10

Text Book/References Books/ Websites:

1. B. L. Garg., Karadia, R.Agarwal ;An introduction to Research Methodology;RBSA Publishers.

2. C. R. Kothari; Research Methodology: Methods and Techniques;New Age International.

3.S. C. Sinha andDhiman; Research Methodology;Ess Publications.

Suggested List of Laboratory Practical (Expandable): Nil

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PEOPLE'S UNIVERSITY, BHOPAL
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Programme: Bachelor of Technology   **Semester –IV**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (100)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-409	Environmental Science	1	-	-	End Sem (Nil)	Internal (100)		End Sem (Nil)	Internal (Nil)	(Nil)

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: 100	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: 100
Practical Internal Max Marks: Nil	Lab Performance / Quiz/Attendance -Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	Imparting basic knowledge about the environment and its allied problems and developing an attitude of concern for the environment.
Course Outcomes	**Student will be able to learn:** 1. Conceptual knowledge of energy resources with its applications. 2. To understand the ecosystems and value of these ecosystems to humans and to animals and plants. 3. Developing awareness of biodiversity and its conservation. 4. Categorize different types of pollutions and their control measures. Discover effective methods of waste Management. Analyze global environmental problems and come out with best possible solutions. 5. Understand environmental laws and sustainable development.

Unit	Contents (Theory)	Marks Weightage
I	**Energy Resources:** Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. The multidisciplinary nature of environmental studies Definition, scope and importance, Need for public awareness.	20
II	**Ecosystems:** Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries).	20
III	**Biodiversity and its Conservation:** Introduction – Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values. Biodiversity at global, national and local level. India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts. In-situ and Ex-situ conservation of biodiversity.	20
IV	**Environmental Pollution:** Definition, Causes, effects and control measures of: a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear pollution. Solid waste management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Disaster management: floods, earthquake, cyclone and landslides.	20

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Programme: **Bachelor of Technology**   **Semester –IV**

V	**Environmental Policy, Legislation, Rules and Regulations :** National Environmental Policy Environmental Protection act, Legal aspects Air (Prevention and Control of pollution) Act1981, Water (Prevention and Control of pollution) Act-1974, Water pollution Act-1977, Forest Conservation Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules .	**20**

Text Book/References Books/ Websites

1. Dr. S. S. Dara and Dr. D. D. Mishra; A textbook of Environmental Chemistry and Pollution Control, S. Chand & Company Ltd.
2. Dr. Suresh K. Dhameja; Environmental studies; S K Kataria and Sons.
3. A. Ristinen and Jack J. Kraushaar; Energy and the Environment, 2nd Edition: Robert; Shree Sai Publication
4. AninditaBasak ; Environmental Studies; Pearson Publications.
5. Gilbert M. Masters; Introduction to Environmental Engineering and Science; Prentice-Hall Publications.

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: Bachelor of Technology   **Semester –IV**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total (Nil)	End Sem (Nil)	Internal (50)	Total (50) Min: 20 (D Grade)
CBTE-410	Massive Open Online Courses (MOOCs)-I	-	-	1						

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/Attendance /Quiz - Max. Marks: 50	

Pre-Requisite	Nil
Course Objective	MOOCs build on the engagement of learners who self-organize their participation according to learning goals, prior knowledge and skills, and common interests. Objective of this course is to improve the technical skills of students and its gives an opportunity to explore themselves beyond class room teaching.
Course Outcomes	**Student will be able to learn:** New interesting courses of their own curiosity and improve their knowledge and skills. MOOCs give an opportunity to connect openly on a global scale, with global learners. The ability to experiment with pedagogical methods on a vast scale.

Unit	Contents (Theory)	Marks Weightage
I	Massive Open Online Courses (MOOCs) are online courses that allow participants free access and unrestricted participation in any course of their choice. Besides the conventional modes of teaching such as lectures, videos and reading material, MOOCs also provide a platform for interactive forums. After the III semester End Sem Examination, all students are instructed to register themselves in a minimum IV (Four weeks) MOOC/NPTEL/SWAYAM Certification course in their Engineering discipline. Students must appear in the certification examination conducted by NPTEL/ SWAYAM and submit his/her assignment/assessment sheets to their respective assigned faculty of the department before the end of the semester. A student should give an effective PowerPoint presentation of a chosen course in the class seminars and receive feedback from each other. This effort will help them to communicate their ideas more clearly. The final evaluation of this course will base on a PowerPoint Presentation and Certification during the academic session by the assigned faculty.	50

Text Book/References Books/ Websites:

1. https://swayam.gov.in/
2. http://nptel.ac.in
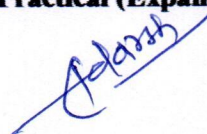3. https://onlinecourses-archive.nptel.ac.in

Suggested List of Laboratory Practical (Expandable): Nil
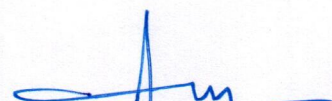
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Programme: **Bachelor of Technology**   Semester –IV

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (50)	Total (50)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-411	Sociology	1	-	-			Min: 20 (D Grade)			

Duration of Theory (Externals): Nil

Theory Internal– Max Marks: 50	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: 50
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	The objective of this course is to provide students a basic understanding of sociological concepts.
Course Outcomes	**Student will be able to learn:** 1. The meaning of Sociology and its importance. 2. The basic concepts involved in sociology. 3. About the social changes 4. About the Basic Social structure. 5. Understand the social law and its control.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Sociology: definitions, aim and objective; Relation with other social sciences – law and history; Important theoretical approaches: evolutionism, functionalism, conflict theory, interactionist theory; Law as a tool of social engineering: Durkheim, Weber, Pound and Bentham.	10
II	**Basic Concepts:** Social Groups: Cooley and Sumner; Community; Association; Tribes; Social Groups; Status and Role.	10
III	**Social Change:** Social Reform Movements in India – Raja Ram Mohan Roy, JyotibaPhule, Naicker, etc.; Modernization and Post Modernization; Liberalization and Globalization; Fordism and Mc Donaldization.	10
IV	**Social Structure:** Culture: Culture Relativism, Racism, Ethnicity and Ethnocentricism; Socialization; Status and Role.	10
V	**Social Control:** Custom as an Agency of Control; Law as an Agency of Control; Media as an Agency of Control; Public Opinion as an Agency of Control.	10

Text Book/References Books/ Websites:
1. Vidya Bhushan and D.R. Sachdeva;An Introduction to Sociology; KitabMahal Publisher, New Delhi.
2. Desai, N. and M. Krishnaraj; Women and Society in India; AjantaPublications, 1987.
3. Myneni; Sociology; Allahabad Law Agency, Faridabad, 2004.
4. Goode, W.J.and P.K. Hatt; Methods in Social Research; McGraw Hills NewYork 1952.
5. Giddens A.; Sociology; Polity Press, UK, 1993.

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: **Bachelor of Technology**   Semester –IV

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total	End Sem (Nil)	Internal (50)	Total (50)
CBTE-412	Fine Arts-II	-	-	1			Nil			Min: 20 (D Grade)

Duration of Theory (Externals): –Nil

Theory Internal- Max Marks: –Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/Attendance / Quiz - Max. Marks:50	

Pre-Requisite	Basic knowledge of art and drawing.
Course Objective	To teach the core competencies of critical and conceptual thinking through the continual observation and analysis of the visual and social world also provide a strong philosophical and historical foundation of the visual arts and its impact
Course Outcome	**Student will be able to learn:** 1. Increase ability to communicate with people. 2. Learn to sketch and take field dimensions. 3. Skillfully create artistic form using techniques and methods appropriate to the intended result. 4. Learn to take data and transform it into graphic drawings.

Unit	Contents (Theory)	Marks Weightage
I	**History of Indian Painting II :**Cave Paintings of India- Ajanta, Bagh, Jain, Pal (Apabhransh), Mughal Painting- Akbar and Jahangir Rajasthani painting- Mewar, Kishangarh, Jaipur	50

Text Book/References Books/ Websites:
1. Lokesh Chandra Sharma; A Brief History of Indian Painting.
2. R.A. Agrawal; RoopPrad Kala KemoolAdhar.

Suggested List of Laboratory Experiments :- (Expandable):
1. Composition: - Human Figure with Background Poster Colour
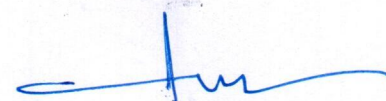2. Copy work: - Indian Miniature

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Programme: **Bachelor of Technology**   Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (Nil)	Internal (Nil)	Total
CBTE-5101	Gender Equality	3	-	-			Min: 40 (D Grade)			(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Attendance /Quiz - Max. Marks: Nil	

Pre-Requisite	Basic knowledge about Constitutional Law and Criminal Law.
Course Objective	This course is aimed at discussing the interface between law and gender equality. It also aims to sensitize and create awareness about gender related issues.
Course Outcomes	**Student will be able to learn:** 1. The concept of gender equality. 2. Relationship between gender and the law. 3. Different aspects of gender discrimination and reforms 4. National and International efforts towards creating gender equality. 5. Presence of Women-Centric Laws in India

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Meaning of Sex and Gender; History of Gender Movements; Gender roles and gendered division of labour, Private vs public divide and gender inequality; Physical difference, attributes and behavioural dispositions.	14
II	**Women as Workers:** Unpaid, underpaid and casual work; Women in primary, secondary and tertiary sectors; Classification of work in Indian census and NSSO – Main workers, marginal workers, non-workers; Invisibility of women's work, problems in measurement; Non-recognition of women's work in national income accounting.	14
III	**Gender and Health:** Poverty, Gender Discrimination and Under Nutrition; Epidemiology of Menstruation and Menstrual Disorder; Early Marriage, Unwanted Pregnancy and Unsafe Abortions; Adolescent Pregnancy and Sexually Transmitted Infection and HIV/AIDS; Health issues relating to Violence: Sexual Abuse, Immoral Trafficking, Rape.	14
IV	**Gender Based Violence in Community and State:** Rape as a weapon of oppression – causes and implications; Sexual abuse and harassment; Trafficking of Women and Girls; State Violence; Custodial violence; Violence by law enforcing agency; Genocide; Armed Conflict, Displacement and Gender Abuse; War crimes and Sexual abuse; Sexual Assault of Refugees and Displaced Women; New Forms of Violence against Women - Online Violence and its Implications.	14
V	**Response to Violence Against Women:** International & National response: International Initiatives – legal and policy framework, National Human Rights Commission, National Commission for Women, Law Enforcing Agencies: All Women's Police Stations, Vigilance Cells; Legal Aid Cells; Judiciary: Family Courts/ Mahila Courts; Service Providers: Helplines, Women and Children Help lines; Non-State Actors: INGOs and NGOs, Collective protests, Restorative justice in the context of gender violence.	14

Text Book/References Books/ Websites:

1. Chaudhuri, Maitrayee; Feminisms in India. Kali for Women; New Delhi

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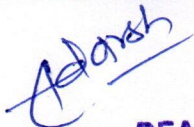
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Programme: **Bachelor of Technology**   Semester –V
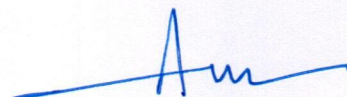
2. Chaudhuri, Maitrayee;The Indian Women's Movement: Reform and Revival; Reprinted Delhi: Palm Leaf.
3. Gandhi, N.; When the rolling Pins hit the street: a case study of the Anti-price rise Movement in India; New Delhi.
4. Alexander;Linda Lewis et al (eds); New Dimensions in Women& Health.

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: **Bachelor of Technology**   Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-5102	Human Health & Nutrition	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Attendance /Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	A study of nutrition and food as applied to daily living. The course provides information on basic nutrition and wellness concepts in relation to the individual and family throughout life.
Course Outcomes	**Student will be able to learn:** 1. Basic concepts in food and nutrition. 2. Know different types of nutrients. 3. The basic food groups. 4. Various cooking methods 5. Normal body parameters.

Unit	Contents (Theory)	Marks Weightage
I	**Basic Concepts in Food and Nutrition:** Basic terms used in study of food and nutrition, Understanding relationship between food nutrition and health, Functions of food-Physiological, Psychological and social.	14
II	**Nutrients:** Functions, dietary sources and clinical manifestation of deficiency / excess of the following nutrients:Carbohydrates, Lipids and Proteins, Fat soluble vitamins – A,D,E and K, Water soluble vitamins- thiamin, riboflavin, niacin, pyridoxine, Foliate, vitamin B12 and vitamin C, Minerals- calcium, iron and iodine.	14
III	**Food Groups:** Selection, nutritional contribution and changes during cooking of the following food group: • Cereals • Pulses • Milk and milk products • Fats and oils • Fruits and vegetables • Meat, poultry and fish • Eggs	14
IV	**Methods of Cooking and Preventing Nutrient Losses:** Dry, moist, frying and microwave cooking, Advantages disadvantages and the effect of various methods of cooking on nutrition's, Minimizing nutrient losses.	14
V	**Basic Concepts in Food and Nutrition:** Basic terms used in study of food and nutrition, Understanding relationship between food nutrition and health, Functions of food-Physiological, Psychological and social.	14

Text Book/References Books/ Websites:
1. Swaminathan; M Hand book of foods and nutrition fifth Ed;Bappco.
2. Srilakshmi B; Nutrition Science 2012; New Age international (P) LTD.
3. Mudambi, SR and Rajagopal; Mv fundamentals of foods Nutrition and Diet Therapy; Fifth Ed: 2012
4. Khanna K Gupta S Seth R Mahana R. Rekhi T.;The Art and Science of cooking.

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: **Bachelor of Technology**   Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	**T**	**P**	**End Sem** (70)	**Internal** (30)	**Total** (100) Min: 40 (D Grade)	**End Sem** (Nil)	**Internal** (Nil)	**Total** (Nil)
CBTE-5103	Ethical Hacking and Cyber Security	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Attendance /Quiz - Max. Marks: Nil	

Pre-Requisite	Student should have basic knowledge of computer.
Course Objective	To prepare students with the technical knowledge and skills needed to protect and defend computer systems and networks.
Course Outcomes	**Student will be able to learn:** 1. Identify and analyze the stages an ethical hacker requires to take in order to compromise a target system. 2. Techniques to carry out a penetration testing. 3. About various types of attacks, attackers and security threats. 4. Gain knowledge of the tools, techniques and ethical issues likely to face the domain of ethical hacking and ethical responsibilities. 5. Understand details of cybercrime.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Understanding the importance of security, Concept of ethical hacking and essential Terminologies- Threat, Attack, Vulnerabilities, Target of Evaluation, Exploit, Phases involved in hacking.	14
II	**Foot printing:** Introduction to foot printing, Types of foot printing, Understanding the information gathering methodology of the hackers, Tools used for the reconnaissance phase.	14
III	**System Hacking:** Aspect of remote password-guessing Role of Eavesdropping, Various methods of password cracking, Keystroke Loggers, Understanding Sniffers, Comprehending Active and Passive Sniffing, ARP Spoofing and Redirection, DNS, and IP Sniffing, HTTPS Sniffing.	14
IV	**Hacking Wireless Networks:** Introduction to 802.1I,Role of WEP, Cracking WEP Keys, Sniffing Traffic, Wireless DOS attacks, WLAN Scanners, WLAN Sniffers, Hacking Tools, Securing Wireless Networks.	14
V	**Introduction to Cybercrime:** Defining Cybercrime, Understanding the Importance of Jurisdictional Issues, Quantifying Cybercrime, Differentiating Crimes That Use the Net from Crimes That Depend on the Net, working toward a Standard Definition of Cybercrime, Categorizing Cybercrime, Developing Categories of Cybercrimes, Prioritizing Cybercrime Enforcement, and Reasons for Cybercrimes.	14

Text Book/References Books/ Websites:
1. Rajat Khare; Network Security and Ethical Hacking; Luniver Press
2. Thomas Mathew; Ethical Hacking; EC Council
3. Debby Russell and Sr. G.T Gangemi; Computer Security Basics; O' Reilly Media
4. Thomas R Peltier, Justin Peltier and John blackley; Information Security Fundamentals; Prentice Hall

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: **Bachelor of Technology**   Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-5104	Industrial Safety and Environment	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Attendance /Quiz - Max. Marks: Nil	

Pre-Requisite	Student has fundamental knowledge about various types of industries.
Course Objective	To make the students familiar with various industrial safety and their relative acts.
Course Outcomes	Student will be able to learn: 1. Demonstrate an integrative approach to analyses of safety in various industries. 2. Ability to analyses various types industrial accidents. 3. The ability to apply the fundamental knowledge in environmental factors. 4. Students will understand the basic about industrial hazards. 5. To identify types of industrial acts.

