Shri Vaishnav Vidyapeeth Vishwavidyalaya
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B.Tech (CSE with specialization in Enterprise System in association with RedHat)
Choice Based Credit System (CBCS)-2025-29
SEMESTER-II

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCSH107	BS	Linear Algebra	60	20	20	0	0	3	1	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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COURSE OBJECTIVES

The student will have ability to:

1. Know the fundamental principles of the Linear algebra.

2. Understand and apply the basics of the Matrices and Vector Space.

COURSE OUTCOMES

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

1. Apply the techniques to find the Solution of Linear equations.

2. Apply the basics of the calculus of the Determinants.

3. Apply the basics of the calculus of the Matrices.

4. Apply the concept of Singular value decomposition and Principal component analysis in Image Processing and Machine Learning.

SYLLABUS

UNIT I

Introduction to Matrices and Determinants; Solution of Linear Equations; Cramer's rule; Inverse of a Matrix.

UNIT II Vectors and linear combinations; Rank of a matrix; Gaussian elimination; LU Decomposition; Solving Systems of Linear Equations using the tools of Matrices.

UNIT III Vector space; Dimension; Basis; Orthogonality; Projections; Gram-Schmidt orthogonalization and QR decomposition

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UNIT IV

Eigenvalues and Eigenvectors; Positive definite matrices; Linear transformations; Hermitian and unitary matrices;

UNIT V

Singular value decomposition and Principal component analysis; Introduction to their applications in Image Processing and Machine Learning.

TEXT BOOKS:

1. Higher Engineering Mathematics, B. S. Grewal**.**

REFERENCES:

1. Advanced Engineering Mathematics, 7th Edition, Peter V. O'Neil.
2. Advanced Engineering Mathematics, 2nd Edition, Michael. D. Greenberg.
3. Introduction to linear algebra, 5th Edition, Gilbert Strang.
4. Applied Mathematics (Vol. I & II) , by P. N. Wartikar& J. N.Wartikar.
5. Digital Image Processing, R C Gonzalez and R E Woods
6. https://machinelearningmastery.com/introduction-matrices-machine-learning

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BTEC 104	**BEC**	**Digital Logic & Circuit Design**	**60**	**20**	**20**	**30**	**20**	**3**	**1**	**2**	**5**

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Course Educational Objectives (CEOs):

The objective of this course is to:
1.Use of Boolean algebra and Karnaugh Map to simplify logic function.
2.Describe the operation of different Combinational and Sequential Logic Circuits.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes.

The students will be able to
1.Design an optimal digital logic circuit to meet the given specifications.
2.Evaluate the performance of the given digital logic circuit based on specific criteria for reliable system implementation.

Syllabus:

UNIT I **10HRS**

Number System & Codes: Introduction to number systems, Binary numbers, Octal & Hexadecimal Numbers, Number base Conversion, Signed binary numbers : 1‟s Complement & 2‟s Complement representation and their arithmetic operation, Floating point representation, binary codes, BCD,ASCII, EBCDIC, Gray codes, Error detecting and Correcting codes, Hamming codes.

UNIT II **9HRS**

Boolean algebra and Logic gates: Introduction, Logic operations, Axioms and laws of Boolean algebra, Demorgan‟s theorem, Boolean functions, Canonical and standard forms. Logic gates and their applications, universal gates, NAND-NOR implementation of logic functions. Minimization techniques for logic functions-K-map, Tabular / QuineMcCluskey method.

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UNIT III **8HRS**

Combinational logic: Arithmetic circuits- Half adder, Full adder, Halfsubtractor, Full subtractor, Parallel and Serial adder, BCD adder, Multiplexer, De-multiplexer, Encoder & Decoder.

UNIT IV **7HRS**

Sequential logic: Introduction, Latch and Flip Flop- S-R, D, JK and T, State diagram, characteristic equation, state table and excitation table, Flip flop conversion, applications of Flip flop, Counters, Registers.

UNIT V **8HRS**

Semiconductor Memories and A/D and D/A converters: Semiconductor Memory – RAM, ROM- Organization, operation and their Types, PLD- PAL, PLA, PROM, FPGA, Analog to Digital (A/D)and Digital to Analog (D/A) converters and their types.

Text Books:

1.M. Morris Mano,"Digital Logic and Computer Design", Pearson Education, 2016.
2.S Salivahanan and S Arivazhagan: Digital Circuits and Design,4th Edition, Vikas Publishing House, 2012.