Unit	Contents (Theory)	Marks Weightage
I	**Industrial Safety:** Electrical safety, Construction safety, Chemical safety, Fire safety, Need of safety, Safety programme, Industrial safety principle, Safety policy, Safety inspection, Safety legislation, Safety measures, Safety audit.	14
II	**Industrial Accidents:** Types of accidents, Nature and effect of accidents, Causes, Preventions, Accident management, Reporting, Investigations, Laws and Acts, Safety education and training.	14
III	**Environmental Factors:** Environment introduction, Need of environment control, Safe working environment, Entry and exit, Housekeeping, Work area, Floors and other surfaces, Workstations, Welfare facilities, Air quality, Temperature, Illumination, Noise, Vibrations, Plant layout, Lighting, Ventilations.	14
IV	**Industrial Hazards**: Classification, Categories, Hazard management, Identification and hazard control, Physical hazard, Chemical hazard, Biological hazard, Psychosocial hazard, Fire hazard, Health hazard, HAZOP, Major industrial hazard, Security management.	14
V	**Industrial Acts:** Factories act, 1948, Workers safety act, Provision of acts, Requirements of acts, Duties of inspector, OSHA, Indian electricity act -1910, Indian boiler act -1923, Mines act-1952, Petroleum act-1934, Minimum wages act-1948, The payment of wages Act-1936, Employee state insurance act, Workmen compensation act.	14

Text Book/References Books/ Websites:
1. AnupamaPrashar; Industrial Safety & Environment, S.K. Kataria and Sons Publication.
2. R. K. Jain and Sunil S. Rao; Industrial Safety, Health and Environment Management Systems; Khanna Publishers.
3. Thomas D. Schneid; Safety Law: Legal Aspects in Occupational Safety and Health (Occupational Safety & Health Guide Series), CRC Press.
4. Pravin M.Pathak&Jayant P. Khairnar; Industrial Safety Management: Safety, Health & Environment Management; Notion Press.
5. R.K. Mishra ; Safety Management: Safety, Health & Environment Management; AITBS Publishers.

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: **Bachelor of Technology**   Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBCS-502	Discrete Structure	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal– Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks:10
Practical Internal Max Marks: Nil	Lab Performance/ Quiz/Attendance - Max. Marks: Nil	

Pre-Requisite	Student should have basic knowledge of algebra and mathematics.
Course Objective	The course objective is to provide students with an overview of discrete mathematics.
Course Outcomes	**Student will be able to learn:** 1. Fundamental mathematical concepts and terminology. 2. The various function used in discrete mathematics and will learn techniques for constructing mathematical proofs. 3. Logical reasoning to solve a variety of problems. 4. The graph theory and cycles. 5. The combinatorics and recurrence relation and how to solve problems based on them.

Unit	Contents (Theory)	Marks Weightage
I	**Set theory and Relations :** Definition of Sets, countable and uncountable sets, finite and infinite sets, Venn Diagrams, principles of inclusion and exclusion, proofs of some general identities on sets multi-sets and ordered pairs, Relation, Definition, Types of relation, Composition of relations, Equivalence relation, Equivalence class, partial ordering relation and job -scheduling problem.	14
II	**Functions & Pigeon Hole Principle :** Definition, Domain, Co-Domain and Range of a Function, Image of an Element, Everywhere Defined Function, Equal Function, type of function, Invertible Function, Composition of Functions, Identity Function, Inverse Function, Recursively Defined Function, pigeonhole principle, Theorem proving Techniques, Mathematical induction and proof by contradiction.	14
III	**Prepositional Logic & Finite State Machines :** Proposition, First order logic, Basic logical operations, Truth tables, tautologies, Contradictions, Algebra of prepositions, logical implications, logical equivalence, predicates, normal forms, Universal and existential quantifiers, Introduction to finite state machine and Finite state machines as models of physical system equivalence machines.	14
IV	**Graph Theory :** Introduction and basic terminology of graphs, planer graphs, Multi-graph and weighted graphs, Isomorphic graphs, Paths, Cycles and connectivity, Shortest path in weighted graph, Introduction to Eulerian paths and circuits, chromatic number, isomorphism and Homomorphism of graphs.	14
V	**Combinatorics & Recurrence Relations :** Introduction: Permutation and combination, Binomial Theorem, Multinomial Coefficients Recurrence Relation and Generating Function, Introduction to Recurrence Relation and Recursive algorithms, Linear recurrence relations with constant coefficients, Homogeneous Solutions, Particular solutions, Total solutions, Generating functions, Solution by method of generating functions.	14

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Programme: **Bachelor of Technology**   Semester –V

Text Book/References Books/ Websites:

1. D.C. Aggarwal; Discrete Mathematics.
2. Lipschutz; Discrete Mathematics (Schaum); TMH.
3. S k Sarkar; Discrete Mathematics; S. Chand.
4. Harish Mittal; Discrete Mathematics; I.K International Publishing House PVT.LTD.
5. https://www.tutorialspoint.com/discrete_mathematics.

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: **Bachelor of Technology**   Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (Nil)	Internal (Nil)	Total
CBCS-503	Software Engineering	3	1	-			Min: 40 (D Grade)			(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Quiz/Attendance - Nil Max. Marks: Nil	

Pre-Requisite	Students should have basic knowledge of languages.
Course Objective	To understand the fundamentals of software engineering principles and practices, including project management, configurations management, requirements definition, system analysis, design, testing, and deployment.
Course Outcomes	**Student will be able to learn:** 1. The process involved in the development of software. 2. The various software requirements which are required in the software development. 3. About software and data design. 4. Write, test and maintain computer programs and web application. 5. To use appropriate resources to stay abreast of the latest industry development tools and techniques

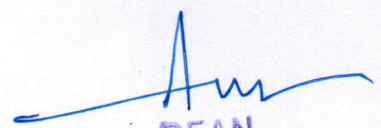| Unit	Contents (Theory)	Marks Weightage
I	**Software Process:** Introduction, S/W Engineering Paradigm – life cycle models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object oriented), system engineering, computer based system, verification, validation, life cycle process, development process, system engineering hierarchy.	14
II	**Software Requirements:** Functional and non-functional, user, system, requirement engineering process: feasibility studies, requirements, elicitation, validation and management, software prototyping, prototyping in the software process, rapid prototyping techniques, and user interface prototyping, S/W document. Analysis and modeling: data, functional and Behavioral models – structured analysis and data dictionary.	14
III	**Design Concepts And Principles:** Design process and concepts: modular design, design heuristic, design model and document. Architectural design: software architecture, data design, architectural design, transform and transaction mapping, user interface design, user interface design principles. Real time systems: Real time software design, system design, real time executives, data acquisition system - monitoring and control system. SCM: Need for SCM, Version control, Introduction to SCM process, Software configuration items.	14
IV	**Taxonomy of Software Testing:** Levels, test activities, types of s/w test: black box testing, testing boundary conditions, structural testing, test coverage criteria based on data flow mechanisms, regression testing, testing in the large. S/W testing strategies: strategic approach and issues, unit testing, integration testing, validation testing, system testing and debugging.	14
V	**Software Project Management:** Measures and measurements: S/W complexity and science measure, size measure, data and logic structure measure, information flow measure. Software cost estimation, function point models, COCOMO model- Delphi method.- Defining a Task Network, Scheduling, Earned Value Analysis, Error Tracking, Software changes, program evolution dynamics, software maintenance, Architectural evolution. Taxonomy of CASE tools.	14

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Programme: **Bachelor of Technology**   **Semester –V**

Text Book/References Books/ Websites:

1. James F Peters and WitoldPedryez; Software Engineering – An Engineering Approach; John Wiley and Sons; New Delhi.
2. Ali Behforooz and Frederick J Hudson; Software Engineering Fundamentals; Oxford University Press.
3. RajaniKantaMalu; Software Engineering; Scitech Publication Pvt. Ltd. Chennai.
4. https://www.tutorialspoint.com/software_engineering/index.htm.
5. https://www.javatpoint.com/software-engineering-tutorial.

Suggested List of Laboratory Practical (Expandable): NIL

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Programme: **Bachelor of Technology**　　　　　　　　　　　　　Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	**T**	**P**	**End Sem (70)**	**Internal (30)**	**Total (100) Min: 40 (D Grade)**	**End Sem (35)**	**Internal (15)**	**Total (50) Min: 20 (D Grade)**
CBCS-504	Operating System	3	1	1	End Sem (70)	Internal (30)		End Sem (35)	Internal (15)	

Duration of Theory (Externals): 3 Hours

Theory Internal– Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance /Attendance / Quiz - Max. Marks: 15	

Pre-Requisite	Student should have basic knowledge about computer fundamentals.
Course Objectives	Student will be able to understand the basic components of a computer operating system, and the interactions among the various components.
Course Outcome	**Student will be able to learn:** 1. The basic concept of operating system working. 2. About the processes are scheduled using the scheduling algorithm. 3. The deadlock and memory management. 4. The concept of virtual memory. 5. About the files and disk is managed by the operating system.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Introduction to Language Processors, Language Processing Activities and Language Processors Development Tools, Translators, Interpreters, Assemblers, Compiler, Macros and Macro Processors, Linkers, Loaders, Software Tools, Introduction to Operating Systems, Types of operating Systems, system protection and Operating system services.	14
II	**Process Scheduling & IPC:** Basic concepts of CPU scheduling, Scheduling criteria, Scheduling algorithms, algorithm evaluation, multiple processor scheduling, Process concept, operations on processes, threads, Inter-process communication, Precedence graphs, critical section problem, semaphores and classical problems of synchronization	14
III	**Deadlock & Memory Management :** Deadlock problem, deadlock characterization, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, Methods for deadlock handling, Concepts of memory management, logical and physical address space, swapping, Fixed and Dynamic Partitions, Best-Fit, First-Fit and Worst Fit Allocation, paging, segmentation and paging combined with segmentation.	14
IV	**Virtual Memory & OS Security:** Concepts of virtual memory, Cache Memory Organization, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation, Role of Operating System in Security, System Protection, Password Management and Trusted Systems	14
V	**Disk Scheduling & Files:** Disk scheduling, file concepts, File manager, File organization, access methods, allocation methods, free space managements, directory systems, file protection, file organization & access mechanism, file sharing implement issue and introduction to distributed systems.	14

Text Book/References Books/ Websites: P. T. O.

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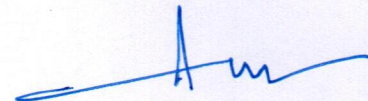ACADEMIC AFFAIRS
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Programme: **Bachelor of Technology**   Semester –V

1. Dhamdhare; System Programming and Operating System; Tata McGraw Hill Publications.
2. Peter Galvin; Operating System Concepts; Wiley India.
3. Rajiv Chopra; Operating System; S.Chand New Delhi.
4. https://www.tutorialspoint.com/operating_system.
5. https://www.javatpoint.com/os-tutorial.

Suggested List of Laboratory Practical (Expandable):

1. Program to implement FCFS CPU Scheduling Algorithm.
2. Program to implement SJF CPU Scheduling Algorithm.
3. Program to implement Round Robin CPU Scheduling Algorithm.
4. Program to implement Priority CPU Scheduling Algorithm.
5. Program to simulate producer-consumer problem using semaphores.
6. Program to implement FIFO Page Replacement Algorithm.
7. Program to implement LRU Page Replacement Algorithm.
8. Program to implement Optimal Page Replacement Algorithm.
9. Program to implement Banker's Algorithm for Deadlock Avoidance.
10. Program to simulate Single level directory file organization technique.

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Programme: **Bachelor of Technology**   Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	**T**	**P**	**End Sem (70)**	**Internal (30)**	**Total (100)**	**End Sem (35)**	**Internal (15)**	**Total (50)**
CBCS-505	Computer Network	3	1	1			**Min: 40 (D Grade)**			**Min: 20 (D Grade)**

Duration of Theory (Externals): 3 Hours

Theory Internal– Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance /Attendance / Quiz - Max. Marks: 15	

Pre-Requisite	Student should have basic knowledge of computer.
Course Objectives	To develop an understanding of computer networking basics, various protocols, modern technologies and their applications.
Course Outcome	**Student will be able to learn:** 1. Protocol layering of the network models. 2. The working of data link layer and Ethernet. 3. How the addressing is done in the network layer. 4. The various protocols used in transport layer and application layer. 5. Various technologies and algorithms related to network security and management.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction & Protocol Layering:** Introduction to Computer Networks, Elements of Computer Networks, Applications, Types: LAN, WAN, MAN, Internet, Intranet, Extranet, Introduction to Protocol Layering Principle, OSI Model, Functions of 7 Layers, TCP / IP Protocol Suite, SNA, Internetworking and Internetworking Devices	14
II	**Data Link Layer & Ethernet:** Introduction to DLL, LLC & MAC Sub Layers, Introduction to Physical Addressing, SLIP, PPP, HDLC, Bit Oriented & Byte Oriented Protocols, Introduction to ALOHA, Pure ALOHA, Slotted ALOHA, CSMA, Types, CSMA/CD, CSMA/CA, Introduction to IEEE 802 Project, Token Bus, Token Ring, FDDI, DQDB and Ethernet, Introduction to Spread Spectrum and its Types	14
III	**Network Layer & Addressing:** Introduction to Addressing, Addressing Classes, Classless Addressing, Introduction to Subnetting and Supernetting, Connectionless & Connection Oriented Services, Introduction to Routing, Types, Routing Protocols, RIP, OSPF, BGP, IP, ICMP, ICMP Messages, IGMP, ARP and RARP	14
IV	**Transport Layer & Application Layer:** Introduction to Port Addressing, UDP, TCP, 3 Way Handshaking for TCP Connection Management, Types of TCP Connections, Introduction to BOTP, DHCP, DNS, TELNET, FTP, TFTP, Introduction to Mail Transfer, SMTP, Message Access Agents, SNMP, SMI, MIB, HTTP, NNTP and Remote Procedure Call	14
V	**Security & Management:** Introduction to Encryption and Decryption, Symmetric Key Cryptography, Classical Encryption Techniques, DES Algorithm, Public/Private Key Cryptography, RSA Algorithm, Digital Signatures, Firewalls, Attacks, Intruders, Malicious Software's and Antivirus Software's, Introduction to Network Management, Fault Management, Configuration Management, Accounting Management, Performance Management, Security Management and Introduction to Network Monitoring	14

Text Book/References Books/ Websites: P.TO -

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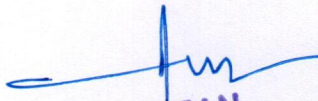PEOPLE'S UNIVERSITY, BHOPAL.   PEOPLE'S UNIVERSITY, BHOPAL   PEOPLES UNIVERSITY, BHOPAL (M.P.)

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Programme: **Bachelor of Technology**   Semester –V

1. Frozen; Data Communication &Networking; IV Edition, TMH.
2. William Stallings; Data & Computer Communication; Pearson Education.
3. Sanjay Sharma; Data Communication and Computer Network; S.K.Kataria and sons.
4. https://www.javatpoint.com/computer-network-tutorial.
5. https://www.geeksforgeeks.org/computer-network-tutorials.

Suggested List of Laboratory Practical (Expandable):

1. Write a program in 'C' for PC to PC communication using RS-232 port.
2. Write a program for encryption and decryption using monoalphabetic substitution or polyalphabetic substitution.
3. Write a program to implement Huffman data compression algorithm to generate Prefix codes and encoded text.
4. Study of Novell Netware.
5. Study and implementation of routing algorithm.
6. Study and implementation of congestion control algorithm.
7. Implementation of subnet mask concept.
8. Simulation of ARP and RARP protocols.
9. Simulation of TCP protocol.
10. Network socket programming.

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Programme: **Bachelor of Technology**   Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)
CBCS-506	Cloud Computing	3	-	1						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance /Attendance / Quiz - Max. Marks: 15	

Pre-Requisite	Student should have basic knowledge of Computer, Networking and Storage.
Course Objective	To understand the necessary theoretical background for computing and storage clouds environments and to know the methodologies and technologies for the development of applications offered through cloud computing environments.
Course Outcomes	**Student will be able to learn:** 1. Basic concepts of virtualization. 2. The basic concept of application virtualization. 3. The basic concepts of cloud computing. 4. Computer networking and IP addressing. 5. To create virtual machines (VM).

Unit	Contents (Theory)	Marks Weightage
I	**Introduction to Cloud Computing:** History, Importance of Virtualization in Cloud, Anatomy of Cloud, Cloud deployment models, Cloud delivery models, Stepping stones for the development of cloud, Grid Computing, Cloud Computing.	14
II	**Introduction to Virtualization:** Traditional IT Infrastructure, Benefits of Virtualization, Types of Virtualization, History of Virtualization.	14
III	**Server, Storage, Network and Application Virtualization:** Types of Server Virtualization, Hypervisors, Anatomy of Server Virtualization, Benefits of Storage Virtualization, Types of Storage Virtualization, VPN, VLAN, Benefits of Application Virtualization.	14
IV	**Cloud Implementations/Cloud Deployment Models, Cloud Delivery Models:** Decision Factors for Cloud Implementations, Public, Private and Hybrid Cloud, Overview, Infrastructure as a Service (IAAS) Cloud Delivery Model, Platform as a Service (PAAS) Cloud Delivery Model, Software as a Service (SAAS) Cloud Delivery Model.	14
V	**Case Study On Virtualization, Cloud Workloads:** Customer IT Landscape, Triggers of Virtualization, Preparation for Virtualization, Transition Tools for Virtualization, Cost savings, Cloud workload Overview, Workloads most suitable for Cloud, Workloads not suitable for Cloud.	14

Text Book/References Books/ Websites:
1. Dr. SajalSaha; Introduction to Virtualization and Cloud Computing; IBM ICE Publication.
2. Mel Cordero; System Virtualization Strategies; IBM Redbooks.
3. Stuart Devanish; Introduction and Configuration Fourth Edition; IBM Redbooks.
4. https://www.tutorialspoint.com/cloud_computing/index.htm.
5. https://www.javatpoint.com/cloud-computing-tutorial.

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Suggested List of Laboratory Practical (Expandable):

1. Create Multiple Virtual Machines Using Virtual Box.
2. Virtual Machine Using QEMU.
3. KVM on Ubuntu 12.10.
4. KVM and guest operating system on CentOS6.3.
5. Installation of VMware ESX Server.
6. Study basics of PAAS and their use case.
7. Study basics of IAAS and their use case.
8. Steps to install and run the Google App Engine on Windows.
9. Steps to simulate Cloud scenario using Cloud Sim.
10. Create Multiple Virtual Machines in VMware.

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Programme: **Bachelor of Technology**   Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)
CBTE-507	NCC-V	1	-	6						

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks:15	Best of Two Mid Semester Test – Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05
Practical Internal Max Marks: 15	Lab Performance/ Quiz/Attendance - Max. Marks: 15	

Pre-Requisite	Nil	
Course Objective	(a) Understand the concept of Team and its functioning. (b) Hone Public speaking skills. (c) Understand the security set up and management of Border/Coastal areas. (d) Acquire knowledge about an Infantry Battalion organization and its weapons. (e) Acquire knowledge about Indo-Pak Wars fought in 1965 & 1971.	
Course Outcomes	**Student will be able to learn:** 1. Participate in team building exercise and value teamwork. 2. Improve communication skills by public speaking activities. 3. Understand the security mechanism and management of Border/Coastal areas. 4. Get motivated to join armed forces.	

Unit	Contents (Theory)	Marks Weightage
I	**Personality Development:** (i) Group Discussions –Team work. (ii) Public speaking.	07
II	**Border & Coastal Areas:** Security Setup and Border/Coastal management in the area.	07
III	**Introduction to Infantry Battalion and its Equipment:** Organization of Infantry Battalion & its weapons.	07
IV	**Military History:** Study of Battles of Indo-Pak Wars 1965 & 1971.	14

 # Note: For NCC-V, 05 credits will be allotted after successful completion of camp.

Text Book/References Books/ Websites:
1. Cadet's handbook, NCC Directorate, MP, CG.
2. Supplementary cadet's handbook, NCC Directorate, MP, CG.

Suggested List of Laboratory Practical (Expandable):
1. **Drill**
   - Ceremonial Drill.
   - Guard Mounting.
2. **Field Craft & Battle Craft**
   - Fire control orders.
   - Types of fire control orders.
   - Fire and Movement- when to use fire and movements tactics, Basic considerations, Appreciation of ground cover, Types of cover, Dead ground, Common Mistakes, Map and air photography, Selection

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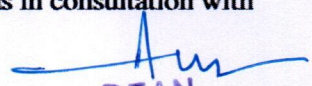Programme: **Bachelor of Technology**   Semester –V

of Fire position and fire control.

3. **Map Reading:** Google Maps & applications.
4. **Weapon Training:** Short Range firing
5. **Social Service and Community Development:** Cadets will participate in various activities throughout the semester e.g., Blood donation Camp, SwachhataAbhiyan, Constitution Day, Jan Jeevan HariyaliAbhiyan, BetiBachaoBetiPadhao etc. as per the requirement and similar announced days- National and State level.
6. **Health & Hygiene:**
- Yoga- Introduction, Definition, Purpose, Benefits.
- Asanas-Padamsana, Siddhasana, Gyan Mudra, Surya Namaskar, Shavasana, Vajrasana, Dhanurasana, Chakrasana, Sarvaangasana, Halasana etc.
7. **Obstacle Training:**
- Obstacle training – Intro, Safety measures, Benefits.
- Obstacle Course- Straight balance, Clear Jump, Gate Vault, Zig- Zag Balance, High Wall etc.

Note: Examination of this NCC course will be conduct as per NCC head quarter norms in consultation with office of COE, PU.

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Programme: **Bachelor of Technology**   Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (35)	Internal (15)	Total (50)	End Sem (Nil)	Internal (Nil)	Total
CBTE-508	Accounting and Finance Management	2	-	-			Min: 20 (D Grade)			(Nil)

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks: 15	Best of Two Mid Semester Test – Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	The objective of this course is to familiarize the students with concepts and methods in accounting as a subject in Business Financial Management.
Course Outcomes	**Student will be able to learn:** 1. To understand Basic accounting concepts. 2. To know system of book banking. 3. To understand depreciation methods. 4. To understand the framework of balance sheet. 5. To understand the Bank Reconciliation Statement.

Unit	Contents (Theory)	Marks Weightage
I	**Accounting:** Meaning, scope & relationship with other functional areas, book keeping & accounting.	07
II	**Conceptual framework of accounting:** Accounting principles, accounting concepts, accounting conventions, systems of books keeping, double entry system of books keeping, journal (Numerical).	07
III	**Depreciation Accounting:** Concepts causes methods of providing depreciation different assets: Fixed installment method (Numerical), Diminishing balance method (Numerical), Annuity method (Numerical).	07
IV	**Final Accounts:** Manufacturing account, trading account, profit & loss account, balance sheet and adjustments (Numerical).	07
V	**Bank Reconciliation Statement:** Objective, Importance & Techniques	07

Text Book/References Books/ Websites:

1. Jain &Narang: Elements of Accounting.
2. S.N. Maheshwari: Fundamentals of Accounting.
3. Shukla, Grewal & Gupta: Advanced Account.

Suggested List of Laboratory Practical (Expandable): Nil

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School of Research and Technology   *Department: Computer Science and Engineering*

PEOPLE'S UNIVERSITY, BHOPAL
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Programme: **Bachelor of Technology**   Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total	End Sem (Nil)	Internal (50)	Total (50)
CBCS-509	Web Designing Lab	-	-	1			(Nil)			Min:20 (D Grade)

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/ Quiz/Attendance – Max. Marks: 50	

Pre-Requisite	Basic knowledge in HTML Tags & skill of creating web pages should be known.
Course Objective	Student will be able to design web pages and websites.
Course Outcomes	Student will be able to learn: 1. Students will be able to design and implement dynamic websites with good aesthetic sense. 2. Students will be able to have a good grounding of Web Application Terminologies, Internet Tools, E-Commerce and other web services. 3. Students will be able to explore different web extensions and web services standards.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction to HTML:** Web site, Web Page, Types of Web Pages, Browsers and their types, Client –Server Model, Web –Server, Working of different types of Web Pages, General structure of a Web Page, Scripting languages, URL, Popular Search Engines, WWW **Basic principles:** Involved in developing a web site, Planning process, Five Golden rules of web designing, Designing navigation bar, Page design, Home Page Layout, Design Concept. **Concept of CSS:** Creating Style Sheet ,CSS Properties , CSS Styling(Background, Text Format, Controlling Fonts) , Working with block elements and objects, Working with Lists and Tables ,CSS Id and Class ,Box Model Creating page Layout and Site Designs.	50

Text Book/References Books/ Websites:

1. https://www.geeksforgeeks.org/html-introduction
2. https://www.javatpoint.com/what-is-html

Suggested List of Laboratory Practical (Expandable):

1. Structure of HTML web page.
2. Create a HTML document containing a nested list showing a content page of any book.
3. Write a HTML code to create a web page with pink color background and display moving message in red colour.
4. Design a page having suitable background color and text color with title "My First Web Page" using all the attributes of the Font tag.
5. Write a HTML code to create a web page to design a Bio-Data.
6. Write a HTML code to create a web page with four frames (Picture, table, list, and hyperlink).
7. Write a HTML code to create a web page to show India map.
8. Write a HTML code to create a web page to show registration naukri.com.
9. Write a HTML code to create a Web Page in HTML to show Admission form in OITM.
10. Write a HTML code to show your resume using Appropriate Formatting Elements.

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Programme: **Bachelor of Technology**   Semester –V

Subject Code	Subject Title	Credit			Theory				Practical		
		L	**T**	**P**	**End Sem (Nil)**	**Internal (Nil)**	**Total**		**End Sem (100)**	**Internal (Nil)**	**Total (100)**
CBTE-510	Industrial Training	-	-	1			**(Nil)**				**Min: 40 (D Grade)**

Duration of Theory (Externals): -Nil

Theory Internal- Max Marks: -Nil	Best of Two Mid Semester Test-Max Marks: Nil	Assignment/Quiz/Attendance Max. Marks: Nil
Practical Internal Max Marks: Nil	Lab Performance/ Quiz/Attendance - Max. Marks: Nil	

Pre-Requisite	Fundamental Engineering concepts of concern discipline.
Course Objective	The objective of industrial training is to provide to students the feel of the actual working environment and to gain practical knowledge and skills, which in turn will motivate, develop and build their confidence.
Course Outcome	**Student will be able to learn:** 1. Participate in the projects in industries during his or her industrial training. 2. Describe use of advanced tools and techniques encountered during industrial training and visit. 3. Interact with industrial personnel and follow engineering practices and discipline prescribed in industry. 4. Develop awareness about general workplace behavior and build interpersonal and team skills. 5. Prepare professional work reports and presentations..

Unit	Contents (Theory)	Marks Weightage
I	The Course industrial training is to provide work experience, so that student's engineering knowledge is enhanced and employment prospects are improved. Industrial training of the students is essential to overcome the wide gap between the classroom learning and industrial environment. Industrial Training is a practical course, in which the students should undergo in reputed Private / Public Sector / Government organization / companies as industrial training of minimum **FOUR** weeks in the semester break **after IV semester** theory examinations. **Training period:** Minimum of Four weeks or 30 (Thirty) Days. **Evaluation:** Fifth semester **Companies / Areas covered:** Any field related to concern branch / discipline of Engineering. **Grading:** As per Scheme. **Note:** The presentation is evaluated by your class incharge. Report must be submitted during power point presentation. A Viva voce comprising comprehensive questions based on your presentation and training undergone. **Etiquettes:** Dress properly, behave well, portray good image as a university student, be punctual, observe work ethics, concern for safety, be professional.	100

Text Book/References Books/ Websites: Nil

Suggested List of Laboratory Experiments: - (Expandable): Nil

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Programme: **Bachelor of Technology**   Semester –V

Subject Code	Subject Title	Credit			Theory				Practical		
		L	T	P	End Sem (Nil)	Internal (50)	**Total (50)**		End Sem (Nil)	Internal (Nil)	**Total**
CBTE-511	Indian Constitution	-	-	-			Min: 20 (D Grade)				(Nil)

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: 50	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: 50
Practical Internal Max Marks: Nil	Lab Performance/ Quiz/Attendance - Max. Marks: Nil	

Pre-Requisite	Fluency in English
Course Objective	The objective of this Course is to outline the essential features of the Indian Constitution and to discuss important organs established by it.
Course Outcomes	**Student will be able to learn:** 1. About the fundamental rights and duties 2. About the institutional arrangement provided by the Constitution.(UG) 3. About the institutional arrangement provided by the Constitution.(SG) 4. About the local administration. 5. About the working of election commission.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Constitution-meaning of the term; Indian Constitution: Sources and constitutional history; Features: Citizenship; Preamble; Fundamental Rights and Duties; Directive Principles of State Policy.	10
II	**Union Government and its Administration:** Structure of the Indian Union: Federalism; Centre- State relationship; President: Role; power and position; PM and Council of ministers; Cabinet and Central Secretariat; Lok Sabha; Rajya Sabha; Supreme Court of India.	10
III	**State Government and its Administration:** Governor: Role and Position; CM and Council of ministers; State Secretariat: Organization; Structure and Functions; High Courts.	10
IV	**Local Administration:** District's Administration head: Role and Importance; Municipalities: Introduction; Mayor and role of Elected Representative; CEO of Municipal Corporation; Pachayati raj: Introduction; PRI: ZilaPachayat; Elected officials and their roles; CEO ZilaPachayat: Position and role; Block level: Organizational Hierarchy (Different departments); Village level: Role of Elected and Appointed officials; Importance of grass root democracy.	10
V	**Election Commission:** Role and Functioning; Chief Election Commissioner and Election Commissioners; State Election Commission: Role and Functioning; Institute and Bodies for the welfare of SC/ST/OBC and women.	10

Text Book/References Books/ Websites:

1. Laxmikanth; Indian Polity.
2. SubhashKashyap; Indian Administration.
3. D.D. Basu;Indian Constitution.
4. Avasti and Avasti;Indian Administration.

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: **Bachelor of Technology**   Semester –VI

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (Nil)	Internal (Nil)	Total
CBCS-6101	Information Management System	3	-	-			Min: 40 (D Grade)			(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal– Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz - Max. Marks:Nil	

Pre-Requisite	Student should have basic knowledge of Computer and Networking.
Course Objective	To understand the various storage technologies and the concept of cloud computing.
Course Outcomes	Student will be able to learn: 1. To understand the concept of information storage and data center environment. 2. About architecture of storage system and concept of RAID. 3. Concept of networked storage and its architecture. 4. Hybrid storage solutions and design of secure data center. 5. Concept of cloud computing and its working.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction to Storage Technology:** Evolution of Storage Management, Storage technologies at a glance, Storage Devices, File Allocation Methods, Challenges in Data Storage and Management, Data Storage Infrastructure , Information Lifecycle Management, Data categorization.	14
II	**Storage Systems:** Architecture Components of a Storage System Environment, Disk drive components, Disk Drive Performance, properties, performance, and specifications, Logical Components, Concept of RAID and its Components, Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Comparison of Levels, mapping and operation.	14
III	**Introduction to Networked Storage:** Evolution of networked storage, Architecture, Overview of JBOD, DAS, NAS, SAN, limitations of DAS, NAS, CAS & SAN. Benefits of NAS, Components, Implementations, CAS Architecture, Storage and Retrieval, Security Criticism in Networked Storage Technologies, Risk Mitigation for Networked Storage.	14
IV	**Hybrid Storage solutions:** Hybrid Storage Appliance, Virtualization, Types of Virtualization, Storage Virtualization, Virtual Appliance, Industry management standards (SNMP, SMI-S, CIM), standard framework applications, Data Center. Requirement for the design of a secure data center, Key Program Management Metrics, Back up and Disaster Recovery, Importance of disaster recovery planning.	14
V	**Introduction of Cloud Computing** Introduction, Types of Cloud Computing, Cloud Computing Model Cloud Computing Characteristics, Advantage & Disadvantage of Cloud Computing, Essential Characteristics of Cloud Computing, Evolution of Cloud Technologies, Cloud Application Services, Cloud Computing Model, Storage on Cloud, Cloud Security and integration, Cloud Architecture, Risk of Cloud Computing, The future of Cloud Computing.	14

Text Book/References Books/ Websites:

1. W. Rittinghouse and James F. Ransome; Cloud Computing: Implementation, Management and Security; CRC Press, Taylor Frances Publication.

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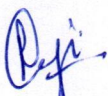## *(Applicable for Admitted from Academic Session 2021-22 onwards)*

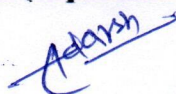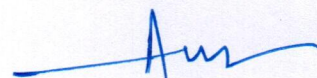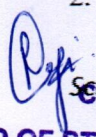Programme: **Bachelor of Technology**   Semester –VI

2. Nick Antonopoulos, Lee Gillam; Cloud Computing: Principles, System & Application, Springer.
3. Anthony T. Velete, Toby J.Velk, and RoBErtEltenpeter, Cloud Computing: A practical Approach, TMH Publication.
4. www.tutorialspoint.com.
5. www.geeksforgeeks.org/stroagemanagement.

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: **Bachelor of Technology**   Semester –VI

Subject Code	Subject Title	Credit			Theory			Practical		
		L	**T**	**P**	**End Sem (70)**	**Internal (30)**	**Total (100)**	**End Sem (Nil)**	**Internal (Nil)**	**Total**
CBCS-6102	Mobile Computing	3	-	-			**Min: 40 (D Grade)**			**(Nil)**

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Quiz/Attendance - Max. Marks: Nil	

Pre-Requisite	Basic knowledge of Virtualization Technologies, Operating Systems, and Networking.
Course Objective	To impart fundamental concepts in the area of mobile computing, to provide a computer systems perspective on the converging areas of wireless networking, embedded systems and software.
Course Outcomes	**Student will able to learn:** 1. The basic concepts of mobile computing. 2. The wireless networking and mobile network layer. 3. The mobile transport layer and various protocols used by this layer. 4. The synchronization and dissemination of data. 5. Various routing algorithms of mobile adhoc networks.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices. GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS, CSHSD, DECT.	14
II	**(Wireless) Medium Access Control (MAC):** Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11) Mobile Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.	14
III	**Mobile Transport Layer:** Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks. Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process &QoS Issues.	14
IV	**Data Dissemination and Synchronization:** Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols.	14
V	**Mobile Adhoc Networks (MANETS):** Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc. , Mobile Agents, Service Discovery. Protocols and Platforms for Mobile Computing: WAP, Bluetooth, XML, J2ME, Java Card, Palm OS, Windows CE, Symbian OS, Linux for Mobile Devices, Android.	14

Text Book/References Books/ Websites:

1. Jochen Schiller; Mobile Communications; Addison-Wesley, Second Edition.
2. Raj Kamal; Mobile Computing; Oxford University Press.

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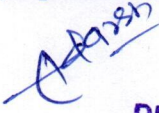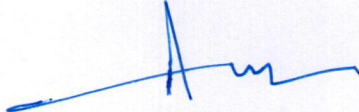
3. UWE Hansmann, LotherMerk, Martin S. Nicklaus, Thomas Stober; Principles of Mobile Computing; Second Edition, Springer.
4. https://www.tutorialspoint.com/mobile_computing/index.htm.
5. https://www.javatpoint.com/mobile-computing.

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: **Bachelor of Technology**   Semester –VI

Subject Code	Subject Title	Credit			Theory			Practical		
CBCS-6103	E-Commerce	L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
		3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Quiz/Attendance - Max. Marks: Nil	

Pre-Requisite	Basic knowledge of computer.
Course Objective	To provide knowledge about electronic commerce and network security while performing the various transactions.
Course Outcomes	**Student will be able to learn:** 1. What is electronic commerce and what are its needs. 2. The network infrastructure required for the e-commerce. 3. The various securities issues and also learn about the importance of firewall. 4. To secure data through encryption. 5. About the protocols of electronic payments.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Definition of Electronic Commerce, E-Commerce: technology and prospects, incentives for engaging in electronic commerce, needs of E-Commerce, advantages and disadvantages, framework, Impact of E-commerce on business, E-Commerce Models.	14
II	**Network Infrastructure For E- Commerce:** Internet and Intranet based E-commerce- Issues, problems and prospects, Network Infrastructure, Network Access Equipment, Broadband telecommunication (ATM, ISDN, and FRAME RELAY). Mobile Commerce: Introduction, Wireless Application Protocol, WAP technology, Mobile Information device.	14
III	**Web Security:** Security Issues on web, Importance of Firewall, components of Firewall, Transaction security, Emerging client server, Security Threats, Network Security, Factors to consider in Firewall design, Limitation of Firewalls.	14
IV	**Encryption:** Encryption techniques, Symmetric Encryption: Keys and data encryption standard, Triple encryption, Secret key encryption; Asymmetric encryption: public and private pair key encryption, Digital Signatures, Virtual Private Network.	14
V	**Electronic Payments:** Overview, The SET protocol, Payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking. EDI Application in business, E- Commerce Law, Forms of Agreement, Govt. policies and Agenda.	14

Text Book/References Books/ Websites:
1. Ravi Kalakota, Andrew Winston; Frontiers of Electronic Commerce; Addison Wesley.
2. Pete Lohsin, John Vacca ; Electronic Commerce ; New Age International.
3. Goel, Ritendra ; E-commerce ; New Age International.
4. Laudon; E-Commerce: Business, Technology, Society; Pearson Education.
5. Bajaj and Nag; E-Commerce the cutting edge of Business; TMH.

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: **Bachelor of Technology**   Semester –VI

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (Nil)	Internal (Nil)	Total
CBCS-6104	**Microprocessor**	3	-	-			Min: 40 (D Grade)			(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance /Attendance / Quiz- Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	To introduce students with the architecture, programming, interfacingand operation of typical microprocessors.
Course Outcomes	**Student will be able to learn:** 1. To understand basic architecture of 16 bit and 32 bit microprocessors. 2. Execution of instructions and performance of microprocessors. 3. To understand register organization, memory addressing. 4. Fundamental of Programming. 5. To understand interfacing an external device with the processor.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction to Digital Computer and Microprocessor:** **Digital Computers:** General architecture and brief description of elements, instruction execution, instruction format, and instruction set, addressing modes, programming system, higher lever languages. **Buses and CPU Timings:** Bus size and signals, machine cycle timing diagram, instruction timing, processor timing. **Microprocessor and Microprocessor Development Systems:** Evolution of Microprocessor, Microprocessor architecture and its operations, memory, inputs-outputs (I/O), data transfer schemes interfacing devices, architecture advancements of microprocessors.	14
II	**8085 Microprocessor:** pin configuration, internal architecture. Timing & Signals: control and status, interrupt: ALU, machine cycles, Instruction Set of 8085: **Addressing Modes:** Register addressing, direct addressing; register indirect addressing, immediate addressing, and implicit addressing. Instruction format, op-codes, mnemonics, no. of bytes, RTL, variants, no. of machine cycles and T states, addressing modes. **Instruction Classification:** Data transfer, arithmetic operations, logical operations, branching operation, machine control; Writing assembly Language programs, Assembler directives.	14
III	**16-bit Microprocessors:** Architecture: Architecture of INTEL 8086 (Bus Interface Unit, Execution unit), register organization, memory addressing, memory segmentation, Operating Modes Instruction Set of 8086 Addressing Modes: Instruction format: Discussion on instruction Set: Groups: data transfer, arithmetic, logic string, branch control transfer, processor control. **Interrupts:** Hardware and software interrupts, responses and types.	14
IV	**Fundamental of Programming:** development of algorithms, flowcharts in terms of structures, (series, parallel, if-then-else etc.)**Assembler Level Programming:** memory space allocation (mother board and user program) Assembler level programs (ASMs)**Other Microprocessors:** Motorola 6800/MC6809, 65C02, Signetics 2650 etc.	14

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Programme: **Bachelor of Technology**   Semester –VI

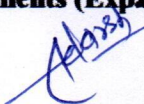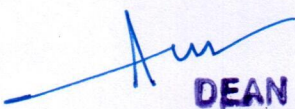|		
V	**Peripheral Interfacing:** I/O programming: Programmed I/O, Interrupt Driven I/O, DMA I/O interface: serial and parallel communication, memory I/O mapped I/Os. Peripheral Devices: 8237 DMA controller, 8255- Programmable peripheral interface, 8253/8254 Programmable timer/counter 8259 programmable Interrupt Controller.	**14**

Text Book/References Books/ Websites:

1. A Ditya P Mathur; Introduction to Microprocessor; Tata Mc Graw Hill.
2. M. Rafiquzzaman; Microprocessors- Theory and applications; PHI.
3. B. Ram; Advanced Microprocessor & Interfacing; Tata McGraw Hill.
4. Renu Singh & B.P. Singh,;Microprocessor and Interfacing and applications; New Age International.
5. Hall D.V.; Microprocessors Interfacing; Tata Mc Graw Hill.
6. Liu and Gibson G.A.; Microcomputer Systems: The 8086/8088 Family; Prentice Hall (India)

Suggested List of Laboratory Experiments (Expandable):Nil

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School of Research and Technology   *Department: Computer Science and Engineering*

PEOPLE'S UNIVERSITY, BHOPAL
(Applicable for Admitted from Academic Session 2021-22 onwards)

Programme: **Bachelor of Technology**   Semester –VI

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBCS-602	Automata Theory	3	1	-			Min: 40 (D Grade)			

Duration of Theory (Externals): 3 Hours

Theory Internal– Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance /Attendance / Quiz - Max. Marks: Nil	

Pre-Requisite	Student should have basic knowledge of Mathematics.
Course Objective	To make student understand the foundations of automata theory which also include the application of mathematical techniques and logical reasoning to important problems, and to develop a strong background in reasoning about finite state automata and its languages.
Course Outcomes	**Student will be able to learn:** 1. The basics of automata. 2. To work with the regular expressions and languages. 3. The context free grammar and languages of pushdown automata. 4. The working of Turing machines. 5. Understand the problem of un-decidability.

Unit	Contents (Theory)	Marks Weightage
I	**Automata:** Introduction to formal proof Additional forms of proof – Inductive proofs –Finite Automata (FA) Deterministic Finite Automata (DFA) Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions. Introduction of Sets , Logic , Functions , Relations , Languages , Proofs Mathematical Induction , Strong Principle of Mathematical Induction , Recursive Definitions ,Structural Induction, Kleene's Theorem	14
II	**Regular Expressions and Languages:** Regular Expression – FA and Regular Expressions – Proving languages not to BT regular – Closure properties of regular languages – Equivalence and minimization of Automata. A Criterion for Regularity, Minimal Finite Automata, Pumping Lemma for Regular Languages.	14
III	**Context-Free Grammar and Languages:** Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG, Deterministic Pushdown Automata. PDA corresponding to a Given CFG , CFG Corresponding to a Given PDA	14
IV	**Properties of Context-Free Languages:** Normal forms for CFG– Turing Machines – Programming Techniques for TM. The Pumping Lemma for CFG, Intersection & Complement of CFGs, Decision Problems Involving CFGs, Turing Machine (TM) Definition & Examples, Computing a Partial Function with a TM.	14
V	**Un-decidability:** A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Un-decidable problems about Turing Machine – Post's Correspondence Problem - The classes P and NP. Recursive Enumerable & Recursive Languages, Enumerating a Language, Context-Sensitive Languages & Chomsky Hierarchy.	14

Text Book/References Books/ Websites:

1. S.N. Sivanandam; Theory of Computation; I.K International Publishing House PVT.LTD.
2. Dr. P. K. Srimani; Automata Theory; Cambridge University Press, New Delhi.
3. Jeffery D. Ullman; Theory of Computation; Pearson.

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4. KLP Mishra and Chandershekharan; Theory of Computation; Prentice-Hall of India Pvt. Ltd; 3rd edition.
5. https://www.tutorialspoint.com/automata_theory/index.htm.

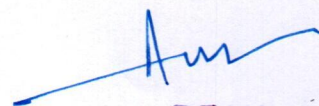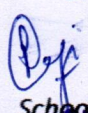**Suggested List of Laboratory Experiments :- (Expandable): Nil**

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (35)	Internal (15)	Total (50)
CBCS-603	Computer Graphics and Multimedia	3	1	1	End Sem (70)	Internal (30)	Min: 40 (D Grade)	End Sem (35)	Internal (15)	Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance /Attendance / Quiz - Max. Marks: 15	

Pre-Requisite	Student should have the basic knowledge of Graphics and Programming.
Course Objective	To gain the knowledge of different graphics techniques with programming.
Course Outcomes	**Student will be able to learn:** 1. All aspects of computer graphics including hardware, software and applications. 2. All typical graphics pipeline. 3. Graphics application programming interface. 4. Different multimedia architecture and files. 5. Concepts of Animation in multimedia.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction to Computer Graphics** : Applications of Computer Graphics,Pixel, Frame ,Buffer Raster ,Display devices – Random Scan , Raster Scan Monitor ,Color CRT Monitor, DVST and Plasma Panel Basic Adapter Cards- MCA, CGA, EGA, VGA	14
II	**Graphics Primitive**: Algorithms for Line Drawing Like DDA, Brenham's Circle Drawing: Mid-Point and Brenham's Algorithm Polygon Drawing: Boundary -Fill and Flood Fill Algorithm	14
III	**2D and 3D Transformation**: Translation, Rotation, Scaling, Reflection, Homogeneous co-ordinate system, Matrices transformation, Composite transformation, **Windowing and Clipping**: View Port ,Line Clipping, Polygon Clipping, Window & View Port Transformation **Curve Generation**: Bezier and B-spline Method	14
IV	**Basic Illumination& Color Models**: Reflection, Specular Reflection, Ray tracing, color models like RGB, YIQ, CMY, HSV.	14
V	**Multimedia and Animation**: An Introduction, Multimedia hardware, Multimedia System Architecture. Data & File Format standards. Like - RTF, TIFF, MIDI, JPEG, DIB, MPEG, Audio: digital audio, Compression. **Animation**: Principal of animation, 3D animation File Formats Morphing & Compression Technique	14

Text Book/References Books/ Websites:
1. 1. Donald Hearn and M.P. Becker; Computer Graphics; Pearson Pub.
2. Pradeep K. Bhatia; Computer Graphics; I.K International Publishing House Pvt. Ltd.
3. Sinha and Udai; Computer Graphics; Tata McGraw Hill.
4. https://www.javatpoint.com/-Website.
5. https://www.geeksforgeeks.org/-Website.

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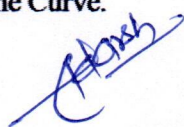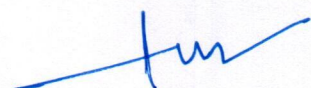PEOPLE'S UNIVERSITY, BHOPAL

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Suggested List of Laboratory Practical (Expandable):

1. Study of Fundamental Graphics Functions.
2. Implement Line generation using DDA algorithm.
3. Implement Line using Bresenham's line generation Algorithm.
4. Generate Circle using Bresenham's Algorithm.
5. Draw a Circle using Mid-Point Algorithm.
6. Draw a Polygon using Flood Fill Algorithm.
7. Perform translation, rotation scaling on 2-D Transformation.
8. Implement Fill Polygon using Boundary Fill Algorithm.
9. Implement Draw Bezeir Curve.
10. Implement Draw B-Spline Curve.

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (35)	Internal (15)	Total (50)
CBCS-604	Neural Network and Artificial Intelligence	3	1	1			Min: 40 (D Grade)			Min:20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance/ Quiz/Attendance - Max. Marks: 15	

Pre-Requisite	Students should have basic knowledge of computer.
Course Objective	To provide an introduction to the field of artificial neural networks and machine learning and to teach students how to solve practical problems via implementation of these techniques via simulation.
Course Outcomes	**Student will be able to learn:** 1. About the components involved in intelligent systems. 2. About the predicate logic and various models related to searching and reasoning. 3. The working of various neural network models. 4. The genetic algorithms which are required for solving the optimization problem. 5. To analyze the structures and algorithms of a selection of techniques related to searching, reasoning and language processing.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction to Artificial Intelligence Knowledge Representation using Predicate Logic:** Meaning and definition of artificial intelligence, Various types of production systems, Characteristics of production systems. Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, comparison of propositional and predicate logic.	14
II	**Knowledge Representation using Predicate Logic:** Resolution, refutation, deduction, theorem proving, inference, monotonic and non-monotonic reasoning. Study and comparison of breadth first search and depth first search. Techniques, other Search Techniques like hill Climbing, Best first Search. A* algorithm, AO* algorithm, and various types of control strategies.	14
III	**Introduction to Neural Network:** Concept, biological neural network, evolution of artificial neural network, McCulloch-Pitts neuron models, Learning (Supervise & Unsupervised) and activation function, Models of ANN-Feed forward network and feedback network, Learning Rules- Hebbian, Delta, Perceptron Learning and Windrow-Hoff, winner take all. Perceptron learning,- Single layer/multilayer, linear Separability, Adaline, Madaline, Back propagation network, RBFN. Application of Neural network in forecasting, data compression and image compression.	14
IV	**Genetic Algorithm:** Introduction to GA, Simple Genetic Algorithm, terminology and operators of GA (individual, gene, fitness, population, data structure, encoding, selection, crossover, mutation, convergence criteria). Reasons for working of GA and Schema theorem, GA optimization problems including JSPP (Job shop scheduling problem), TSP (Travelling salesman problem), Network design routing, timetabling problem.	14
V	**Reasoning and game playing techniques:** Probabilistic reasoning, Baye's theorem, semantic networks, scripts, schemas, frames, conceptual dependency, fuzzy logic, forward and backward reasoning. Game playing techniques like mini-max procedure, alpha-beta cut-offs, planning, Study of the block world problem in robotics, Introduction to understanding and natural languages processing.	14

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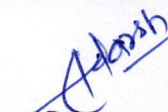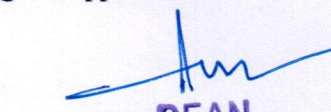
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Text Book/References Books/ Websites:

1. S.N. Shivnandam; Principle of soft computing; Wiley.
2. Rajshekaran and G.A.V. Pail Neural Network, Fuzzy logic And Genetic Algorithm; PHI.
3. Jack M. Zurada; Introduction to Artificial Neural Network System; Jaico Publication.
4. Simon Haykins; Neural Network- A Comprehensive Foundation.
5. https://www.tutorialspoint.com/artificial_neural_network/index.htm.

Suggested List of Laboratory Practical (Expandable):

1. Implement OR, AND Using Perceptron in C.
2. Implement OR, AND Using Perceptron in MATLAB Command-line Argument.
3. Implement OR, AND Using Perceptron in MATLAB GUI.
4. Implement OR, AND, X-OR gate, Using back propagation algorithm in MATLAB using Command line Argument as well as GUI.
5. Implementation of Simple Neural Network (McCulloh-Pitts model).
6. Implementation of Unsupervised Learning Algorithm.
7. Implementation of Simple Genetic Application.
8. Solve a given problem-1 (Operators) using Fuzzy Logic in MATLAB.
9. Solve a given problem-1 (Max-Min Composition) using Fuzzy Logic in MATLAB.
10. To find the solution of the function Maximize, given the constraints using GA approach in C.

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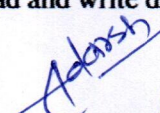Programme: **Bachelor of Technology**   Semester –VI

Subject Code	Subject Title	Credit			Theory			Practical		
CBCS-605	Programming With Python	**L**	**T**	**P**	**End Sem (70)**	**Internal (30)**	**Total (100)** **Min: 40 (D Grade)**	**End Sem (35)**	**Internal (15)**	**Total (50)** **Min:20 (D Grade)**
		2	-	1						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance /Attendance / Quiz - Max. Marks: 15	

Pre-Requisite	Basic knowledge of any programming language.
Course Objectives	To acquire programming skills in core Python and to develop skill of designing Graphical user Interfaces in Python.
Course Outcome	Student will be able to learn: 1. The basics of python programming. 2. To work with the functions and how to use them in the programming. 3. To understand the classes and oops concept in python. 4. To handle the exception in the python. 5. To develop the skills of designing GUI in python.

Unit	Contents (Theory)	Marks Weightage
I	**An Introduction to Python** : A Brief History of Python, Python Versions, Installing Python, Environment Variables, Executing Python from the Command Line, IDLE, Editing Python Files, Python Documentation, Help, Dynamic Types, Python Reserved Words, Operators and Expressions, Naming Conventions, Python Basic Syntax, Comments, String Values, String Methods, The format Method, String Operators, Numeric Data Types, Conversion Functions, Simple Output/Input, Indentation, Functions, Conditional Statements, Iterative Statements.	14
II	**Python Collections**: Lists, Tuples, Sets, Dictionaries, Sorting Dictionaries, Copying Collections. Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Passing Functions to a Function, map, filter, Mapping Functions in a Dictionary, Lambda, Inner Functions, Closures. Modules, Standard Modules -sys, math, time, The dir Function.	14
III	**OOP in Python:** Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes. Simple Character Matches, Special Characters, Character Classes, Quantifiers, The Dot Character, Greedy Matches, Grouping, Matching at Beginning or End, Match Objects, Substituting ,Splitting a String, Compiling Regular Expressions, Flags.	14
IV	**Exceptions in Python:** Errors, Runtime Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions, raise & assert. Data Streams, Creating Your Own Data Streams ,Access Modes, Writing Data to a File, Reading Data From a File, Additional File Methods, Using Pipes as Data Streams, Handling IO Exceptions, Working with Directories, Metadata & The pickle Module.	14
V	**Data Structures, Writing GUIs in Python** : List Comprehensions, Nested List Comprehensions, Dictionary Comprehensions, Dictionaries with Compound Values, Processing Lists in Parallel, Specialized Sorts, Time Functionality ,Generators. Components and Events, An Example GUI, The Tk Widget, Button Widgets, Entry Widgets, Text Widgets,	14

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	Check button Widgets, Radio button Widgets, List box Widgets, Frame Widgets, Menu Widgets, Top level Widgets, Dialogs.	

Text Book/References Books/ Websites:

1. NischaykumarHegde; Python Programming;Educreation Publication.
2. Het land; Magnus Lie; Beginning Python; Apress Publication.
3. Zed A. Shaw; Learn Python: The Hard Way; Pearson Education Third Edition.
4. https://www.tutorialspoint.com/python/index.htm.
5. https://www.w3schools.com/python.

Suggested List of Laboratory Practical (Expandable):

1. Write Python programs using various collection data types.
2. Write a program to perform different arithmetic operations on numbers in python.
3. Write a program to create, concatenate and print a string and accessing substring from a given string.
4. Write a python program to create, append and remove lists in python.
5. Write a program to demonstrate working with dictionaries in python.
6. Write home grown Python functions.
7. Write Network Programs in Python.
8. Write CGI programs in Python.
9. Write GUI programs in Python.
10. Use the IO modeling Python to read and write disk files.

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (35)	Internal (15)	Total (50)	End Sem (Nil)	Internal (Nil)	Total
CBTE-606	Human Resource Management	2	-	-			Min: 20 (D Grade)			(Nil)

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks: 15	Best of Two Mid Semester Test – Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05
Practical Internal Max Marks: Nil	Lab Performance/Attendance / Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	The objective of the course is to acquaint students with the techniques and principles to manage hanuman resource of an organization.
Course Outcomes	**Student will able to learn:** 1. To understand the basis concept of HRM. 2. To learn the techniques for the acquisition of Human Resource. 3. To understand the concept of training and development. 4. To understand the factors responsible for performance appraisal. 5. Human Resource Maintenance.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Human Resource Management: Definition, Nature and Scope of Human Resources Management, Functions Role Competencies of HR Manager, HR Policies, HRM vs HRD. Emerging Challenges of Human Resource Management.	07
II	**Acquisition of Human Resource:** Human Resource Planning-Definition, Objective, Significance, Process of Human Resources Planning, Factor influencing HRP job analysis-job description and job specialization; Recruitment-process, Methods, Sources, Selection-Concept and process; Test and interview; placement and induction & Orientation.	07
III	**Training and Development:** Concept and Importance; Identifying Training and Development Needs; Training Programmes, Types of Training, Evaluating Training Effectiveness; Training Process Outsourcing; Management Development; Career Development, Managing employee well-being and concept of work life balance and quality of work life.	07
IV	**Performance Appraisal:** Nature, objectives and importance; Techniques and systems of performance appraisal; performance appraisal forms potential appraisal and employee counseling; well-being and concept of work life balance and quality of work life.	07
V	**Maintenance:** Employee health and safety; employee welfare; social security; Employer-Employee relations-an over view; concept of redeployment, redundancy, attrition, VRS, downsizing, layoffs and retrenchment, ethics and HRM.	07

Text Book/References Books/ Websites:

1. Gupta & Joshi, 'Human Resource Management', Kalyani Publication, 2nd Edition.
2. Rao VSP, Human Resource Management; Excel Books, New Delhi.
3. Aswathappa, K. 'Human Resource and Personnel Management', Tata McGraw-Hill.
4. https://www.tutorialspoint.com/human_resource_management/index.htm.
5. https://www.javatpoint.com.

Suggested List of Laboratory Practical (Expandable): Nil

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		L	**T**	**P**	**End Sem (35)**	**Internal (15)**	**Total (50)**		**End Sem (35)**	**Internal (15)**	**Total (50)**
CBTE-607	NCC-VI	2	-	1			**Min: 20 (D Grade)**				**Min: 20 (D Grade)**

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks:15	Best of Two Mid Semester Test – Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05
Practical Internal Max Marks: 15	Lab Performance/ Quiz/Attendance - Max. Marks: 15	

Pre-Requisite	Nil
Course Objective	1. Get acquainted about counselling process its need and importance. 2. Know about SSB procedure and different tasks and tests. 3. Know about the conduction during the interview. 4. Understand the security challenges & role of cadets in Border Areas. 5. Know about the modes of entry in Armed forces, CAPF & police. 6. Understand the life history & leadership qualities of great generals. 7. Learn about 1999 Kargil war. 8. Acquire the knowledge about various wars and their heroes. 9. Know about various components of communication process.
Course Outcomes	**Student will able to learn:** 1. Get motivated to join Armed forces, police & CAPF. 2. Write their CV effective and appealing. 3. Face SSB interview effectively in their future. 4. Understand individual responsibilities & role in meetings the security challenges on Border/Coastal areas. 5. Imbibe the feeling of patriotism. 6. Communicate more effectively.

Unit	Contents (Theory)	Marks Weightage
I	**Personality Development:** (i) Career Counseling. (ii) SSB Procedure. (iii) Interview Skills	07
II	**Border&CoastalAreas:** Security Challenges & Role of cadets in Border management.	07
III	**Armed Forces:**ModesofEntryintoArmy,Policeand CAPF.	07
IV	**Military History :** (i) BiographiesofRenownedGenerals. (ii) WarHeroes:Param VeerChakraAwardees. (iii) StudyofBattlesofKargil. (iv) WarMovies.	07
V	**Communication:** IntroductiontoCommunication&LatestTrends.	07

Text Book/References Books/ Websites:

1. Cadet's handbook, NCC Directorate, MP, CG.
2. Supplementary cadet's handbook, NCC Directorate, MP, CG.

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Suggested List of Laboratory Practical (Expandable):

1. Drill
- Ceremonial Drill.
- Guard of Honour.
2. Weapon Training (WT): Short Range firing.
3. Map Reading (MR): Google maps and Applications.
4. Field Craft & Battle Craft (FCBC): Knots, Lashing and Stretchers.
5. Social Service and Community Development (SSCD) : Cadets will participate in various activities throughout the semester e.g., Blood donation Camp, SwachhataAbhiyan, Constitution Day, Jan Jeevan HariyaliAbhiyan, BetiBachaoBetiPadhaoetc as per the requirement and similar announced days- National and State level.
6. Introduction of Infantry Weapons & Equipment (INF): Characteristics of 5.56MM INSAS Rifle, Ammunition, Fire Power, Stripping, Assembling & Cleaning Practice.
7. Communication (COM)
- Basic Radio Telephony (RT) Procedure.
- Introduction, Advantages, Disadvantages, Need for standard procedures.

Note: Examination of this NCC course will be conduct as per NCC head quarter norms in consultation with office of COE, PU.

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	**T**	**P**	**End Sem** (35)	**Internal** (15)	**Total (50)** **Min: 20 (D Grade)**	**End Sem** (Nil)	**Internal** (Nil)	**Total** (Nil)
CBTE-608	**Company and Compensation Law**	2	-	-						

Duration of Theory (Externals): 2 Hours

Theory Internal– Max Marks: 15	Best of Two Mid Semester Test – Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05
Practical Internal Max Marks: Nil	Lab Performance/Attendance / Quiz - Max. Marks: Nil	

Pre-Requisite	Fluency in English.
Course Objective	The objective of this course is to teach students about the origin, management and winding up of companies. Students will also learn about social security legislations.
Course Outcomes	**Student will be able to learn:** 1. Basic concepts of company law. 2. Memorandum of Association and Articles of Association. 3. Conduct meeting and its documentations. 4. Basic concepts of compensation law. 5. Social Welfare Legislations.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Characteristics of a company; lifting of corporate veil; types of companies including one person company, small company; formation of company –promoters, their legal position, pre-incorporation contract and provisional contracts; online registration of a company.	07
II	**Documents and Shares:** Memorandum of association, articles of association, prospectus, shelf and red herring prospectus, misstatement in prospectus; issue, allotment and forfeiture of share, Debentures, transmission of shares, buyback; issue of bonus shares.	07
III	**Management and Meetings:** Classification of directors, women directors, independent director, small shareholder's director; disqualifications, director identity number (DIN); appointment; legal positions, powers and duties; removal of directors; key managerial personnel, meetings of shareholders and board; types of meeting, convening and conduct of meetings, postal ballot, meeting through video conferencing, e-voting.	07
IV	**Compensation Law:** Employees State Insurance Act, 1948; Minimum Wages Act, 1948; Employees' Compensation Act, 1923.	07
V	**New Developments in Compensation Law:** Code on Social Security 2020: History, Significance and Important Provisions.	07

Text Book/References Books/ Websites:
1. K.L Malik ; Industrial Laws and Labour Laws; Eastern Book Company,Lucknow.
2. J.P. Sharma, J.P.; An Easy Approach to Company and Compensation Laws; Ane Books Pvt Ltd, New Delhi.
3. S.C. Srivastava ; Industrial Relations &Labour Laws; Vikas Publishing House (P) Ltd.
4. Companies Act and Corporate Laws; Bharat Law House Pvt Ltd, New Delhi.
5. Company Law Digest; Bharat Law House Pvt Ltd, New Delhi.

Suggested List of Laboratory Practical (Expandable): Nil

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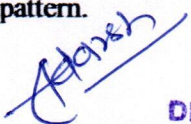Programme: **Bachelor of Technology**   **Semester –VI**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total	End Sem (Nil)	Internal (50)	Total (50)
CBCS-609	Programming Practice Lab	-	-	1			Nil			Min: 20 (D Grade)

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/ Quiz/Attendance - Max. Marks: 50	

Pre-Requisite	Basic knowledge of software.
Course Objective	The main aim of UMLis to define a standard way to visualize the way a system has been designed.
Course Outcomes	**Student will be able to learn:** 1. Increase ability to communicate with people. 2. Learn to sketch and take field dimensions. 3. Learn to take data and transform it into graphic drawings.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction to UML** ➤ Introduction to UML, Goals of UML, Object Oriented Concepts, OO Analysis and Design. UML Diagrams: Class diagram • Object diagram • Use case diagram • Sequence diagram • Collaboration diagram • Activity diagram • State chart diagram • Deployment diagram • Component diagram	50

Text Book/References Books/ Websites:

1. Grady Booch, James Rumbaugh and Ivar Jacobson; The Unified Modeling Language User Guide; Addison Wesley
2. Martin Fowler; UML Distilled: A Brief Guide to the Standard Object Modeling Language; Addison-Wesley Professional
3. https://www.tutorialspoint.com/uml/index.htm
4. https://www.uml.org/what-is-uml.htm
5. https://www.uml-diagrams.org/

Suggested List of Laboratory Experiments :- (Expandable):

1. To create a UML diagram of ATM Application.
2. To create a UML diagram of Library Management System.

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Programme: **Bachelor of Technology**   Semester –VI

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3. To create a UML diagram of Online Book Shop.
4. To create a UML diagram of Railway Reservation System.
5. To create a UML diagram of Banking System.
6. To design a Document Editor.
7. Using UML, design Abstract Factory design pattern.
8. Using UML, design Builder design pattern.
9. Using UML, design Façade design pattern.
10. Using UML, design Bridge design pattern.

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Programme: **Bachelor of Technology**   **Semester –VI**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	**T**	**P**	**End Sem** (Nil)	**Internal** (100)	**Total (100)** Min: 40 (D Grade)	**End Sem** (Nil)	**Internal** (Nil)	**Total** (Nil)
CBTE-610	Universal Human Ethics	2	1	-						

Duration of Theory (External): Nil

Theory Internal- Max Marks: 100	Best of Two Mid Semester Test – Max Marks: -50	Assignment/Quiz/Attendance - Max. Marks: 50
Practical Internal Max Marks: Nil	Lab Performance / Attendance / Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings. 2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way. 3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.
Course Outcomes	**Student will be able to learn:** 1. To start exploring themselves: get comfortable with each other and with the teacher; they start appreciating the need and relevance for the course. 2. Their desires and are able to see that all physical facility they are required for a limited time in a limited quantity. 3. The natural acceptance and see that respect is right evaluation, and only right evaluation leads to fulfillment in relationship. 4. Differentiate between the characteristics and activities of different orders and study the mutual fulfillment among them, feel confident that they can understand the whole existence; nothing is a mystery in this existence. 5. Grasp the right utilization of their knowledge in their streams of Technology/Engineering to ensure mutual fulfillment.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction to Value Education**: Understanding Value Education, Self-exploration as the Process for Value Education ,Sharing about Oneself ,Continuous Happiness and Prosperity – the Basic Human Aspirations, Right Understanding, Relationship and Physical Facility ; Exploring Human Consciousness , Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations ,Exploring Natural Acceptance.	20
II	**Harmony in the Human Being** : Understanding Human being as the Co-existence of the Self and the Body ,Distinguishing between the Needs of the Self and the Body ,Exploring the difference of Needs of Self and Body ,The Body as an Instrument of the Self, Understanding Harmony in the Self , Exploring Sources of Imagination in the , Harmony of the Self with the Body , Programme to ensure self-regulation and Health.	20
III	**Harmony in the Family and Society** : Harmony in the Family – the Basic Unit of Human Interaction, Values in Human-to-Human Relationship, 'Trust' – the Foundational Value in Relationship, Exploring the Feeling of Trust, 'Respect' – as the Right Evaluation , Exploring the Feeling of Respect , Understanding Harmony in the Society, Vision for the Universal Human	20

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	Order , Exploring Systems to fulfill Human Goal.	
IV	**Harmony in the Nature/Existence**: Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature, Exploring the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence, Exploring Co-existence in Existence.	20
V	**Implications of the Holistic Understanding – a Look at Professional Ethics**: Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct , Exploring Ethical Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Exploring Humanistic Models in Education, Holistic Technologies, Production Systems and Management Models Typical Case Studies, Strategies for Transition towards Value-based Life and Profession, Exploring Steps of Transition towards Universal Human Order.	20

Text Book/References Books/ Websites:

1. R.R Gaur; R Sangal; G P Bagaria; A foundation course in Human Values and professional Ethics; Excel books; New Delhi.
2. B L Bajpai;Indian Ethos and Modern Management; New Royal Book Co.
3. A.N. Tripathy; Human Values; New Age International Publishers.
4. Value Education websites, http://uhv.ac.in.

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: **Bachelor of Technology**   Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBCS-7101	Human Computer Interaction	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Quiz/Attendance - Nil Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	Student should be able to understand about computer interaction.
Course Outcomes	**Student will be able to learn:** 1. Importance of design interactive products those are usable. 2. Key terms used in interaction design. 3. A focus on using design features or components, information, and visual screen. 4. Navigation scheme. 5. Use of building tools and multimedia.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Importance of user Interface–definition, importance of good design. Benefits of good design. A brief history of Screen design, The graphical user interface –popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user–Interface popularity, characteristics-Principles of user interface.	14
II	**Design Process:** Human interaction with computers, importance of human Characteristics human consideration, Human interaction speeds and understanding business junctions.	14
III	**Screen Designing:** Design Goals Screen Planning and Purpose, organizing screen elements, ordering of screen data and content–screen navigation and flow–Visually pleasing composition – amount of information focus and emphasis presentation information simply and meaning fully information retrieval on web– statistical graphics Technological Consideration in interface design	14
IV	**Windows:** New and Navigation schemes selection of window, selection of devices based and screen based controls.	14
V	**Components:** Text and Messages, Icons and increases– Multimedia, colors, usesProblems, choosing colors. Software tools– Specification methods, interface– Building tools.	14

Text Book/References Books/ Websites:
1. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell; Human–Computer Interaction; Paul E. Van Hemel
2. Wil Bert O Galitz; The essential l guide to user interface design; Wiley Dream Tech
3. Soren Lauesen; User Interface Design; Pearson Education.
4. https://onlinelibrary.wiley.com/doi/full/10.1002/9781118540190.wbeic182
5. https://www.interaction-design.org/literature/topics/human-computer-interaction

Suggested List of Laboratory Practical (Expandable): Nil

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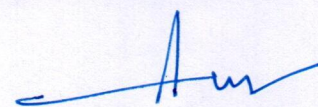
Programme: **Bachelor of Technology**   Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBCS-7102	Distributed System	3	-	-			Min: 40 (D Grade)			

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Quiz/Attendance - Max. Marks: Nil	

Pre-Requisite	Fundamental knowledge of distributed systems
Course Objective	Teach students the core aspects of distributed systems that make their design and implementation more challenging than sequential software running on a single machine
Course Outcomes	**Student will be able to learn:** 1. To provide hardware and software issues in modern distributed systems 2. To get knowledge in distributed architecture and distributed file systems 3. To understand synchronization, consistency, replication, fault tolerance, security in distributed file system. 4. To understand distributed scheduling and algorithm. 5. To study distributed database system and management.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction to distributed systems**: Architecture for Distributed System, Goals of Distributed system, Hardware and Software concepts, Distributed Computing Model, Advantages & Disadvantage distributed system, Issues in designing Distributed System	14
II	**Distributed Share Memory And Distributed File System**: Basic Concept of Distributed Share Memory (DSM), DSM Architecture & its Types, Design & Implementations issues In DSM System, Structure of Share Memory Space, Consistency Model, and Thrashing. Desirable features of good Distributed File System, File Model, File Service Architecture, File Accessing Model, File Sharing Semantics, File Catching Scheme, File Application & Fault tolerance. Naming: - Features, System Oriented Names, Object Locating Mechanism, Human Oriented Name.	14
III	**Inter Process Communication And Synchronization**: API for Internet Protocol, Data Representation & Marshaling, Group Communication, Client Server Communication, RPC-Implementing RPC Mechanism, Stub Generation, RPC Messages. Synchronization: - Clock Synchronization, Mutual Exclusion, Election Algorithms: -Bully & Ring Algorithms.	14
IV	**Distributed Scheduling And Deadlock**: Distributed Scheduling-Issues in Load Distributing, Components for Load Distributing Algorithms, Different Types of Load Distributing Algorithms, Task Migration and its issues. Deadlock-Issues in deadlock detection & Resolutions, Deadlock Handling Strategy, Distributed Deadlock Algorithms.	14
V	**Distributed Multimedia & Database system:** Distributed Database Management System (DDBMS), Types of Distributed Database, Distributed Multimedia: - Characteristics of multimedia Data, Quality of Service Managements. Case Study of Distributed System: - Amoeba, Mach, Chorus	14

Text Book/References Books/ Websites:

1. Pradeep K. Sinha; Distributed Operating System Concept & Design; PHI
2. Coulouris & Dollimore; Distributed System Concepts and Design; Pearson Pub.

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3. Attiya & Welch; Distributed Computing; Wiley Pub.
4. https://link.springer.com/article/10.1007/s00607-016-0508-7/Distributed_computing
5. https://www.hpcs.cs.tsukuba.ac.jp › dsys › dsd-tutorial

Suggested List of Laboratory Practical (Expandable): Nil

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (Nil)	Internal (Nil)	Total
CBCS-7103	Wireless Network	3	-	-			Min: 40 (D Grade)			(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Quiz/Attendance - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	To study the evolving wireless technologies and standards
Course Outcomes	**Student will be able to learn:** 1. Latest wireless technologies and trends in the communication field 2. Understand the transmission of voice and data through various networks. 3. Understand various wireless techniques, modulation techniques 4. Understand various protocols and services provided by next generation networks. 5. IEEE standard.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction of Wireless Networks**: Different Generations of Wireless Networks. Characteristics of the Wireless Medium: Radio Propagation Mechanisms, Path Loss Modelling and Signal Coverage, Effect of Multipath and Doppler, Channel Measurement and Modelling Techniques.	14
II	**Network Planning**: Introduction, Wireless Network Topologies, Cellular Topology, Cell Fundamentals, Signal to Interferences Radio Calculations, Network Planning for CDMA Systems, Wireless Network Operations: Mobility Management, Radio Resources and Power Management	14
III	**Multiple Division Techniques**: FDMA, TDMA, CDMA, OFDM, SDMA. Comparison of Multiple Division Techniques, Modulation Techniques–AM, FM, FSK, PSK, QPSK, QAM, 16QAM Mobile Data Networks: Introduction, Data Oriented CDPD Network, GPRS, EDGE and High Data Rates, SMS in GSM, Mobile Application Protocols.	14
IV	**Introduction to Wireless LAN**: Evolution of WLAN, Wireless Home Networking, Technologies for Home Area Network (HAN), Overview of IEEE 802. 11, Reference Architecture, PHY and MAC Layer, Wireless ATM, HIPERLAN.	14
V	**IEEE standard**: 802. 15WPAN, Home RF, Bluetooth, Interference between Bluetooth and 802. 11, Adhoc Networks, Introduction to 2. 5G and 3GNetworks.	14

Text Book/References Books/ Websites:
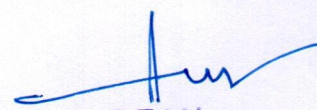
1. Kaveh Pahlavan, Prashant Krishnamurthy; Principles of Wireless Networks, PHI.
2. Qing-An Zeng, Dharma Prakash Agrawal; Introduction to Wireless and Mobile Systems; CENGAGE Learning.
3. Sumit Kasera, Nishit Narang, AP Priyanka, 2. 5GMobileNetworks: GPRS and EDGE; TMH
4. http: //www.cse.wustl.edu/~jain/cis788-97/wireless_lans/index.htm
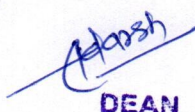5. https: //book.systemsapproach.org/direct/wireless.html

Suggested List of Laboratory Practical (Expandable): Nil

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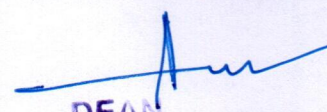
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Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBCS-7104	Embedded System	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz - Max. Marks: Nil	

Pre-Requisite	To provide students with basic knowledge and skills in embedded systems design.
Course Objective	To make students familiar with the basic concepts and terminology of the target area, the embedded systems design flow.
Course Outcomes	**Student will be able to learn:** 1. Understand basic concepts in the embedded systems. 2. Acquire knowledge about basic concepts of circuit emulators. 3. Acquire knowledge about devices and buses used in embedded networking. 4. Develop programming skills in embedded systems for various applications. 5. Learn different operating systems in embedded systems.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction to Embedded System**: Categories, Requirements, Applications, Challenges and Issues. Core of Embedded system, Memory, Sensors and Actuators, communication interface, Embedded firmware, system components.	14
II	**Fundamental issues of hardware software co-design**, computational models in embedded design data flow graph, control flow graph, state machine model, sequential programmed model, concurrent model, unified modeling language.	14
III	**Architecture of 8085 microcontroller**, memory organization, registers, interrupts, addressing modes, instruction sets.	14
IV	**Embedded firmware design approaches**: OS based, Super loop based. Embedded firmware development languages-Assembly language based, high level language based, mixed. Programming in embedded C.	14
V	**Types of Operating system**: Task, process and threads, Multi processing and multi task, Task scheduling, Task communication, Task synchronization.	14
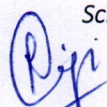
Text Book/References Books/ Websites:
1. Shibu KV; Introduction to Embedded System; TMH.
2. David E Simon; An Embedded Software Prime; Pearson education Asia, 2001.
3. Raj Kamal; Embedded Systems; TMH.
4. https://www.embedded.com
5. http://www2.ensc.sfu.ca/reference/embedded.html

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: **Bachelor of Technology**　　　　　　　　　　　Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBCS-7201	Parallel Algorithm	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Quiz/Attendance - Nil Max. Marks: Nil	

Pre-Requisite	Fundamental knowledge of parallel processing concepts
Course Objective	Parallel processing concepts and introduce the various classes of parallel algorithms.
Course Outcomes	**Student will be able to learn:** 1. Parallel algorithms for basic problems and parallel processing concepts. 2. Learn algorithm and sorting technique. 3. Develop parallel algorithms for standard problems and applications. 4. Analyze efficiency of different parallel algorithms. 5. Understand different parallel architectures and models of computation.

Unit	Contents (Theory)	Marks Weightage
I	**Need for Parallel Processing**: Data and Temporal Parallelism, Models of Computation – RAM and PRAM Model, Shared Memory and Message Passing Models, Processor Organizations – PRAM Algorithm, Analysis of PRAM Algorithms, Parallel Programming Languages.	14
II	**Parallel Algorithms for Reduction**: Prefix Sum, List Ranking, Preorder Tree Traversal Searching, Sorting, Merging, Two Sorted Lists, Matrix Multiplication, Graph Coloring, Graph Searching.	14
III	**2D Mesh SIMD Model**: Parallel Algorithms for Reduction, Prefix Computation, Selection, Odd Even Merge Sorting, Matrix Multiplication	14
IV	**Hypercube SIMD Model:** Parallel Algorithms for Selection, Odd-Even Merge Sort, Bitonic Sort, Matrix Multiplication Shuffle Exchange SIMD Model, Parallel Algorithms for Reduction, Bitonic Merge Sort, Matrix Multiplication, Minimum Cost Spanning Tree.	14
V	**Models**: UMA Multiprocessor Model, Parallel Summing on Multiprocessor, Matrix Multiplication on Multiprocessors and Multicomputer, Parallel Quick Sort, Mapping Data to Processors.	14
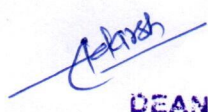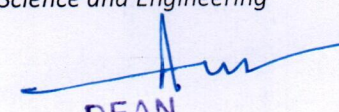
Text Book/References Books/ Websites:

1. Michael J. Quinn; Parallel Computing : Theory & Practice; Tata McGraw Hill Edition, Second edition.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran; Fundamentals of Computer Algorithms, University press, Second edition.
3. V Rajaraman, C Siva Ram Murth; Parallel computers- Architecture and Programming; PHI learning.
4. https: //hpc.llnl.gov/training/tutorials/introduction-parallel-computing-tutorial
5. https: //web.ece.ucsb.edu/Faculty/Parhami/text_par_proc.htm

Suggested List of Laboratory Practical (Expandable): Nil

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(Applicable for Admitted from Academic Session 2021-22 onwards)

Programme: **Bachelor of Technology**   Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (Nil)	Internal (Nil)	Total
CBCS-7202	Digital Image Processing	3	-	-			Min: 40 (D Grade)			(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance /Attendance / Quiz - Max. Marks: Nil	

Pre-Requisite	Digital Image Processing is a subfield of signals and systems, so it would be good if you already have some knowledge about signals and systems, but it is not necessary.
Course Objective	To introduce the concepts of image processing and basic analytical methods to be used in image processing.
Course Outcomes	**Student will be able to learn:** 1. Develop any image processing application. 2. Understand different techniques employed for the transformations of images. 3. Learn techniques employed for the enhancement of images. 4. Understand the need for image compression and to learn the spatial and frequency domain techniques of image compression. 5. Multimedia standards and applications.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Digital Image Processing, Applications, Image Processing Operations, Parts of Digital Image Processing Systems, Image Sampling and Quantization, Neighbors, Connectivity, Distance Measures Between pixels, Linear and Non Linear Operations.	14
II	**Image Transformations:** Introduction to Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Introduction to Spatial Filters, Types, Techniques, Introduction to Fourier Tranormand the frequency Domain, Image Enhancements in Frequency Domain, Frequency Domain Filters, Types, Techniques and Image Restoration.	14
III	**Image Degradation & Restoration:** Introduction to Image Degradation, Image Restoration, Restoration and Degradation Models, Noise Models, Restoration and Degradation by Filtering, Estimation of Degradation Function and various Filtering Techniques and Geometric transformations.	14
IV	**Image Compression and Segmentation:** Introduction to Image Compression, Codling's, Interpixel and Psychovisual Redundancy, Introduction to Image Segmentation, Edge linking And boundary detection, Thresholding and Types of Segmentation.	14
V	**Multimedia:** Introduction to multimedia, system architecture& technologies , Objects for multimedia systems, Multimedia interface standards , data and file format standards, RTF, TIFF, RIFF, MIDI, JPEG, MPEG, Multimedia communication protocols(UDP, RTP, RTCP, XTP , TELNET, IP Multicast etc.), Multimedia Applications, VRML(Virtual reality modeling language), Streaming, Hypermedia and its applications.	14

Text Book/References Books/ Websites:

1. A. K. Jain; Digital Image Processing; Prentice Hall.
2. Prabhat K, Leigh and Kiran Thakrar; Multimedia system Design; PHI Publications.
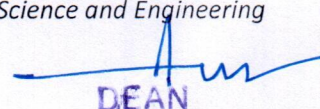3. Rafael C Gonzalez and Richard E Woods; Digital Image Processing.
4. https: //www.mygreatlearning.com/blog/digital-image-processing-explained/
5. https: //sisu.ut.ee/imageprocessing/book/

Suggested List of Laboratory Experiments : - (Expandable): Nil

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Programme: **Bachelor of Technology**   Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (Nil)	Internal (Nil)	Total
CBCS-7203	Block Chain Programming	3	-	-			Min: 40 (D Grade)			(Nil)

Duration of Theory (Externals): 3 Hours

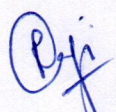| Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance /Attendance / Quiz - Max. Marks: Nil	

Pre-Requisite	Students must have programming skills. Some prior familiarity with cryptography may be helpful, but all necessary background will be covered in class.
Course Objective	Cryptographic Primitives. Block chain concepts and protocols.
Course Outcomes	**Student will be able to learn:** 1. Understand the concepts of the block chain ecosystem. 2. Learn how to develop decentralized applications. 3. Understand how block chains provide distributed storage and reach consensus 4. Comprehend how crypto currencies and non-financial applications work on block chains 5. Create and deploy smart contracts to conceive as autonomous, conflict-free applications

Unit	Contents (Theory)	Marks Weightage
I	**Basics:** Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete.	14
II	**BlockChain:** Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Block chain application, Soft& Hard Fork, Private and Public blockchain.	14
III	**Distributed Consensus:** Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.	14
IV	**Crypto currency:** History, Distributed Ledger, Bit coin protocols - Mining strategy and rewards, Ethereum-Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin. **Crypto Currency Regulation:** Stakeholders, Roots of Bitcoin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy.	14
V	**Block Chain Applications:** Internet of Things, Medical Record Management System, Domain Name Service and future of Block chain.	14

Text Book/References Books/ Websites:
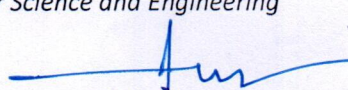
1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder; A Comprehensive Introduction; Bitcoin and Crypto currency Technologies; Princeton University Press.
2. William Mougayar; The Business Blockchain: Promise, Practice and Application of the Next Internet Technology Hardcover.
3. DR. Gavin Wood; A Secure Decentralized Transaction Ledger; Yellow paper 2014.
4. https: //builtin.com › blockchain
5. https: //www.ala.org › tools › future › trends › blockchain

Suggested List of Laboratory Experiments : - (Expandable): Nil

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Programme: **Bachelor of Technology**   Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	**T**	**P**	**End Sem** **(70)**	**Internal** **(30)**	**Total (100)**	**End Sem** **(Nil)**	**Internal** **(Nil)**	**Total**
CBCS-7204	**Data Analytics**	3	-	-			**Min: 40** **(D Grade)**			**(Nil)**

Duration of Theory (Externals): 3Hours

Theory Internal-Max Marks: 30	Best of Two Mid Semester Test– Max Marks: 20	Assignment/Quiz/Attendance- Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Quiz/Attendance – Max Marks: Nil	

Pre-Requisite	Nil
Course Objective	Learn sufficient relevant data, conduct data analytics using scientific methods.
Course Outcome	**Student will be able to learn:** 1. Students will understand proficiency with statistical analysis of data. 2. The ability to think critically in making decisions based on data and deep analytics. 3. Knowledge of big data analytics. 4. The ability to use technical skills in predicative and prescriptive modeling to support business decision-making. 5. The fundamental of visualization. It presents major concepts in visualization design and methods for algorithmic development.

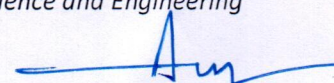| Unit	Contents(Theory)	Marks Weightage
I	**Statistics and Probability**: Descriptive Statistics (Measure of Central Tendency, Association, Dispersion), Probability (Terminology, Rules & Events, Conditional Probability and Bayes Theorem), Data Distribution (Skewness, t-Distribution, Uniform Distribution, Binomial Distribution, Poisson distribution, Geometric Distribution Gaussian Distribution, Standard Normal Distribution, Central Limit Theorem), Inferential Stats (Estimation technique, Hypothesis Testing), Sampling Techniques (Random, Stratified), Statistical Tests (ANNOVA, Chi-Square).	14
II	**Introduction to PYTHON**: PYTHON Objects, PYTHON Libraries: NUMPY, PANDAS, Data frame Manipulation, Visualization, Exploratory Data Analysis (EDA). ML Fundamentals Using Python: Linear and Logistic Regression, Decision Trees, Random Forest, k-Nearest Neighbors, SVM, Ensemble Techniques, PCA, LDA, K-Means Clustering, Hierarchical Clustering, Time Series, Introduction to Deep Learning. Introduction to R Language.	14
III	**Introduction to Big data**: Traditional versus Big data. Characteristics, Types, Challenges, and Evolution of Big data. Technology and Infrastructure for Big data. Desired properties of Big Data system. Introduction to Hadoop, Core Hadoop components, Hadoop Eco system, Hive Physical Architecture, Hadoop limitations, RDBMS Versus Hadoop, Hadoop Distributed File system, Processing Data with Hadoop, Managing Resources and Application with Hadoop, Introduction to YARN and MapReduce programming. PIG: Data Types for PIG, Using Pig on HADOOP. Introduction to NoSQL and MongoDB.	14
IV	**Introduction to Spark**: Apache Spark Architecture, Components of Spark, Spark RDDs, RDD Operations: Transformation & Actions, Spark SQL Library – Data Frames, Leverage Hive for Spark, Machine Learning using Spark ML, Illustrate ML Algorithm using PySpark, Into to Kafka for Spark Streaming, Apache Spark Streaming Features, Spark Streaming Workflow, Streaming Context and Dstreams.	14

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V	**Intro to Tableau:** Interface, Connnecting to Data, Visual Analytics, Mapping, Calculations, Dashboard and Stories, PowerBI, Visualisation with BI, Data Analysis Expressions	14

TextBook/ReferencesBooks/Websites:

1. Anil Maheshwari; Data Analytics; Tata McGraw Hill.
2. Subhashini Seema Acharya; Big Data and Analytics; Wiley publication.
3. Ajit Kumar Roy, Pradip Kumar Choudhury; Applied Big Data Analytics; Create Space Independent Publishing Platform.
4. Vijay Srinivas Agneeswaran; Big Data Analytics Beyond Hadoop; Pearson.
5. http: //www. datasciencecentral. com

Suggested List of Laboratory Experiments (Expandable): Nil

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (Nil)	Internal (Nil)	Total
CBCS-703	Data Mining and Ware Housing	3	-	-			Min: 40 (D Grade)			(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Quiz/Attendance - Max. Marks: Nil	

Pre-Requisite	Fundamental knowledge of mathematics such as Algebra and Trigonometry.
Course Objective	Learning how together and analyze large sets of data to gain useful business understanding.
Course Outcomes	**Student will be able to learn:** 1. Learning how together and analyze large sets of data to gain useful business understanding 2. Get knowledge of Data preprocessing and data quality, Modeling and design of data warehouses. 3. Overview of the developing areas-web mining, text mining, and ethical aspects of data mining 4. Understanding of the design and implementation of data mining based systems. 5. Algorithms for data mining, skills be able to design data warehouses.

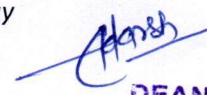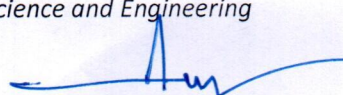| Unit	Contents (Theory)	Marks Weightage
I	**Data Warehousing:** Need for data warehousing, Basic elements of data warehousing, Data Mart, Data Warehouse Architecture, extract and load Process, Clean and Transform data, Star, Snow flake and Galaxy Schemas for Multidimensional databases, Fact and dimension data.	14
II	**Data Warehouse and OLAP technology:** Multidimensional data models and different OLAP Operations, OLAP Server: ROLAP, MOLAP, Data Warehouse implementation, Efficient Computation of Data Cubes, Processing of OLAP queries, indexes data.	14
III	**Data Mining:** Data Mining: Definitions, KDD v/s Data Mining, DBMS v/s Data Mining , DM techniques, Mining problems, Issues and Challenges in DM, DM Application areas, Association Rules & Clustering Techniques: Introduction, Various association algorithms like A Priori, Partition, Pincer search etc. , Generalized association rules, Clustering paradigms; Partitioning algorithms like K-Medoids, CLARA, and CLARANS; Hierarchical clustering, DBSCAN, BIRCH, CURE; categorical clustering algorithms, STIRR, ROCK.	14
IV	**Web Mining:** Web Mining, Web content mining, Web structure Mining, Web Usage Mining, Application of Neural Network, AI, Fuzzy logic and Genetic algorithm, Decision tree in DM, Temporal land spatial DM: Temporal association rules, Sequence Mining, GSP, SPADE, SPIRIT, and WUM algorithms, Episode Discovery, Event prediction, Time series analysis, Spatial Mining, Spatial Mining tasks, Spatial clustering and Spatial Trends.	14
V	**Data Mining of Image and Video:** Image and Video representation techniques, feature extraction, motion analysis, content used image and video retrieval, clustering and association paradigm, knowledge discovery.	14

Text Book/References Books/ Websites:
1. Arun K. Pujari; Data Mining Techniques; Pearson Publications.
2. Han & Kamber; Data Mining; Morgan Kauffman Publications.
3. Vishwanathan; Data Warehousing and Mining; Scitech Publication Pvt. Ltd. Chennai.
4. https://www.tutorialspoint.com
5. https://www.geeksforgeeks.org

Suggested List of Laboratory Practical (Expandable): Nil

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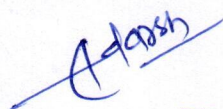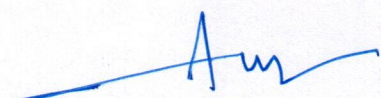
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Programme: **Bachelor of Technology**   Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (35)	Internal (15)	Total (50)
CBCS-704	Compiler Design	3	-	1			Min: 40 (D Grade)			Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance/ Quiz/Attendance - Max. Marks: 15	

Pre-Requisite	Student should have basic knowledge of computer fundamental.
Course Objective	To understand the basic principles of compiler design.
Course Outcomes	**Student will be able to learn:** 1. To introduce the major concept areas of language translation and compiler design. 2. To enrich the knowledge in various phases of compiler 3. To practical programming skills necessary for constructing a compiler. 4. Use, code Optimization techniques, machine code generation and use of symbol table 5. Learn code generation.
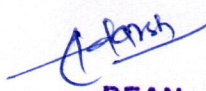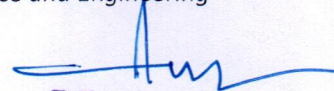
Unit	Contents (Theory)	Marks Weightage
I	**Introduction & Lexical Analysis:** Introduction to Translator, Interpreter, Assembler, Compiler, Analysis Synthesis Model, Phases, Pass Structure, Introduction to Porting, Cross Compiler, Boot strapping, Introduction to Lexical Analysis, Finite State Machines, Regular Expressions and LEX.	14
II	**Syntax Analysis & Semantic Analysis:** Introduction to Syntax Analysis, Parsing, CGF's, Parse Trees, Ambiguity, Normal Forms, Types of Parsing, LL(1)Parsing, LR Parsers, YACC, Introduction to Semantic Analysis, SDT, SDD, Types of Attributes and Introduction to Type Checker.	14
III	**Intermediate Code:** Generation & Run Time Environments Introduction to Intermediate Code Generation, Three Address Code, Representation of TAC, 3 AC for Programming Language Constructs, Introduction to Run Time Memory Storage, Activation Records, Parameter Passing Mechanisms, Static Binding v/s Dynamic Binding, Memory Allocation Techniques, Dynamic Memory Allocation and Garbage Collection.	14
IV	**Symbol Table:** Error Handler and Code Optimization Introduction to Symbol Table, its Uses, Data Structures used for Symbol Table Management, Introduction to Error Handler, its Applications, Types of Errors, Introduction to Basic Block and Flow Graph, Introduction to Code Optimization, Code Optimization Techniques, Local Optimization, Loop Optimization, Global Optimization, Data Flow Analysis and Peep Hole Optimization.	14
V	**Code Generation** Introduction to Target Code Generation, Types of Target Codes, Design of a Code Generator, Directed Acyclic Graph, and Target Code Generation from DAG, Back patching, DAG for TAC, Assembly Code, Introduction to Linkers, Loaders, De compilation and Symbolic Debugging of Optimized Code.	14

Text Book/References Books/ Websites:
1. Santanu Chattopadhyay; Compiler Design; PHI.
2. Rajkumar Y Sudha Rani S, Karthi M; Compiler Design; Wiley.
3. Alfred V Aho and Ravi Sethi; Compilers: Principles, Techniques and Tools; Pearson.

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Programme: **Bachelor of Technology**   Semester –VII

4. https://onlinecourses.nptel.ac.in/noc21_cs07/preview
5. https://www.tutorialspoint.com/compiler_design/compiler_design_useful_resources.htm

Suggested List of Laboratory Practical (Expandable):

1. Program to implement a DFA that accepts all Strings of 'a'and'b'ending with'abb'.
2. Program to implement a DFA that accepts all Strings of 'a' and 'b' having equal number of 'a' and 'b'.
3. Program to implement Lexical Analyzer.
4. Program to implement LL (1) Parser.
5. Program to implement Recursive Descent Parser.
6. Program to implement Operator Precedence Parser.
7. Program to generate Intermediate Code as Postfix Notation.
8. Program to generate Intermediate Code as Three Address Code.

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Programme: Bachelor of Technology   Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)
CBCS-705	Machine Learning With Python	3	1	1						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance /Attendance / Quiz - Max. Marks: Nil	

Pre-Requisite	Basic Knowledge of Computer.
Course Objective	To serve as an introduction to machine learning with Python.
Course Outcomes	**Student will be able to learn:** 1. Problem solving, programming capability and introduction to python. 2. Mapping functions and standard modules. 3. Classes in Python with Regular Expressions 4. Data Structures, GUIs in Python 5. Python and CGI Scripts, HTML, Networking fundamentals.

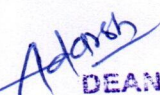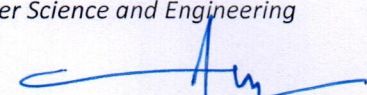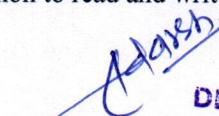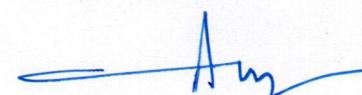| Unit	Contents (Theory)	Marks Weightage
I	**An Introduction to Python**: A Brief History of Python, Python Versions, Installing Python, Environment Variables, Executing Python from the Command Line, The format Method, String Operators, Numeric Data Types, Conversion Functions, Simple Output/Input, The % Method, The print Function, Indenting Requirements, The if Statement, Relational and Logical Operators, Bit Wise Operators, The while Loop, break and continue, The for Loop.	14
II	**Python Collections**: Functions, Modules: Lists, Tuples, Sets, Dictionaries, Sorting Dictionaries, Copying Collections. Defining Your Own Functions, Parameters, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Passing Functions to a Function, map, filter, Mapping Functions in a Dictionary.	14
III	**Exceptions, I/O, Classes in Python Regular Expressions:** Errors, Runtime Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions, raise & amp; assert. Data Streams, Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data From a File, Additional File Methods, Using Pipes as Data Streams, Handling IO Exceptions, Working with Directories, Metadata & The pickle Module. Classes in Python.	14
IV	**Data Structures, Writing GUIs in Python**: List Comprehensions, Nested List Comprehensions, Dictionary Comprehensions, Dictionaries with Compound Values, Processing Lists in Parallel, Specialized Sorts, Time Functionality, Generators. Components and Events, An Example GUI, The T k Widget, Button Widgets, Entry Widgets, Text Widgets, Check button Widgets, Radio button Widgets, List box Widgets, Frame Widgets, Menu Widgets, Top level Widgets, Dialogs.	14
V	**Python and CGI Scripts**: What is CGI, HTML, HTML Forms, A Library Application, HTML Tables, The CGI Script, Rendering of the Script The OS Module & amp; Network Programming: The Environment, creating a Process, Listing Files, File Information(Metadata), Working with Directories. Networking Fundamentals, The Client/Server Model, The socket Module, A Client Program, A Server program and Evaluation Client and Server.	14

Text Book/References Books/ Websites:

1. Python Programming (IBM ICE Publication)

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2. Hetland, Magnus Lie; Beginning Python; (A press Publication)2017.
3. ZedA. Shaw; Learn Python the HardWay Pearson Education; Third Edition(2017)
4. https: //www.mygreatlearning.com/blog/sources-for-analytics-and-machine-learning-datasets/
5. https: //in.mathworks.com/machinelearning

Suggested List of Laboratory Practical (Expandable):

1. Write Python programs using various collection data types.
2. Write homegrown Python functions.
3. Write Network Programs in Python.
4. Write CGI programs in Python.
5. Write GUI programs in Python.
6. Use the IO modeling Python to read and write disk file.

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Programme: **Bachelor of Technology** Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
CBCS-706	Programming With PHP	L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
		3	1	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance /Attendance / Quiz - Max. Marks: Nil	

Pre-Requisite	Basic Programming knowledge and Logical skills
Course Objective	Analyze the basic structure of a PHP web application and be able to install and maintain the web server, compile, and run a simple web application.
Course Outcomes	**Student will be able to learn:** 1. Syntax of PHP, Database support. 2. Write regular expressions including modifiers, operators, and meta characters. 3. Write PHP scripts to handle HTML forms. 4. Exception Handling, JAVA Script. 5. Create PHP programs that use various PHP library functions, and that manipulate files and directories.
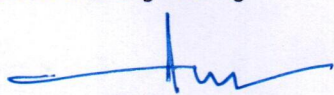
Unit	Contents (Theory)	Marks Weightage
I	**PHP Basics:** Introduction to PHP, Support for Database, PHP Installation, Working with PHP, Why PHP?, Basic Syntax of PHP, PHP statement terminator and case in sensitivity, Embedding, PHP in HTML, Comments, Variables, Assigning value to variable, Constants, Managing Variables.	14
II	**Operators, Controls Structures and Functions in PHP:** Arithmetic Operators, Bit-wise Operators, Comparison Operators, Logical Operators, Concatenation Operator, Incrementing/ Decrementing Operator, Ternary Operator, Operator Precedence, String Manipulation, Break and Continue Functions, User-Define d function, Function Definition, Function Call, Function with arguments, Function with return value, Call by value and call by References,	14
III	**Arrays and PHP File Handling:** Introduction to Array, Array in PHP, Creating an Array, Accessing Element of an Array, Finding the Size fan Array, Iterating Array Elements Converting an Array to String, Array Sorting, Multi-dimensional Array, Accessing elements of a Multidimensional Array, Iterating Multidimensional Array. Introduction, File Open, File Creation, Writing to files, Reading from File, Closing a File Using PHP With HTML Forms.	14
IV	**Class, Object and Exception Handling, JAVA Script:** Introduction, Object, Class, Defining Class in PHP, Object in PHP, Usage of $ this variable, Constructor, Constructor with Parameters. Introduction to Exception, Multiple Catch Blocks, Error Handling in PHP, Java Introduction.	14
V	**Creating and Debugging PHP Projects:** Install the local Web Server, Install the PHP engine. Create and Run PHP Project, Understanding Debug View, The PHP debug respective the Variables view, Installing and Configuring the debuggers- Install the Zen debugger, Install X Debug, Configure the debuggers, Setting up PDT(PHP Development Tools)–Setup PHP server	14

Text Book/References Books/ Websites:
1. Web Programming Thru PHP (IBM ICE Publication).
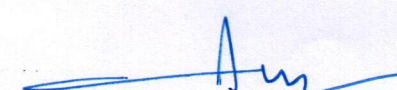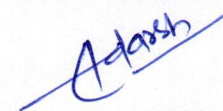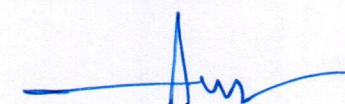2. Tim Converse; PHP Bible.

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3. Bill McCarthy; PHPA beginners guide.
4. Luke Welling; PHP and My SQL Web Development.
5. http://ts.ictacademy.in/PHP-with-MySQL.aspx

Suggested List of Laboratory Practical (Expandable): Nil

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PEOPLE'S UNIVERSITY, BHOPAL
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Programme: **Bachelor of Technology**   Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total (Nil)	End Sem (Nil)	Internal (50)	Total (50) Min: 20 (D Grade)
CBCS-707	Innovative Project Lab	-	-	1						

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/ Quiz/Attendance - Max. Marks: 50	

Pre-Requisite	Fundamental Engineering concepts of concern discipline.
Course Objective	This course sets in motion an exploration of the fundamental approaches that underpin the making and development of an innovation. It draws on ideas and practices such as - interdisciplinary, creativity, collaboration and entrepreneurship to identify problems and opportunities that give rise to innovation.
Course Outcomes	**Student will be able to learn:** 1. Carry out independent and/or collaborative research in the planning and scoping of a creative industry project that seeks to present an innovative outcome. 2. Identify, analyze & define the problem. 3. Generate alternative solutions to the problem identified. 4. Compare & select feasible solutions from alternatives generated. 5. To work effectively in a team.

Unit	Contents (Theory)	Marks Weightage
I	Students shall be encouraged to form groups (Maximum 5) to do a Project on technical topic of concern branch. The student should prepare a working system or some design or understanding of a complex system (on minor level) that he/she has selected for his/her innovative project work using system analysis tools and submit the same in the form of a write-up i. e. detail project report. The student should maintain proper documentation of different stages of project such as concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan wherever applicable. Each student is required to prepare a project report based on the above points and present the same at the final examination with a demonstration of their project.	50

Text Book/References Books/ Websites: Nil

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: **Bachelor of Technology**   Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total (Nil)	End Sem (Nil)	Internal (50)	Total (50)
CBTE-708	Introduction to MATLAB	-	-	1						Min: 20 (D Grade)

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/ Quiz/Attendance - Max. Marks: 50	

Pre-Requisite	C Programming, Basics of Engineering Mathematics, Basic computer literacy is expected.
Course Objective	1. To Impart the Knowledge to the students with MATLAB software to enhances programming knowledge in Research and Development. 2. To introduce students the use of a high-level programming language, MATLAB for scientific problem solving with engineering applications.
Course Outcomes	**Student will be able to learn:** 1. Understand the basics of MATLAB. 2. Break a complex task up into smaller, simpler tasks. 3. To prepare programmes under Case Study (Any two Modules). 4. Tabulate results and analyze.

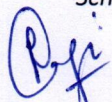| Unit	Contents (Theory)	Marks Weightage
I	1. **Introduction-** Starting MATLAB, Using MATLAB as a calculator, Creating MATLAB variables, Making corrections, Miscellaneous commands 2. **Mathematical functions-** Creating simple plots, Adding titles, axis labels, and annotations, multiple data sets in one plot, Matrix generation, entering a vector, Matrix indexing. 3. **Array operations and Linear equations-** Array arithmetic operations, Matrix inverse, Matrix functions. 4. **Introduction to programming in MATLAB -** M-File Scripts, Script side-effects, Anatomy of a M-File function, Input and output arguments, Input to a script file, Output commands. 5. **Debugging M-files -** Debugging process, Preparing for debugging, Setting breakpoints, Running with breakpoints.	50

Text Book/References Books/ Websites:
1. http: //www.matlabtutorials.com/mathforum/
2. http: //www.mathworks.in/matlabcentral/
3. MATLAB Manuals and Handbooks
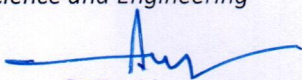
Suggested List of Laboratory Practical (Expandable):
1. Study of introduction to MATLAB.
2. Find the factorial of 5 using MATLAB command.
3. Generate the following row vector b= [1, 2, 3, 4, 5 . . . 9, 10], then transpose it to column vector.
4. Write a programme to Solve the following system x+y=1 x-y+z=0 x+y+z=2
5. Write a programme, let x=[2 -3 5; 0 11 0], then a) find elements in x that are greater than 2 b) find the number of nonzero elements in x.
6. Plot Sinc function, where Sinc (x) = sin(x) / x , and $-2\pi \le x \le 2\pi$
7. Study of M file, Script file and function file in MATLAB with suitable examples.
8. Two case studies related to your respective disciplines.

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Programme: **Bachelor of Technology**   Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (50)	Total (50)	End Sem (Nil)	Internal (Nil)	Total
CBTE-709	Psychology	1	-	-			Min: 20 (D Grade)			(Nil)

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: 50	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: 50
Practical Internal Max Marks: Nil	Lab Performance/ Quiz/Attendance - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	This course makes the students able to understand and deal with personal and professional aspects of life. They become able to deal with common psychological problems encountered in an engineer's life. Their ability to deal with societal aspects of behavior is enhanced. By application of knowledge their quality of personal living and job is maximized.
Course Outcomes	**Student will be able to learn:** 1. Be able to understand and deal with personal and organization phenomenon. 2. Be able to deal with common psychological aspects related to an Engineer's life. 3. Be able to understand the impact of social environment on individuals, groups and communities. 4. Be able to utilize the knowledge of Sociology and to improve the quality of living of self and social relationship at large.

Unit	Contents (Theory)	Marks Weightage
I	**Psychology:** Introduction Definition and Scope of Psychology; Psychology as a science, Personality: Definition, types of personality, Measurement of Personality. Perception, Motivation and Learning.	10
II	**Application of Psychology:** Stress-management, Well-being; Self-development: Application of Psychology in building memory and creativity.	10
III	**Sociology:** Introduction, Importance of Sociology for Engineers, Sociology: Definition and nature; Origin of Society, Social Processes: – Competition, Cooperation Conflict, Accommodation and Assimilation, Social groups – Types and Characteristics; Social Institutions: Marriage: and Family; Religion: Functions and dysfunctions of religion.	10
IV	**Social concerns Social Stratification:** Nature and types, Prejudices, Social Mobility. Social Changes: – Urbanization, Westernization, and Pluralism. Social Disorganization, Social Problems: – Deviance, Delinquent behavior amongst youth, Crime, Prostitution, Gender injustice, Child Abuse, Terrorism. Social Movements.	10
V	**Cognitive Psychology.** An introduction to human mental processes, problem solving, pattern recognition, imagery, memory retention, language comprehension **Attention & Perception:** Definition, types of attention, perception.	10

Text Book/References Books/ Websites:

1. Eastwood and Atwater; Psychology for living: Adjustment, growth and behavior today; Prentice Hall.
2. Meena Hariharan and Radhanath Rath; Coping with life stress; Sage Publications.
3. Shankar Rao; C . N, Sociology; S. Chand & Co Ltd.
4. S. K. Mangal; General Psychology; Sterling Publishers Pvt. Ltd.
5. Baron A. Robert; Psychology; Prentice Hall of India.

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: **Bachelor of Technology**   Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total (Nil)	End Sem (Nil)	Internal (50)	Total (50)
CBTE-710	Massive Open Online Courses (MOOCs)-II	-	-	1						Min: 20 (D Grade)

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/ Quiz/Attendance - Max. Marks: 50	

Pre-Requisite	Nil
Course Objective	MOOCs build on the engagement of learners who self-organize their participation according to learning goals, prior knowledge and skills, and common interests. Objective of this course is to improve the technical skills of students and its gives an opportunity to explore themselves beyond class room teaching.
Course Outcomes	**Student will be able to learn:** New interesting courses of their own curiosity and improve their knowledge and skills. MOOCs give an opportunity to connect openly on a global scale, with global learners. The ability to experiment with pedagogical methods on a vast scale.

Unit	Contents (Theory)	Marks Weightage
I	Massive Open Online Courses (MOOCs) are online courses that allow participants free access and unrestricted participation in any course of their choice. Besides the conventional modes of teaching such as lectures, videos and reading material, MOOCs also provide a platform for interactive forums. After the VI semester End Sem Examination, all students are instructed to register themselves in a minimum IV (Four weeks) MOOC/NPTEL/SWAYAM Certification course in their Engineering discipline. Students must appear in the certification examination conducted by NPTEL/ SWAYAM and submit it to their respective assigned faculty before the end of the semester. A student should give an effective PowerPoint presentation of chosen course in the class scientific seminars and receive feedback from each other. This effort will help them to communicate their ideas more clearly. The final evaluation of this course will base on a PowerPoint Presentation and Certification during the academic session by the assigned faculty.	50

Text Book/References Books/ Websites:
1. https: //swayam.gov.in/
2. http: //nptel.ac.in
3. https: //onlinecourses-archive.nptel.ac.in

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: Bachelor of Technology Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total (Nil)	End Sem (35)	Internal (15)	Total (50)
CBTE-711	Professional Ethics and Proficiency	-	-	1						Min: 20 (D Grade)

Duration of Theory (Externals): -Nil

Theory Internal- Max Marks: -Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance Max. Marks: Nil
Practical Internal Max Marks: 15	Lab performance/Quiz/Attendance: Max. Marks: 15	

Pre-Requisite	Nil
Course Objective	To enable the students to imbibe and internalize the values and ethical behaviour in personal and professional live.
Course Outcome	**Student will be able to learn:** 1. Understand the core values that shape the ethical behaviour of a professional. 2. Learn the need for professional ethics, codes of ethics and roles. 3. Discuss the ethical issues related to engineering. 4. Realize the responsibilities and rights of an engineer in the society. 5. Apply the knowledge of human values and social values to contemporary ethical values and global issues.

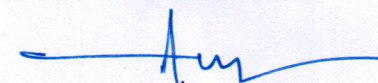| Unit	Contents (Theory)	Marks Weightage
I	**Introduction to Professional ethics**. Basic concepts, Governing ethics, Personal and Professional ethics, Ethical Dilemmas, Life Skills, Emotional intelligence, Thoughts of Ethics, Value education, Dimension of ethics, Professional associations, Professional risks, Professional accountabilities, Professional success, Ethics and profession .	
II	**Communications**: Communication and personality development covering, Psychological aspects of communication, cognition as a part of communication;; Politeness and Etiquette in communication; Cultural factors that influence communication; Mannerisms to be avoided in communication; Language and persuasion; Language and conflict resolution.	
III	**Career Oriental Communication covering, Resume and Bio-data**: Design & style; Applying for a job: Language and format of job application. Job Interviews: purpose and process.	50
IV	**Presentation Skills**: Power-point presentation: structure and format; Using e-mail for business communication; Standard e-mail practices; Language in e-mail; Using internet for collecting information; Referencing while using internet materials for project reports. Advanced Techniques in Technical Communication covering, Interview through telephone/video-conferencing;	
V	**Global Ethical Issues**. Multinational Corporations- Environmental Ethics- Business Ethics- Computer Ethics -Rolein Technological Development-Engineers as Managers- Consulting Engineers- Engineers as Expert witnesses and advisor -Moral leadership.	

Text Book/References Books/ Websites:

1. M. Govindarajan, S. Natarajan and V. S. Senthil Kumar; Engineering Ethics; PHI Learning Private Ltd, New Delhi, 2012.
2. R S Naagarazan; A text book on professional ethics and human values; New age international (P) limited, New Delhi, 2006.

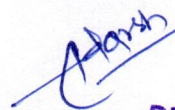*School of Research and Technology* **DEAN** *Department: Computer Science and Engineering*

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Programme: **Bachelor of Technology**   Semester –VII

3. Mike W Martin and Roland Schinzinger; Ethics in Engineering; 4th edition, Tata McGraw Hill Publishing Company Pvt Ltd, New Delhi 2014.
4. Charles D Fleddermann; Engineering Ethics; Pearson Education, Prentice Hall of India, New Jersey 2004.
5. http: //www.slideword.org/slidestag.aspx/human-values-and-Professional-ethics.

Suggested List of Laboratory Practical (Expandable): Nil

Students should prepare and submit hard and soft copy of their report to assigned faculty before End Semester Examination.

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Programme: **Bachelor of Technology**   Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total (Nil)	End Sem (Nil)	Internal (50)	Total (50)
CBTE-712	GD/Seminar	-	-	1						Min: 20 (D Grade)

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/Attendance /Quiz - Max. Marks: 50	

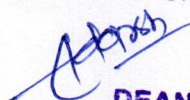| Pre-Requisite	Nil
Course Objective	To enable the students perform as a team player and also emerge as a leader in the group.
Course Outcomes	**Student will be able to:** 1. Understand nature, importance and characteristics of group discussion. 2. Familiarise himself/herself with the different types of group discussions. 3. Learn to identify areas of evaluation in selection group discussions. 4. Chalk out strategies for making individual contributions in group discussion. 5. Learn the method of in-depth study in a specialized area and prepare and present the report of the same.

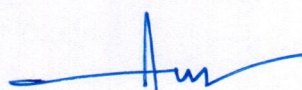| Unit	Contents (Theory)	Marks Weightage
I	**Group Discussion:** • Nature, importance and characteristics of group discussions. • Selection Group Discussions • Group Discussion Strategies • Techniques for Individual Contribution • Group Interaction Strategies **Seminar:** • In depth study in a specialized area by doing literature survey, understanding different aspects of the problem and arriving at a status report in that area. • Learn investigation methodologies, study relevant research papers, correlate work of various authors/researchers critically, study concepts, techniques, prevailing results etc. , analyze it and present a seminar report.	50

Text Book/References Books/ Websites: Nil

Suggested List of Laboratory Practical (Expandable):
Students should prepare and submit hard and soft copy of their report to assigned faculty before End Semester Examination.

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Programme: **Bachelor of Technology**   Semester –VIII
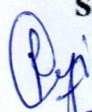
Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total (Nil)	End Sem (300)	Internal (200)	Total (500) Min: 200 (D Grade)
CBCS-801	Project Internship and Viva- Voce	-	-	10						

Duration of Theory (Externals): Nil

Theory Internal– Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 200	Lab Performance/Attendance /Quiz - Max. Marks: 200	

Pre-Requisite	Must have practical knowledge of respective program.
Course Objective	The course aimed to expose technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry. Provide possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job. Exposure to the current technological developments relevant to the subject area of training.
Course Outcomes	**Student will be able to learn:** 1. After completion of this semester long course the student trained in his specialized area of operation. 2. Will be able to critically think, observe and communicate. 3. Will acquire the work experience through advance learning (in terms of depth, complexity and engagement) in an industrial environment. 4. Will be able to apply, extend and test the knowledge gained from class room experience to understand and mitigate complex issues and address real industry challenges. 5. Will be able to assimilate technical and administrative or managerial skills from his interactions with a variety of individuals, systems and practices.

Unit	Contents (Theory)	Marks Weightage
I	The purpose of the Internship Program is to provide each student practical experience in a standard work environment. The students must undergo industrial training/internship for a minimum period of 120 days during the 8th semester in any of the reputed Govt. or private industry/ Government-sponsored Research & Development Organization/ reputed academic institution/foreign universities. The student will give a seminar with help of power point presentation based on his/her internship report before an departmental expert committee constituted by the concerned department as per norms of the institute and submit a report in hard copy to the department in prescribed format from college. The evaluation will be based on the following criteria: • Internal departmental presentation to check knowledge & experience of Project Internship. • External Viva-Voce to evaluate Project Internship work done by student.	500

Text Book/References Books/ Websites: Nil

Suggested List of Laboratory Practical (Expandable): Nil

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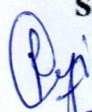Programme: **Bachelor of Technology**   Semester –VIII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total (Nil)	End Sem (300)	Internal (200)	Total (500) Min: 200 (D Grade)
CBCS-801	Project Internship and Viva- Voce	-	-	10						

Duration of Theory (Externals): Nil

Theory Internal– Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 200	Lab Performance/Attendance /Quiz - Max. Marks: 200	

Pre-Requisite	Must have practical knowledge of respective program.
Course Objective	The course aimed to expose technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry. Provide possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job. Exposure to the current technological developments relevant to the subject area of training.
Course Outcomes	**Student will be able to learn:** 1. After completion of this semester long course the student trained in his specialized area of operation. 2. Will be able to critically think, observe and communicate. 3. Will acquire the work experience through advance learning (in terms of depth, complexity and engagement) in an industrial environment. 4. Will be able to apply, extend and test the knowledge gained from class room experience to understand and mitigate complex issues and address real industry challenges. 5. Will be able to assimilate technical and administrative or managerial skills from his interactions with a variety of individuals, systems and practices.

Unit	Contents (Theory)	Marks Weightage
I	The purpose of the Internship Program is to provide each student practical experience in a standard work environment. The students must undergo industrial training/internship for a minimum period of 120 days during the 8th semester in any of the reputed Govt. or private industry/ Government-sponsored Research & Development Organization/ reputed academic institution/foreign universities. The student will give a seminar with help of power point presentation based on his/her internship report before an departmental expert committee constituted by the concerned department as per norms of the institute and submit a report in hard copy to the department in prescribed format from college. The evaluation will be based on the following criteria: • Internal departmental presentation to check knowledge & experience of Project Internship. • External Viva-Voce to evaluate Project Internship work done by student.	500

Text Book/References Books/ Websites: Nil

Suggested List of Laboratory Practical (Expandable): Nil

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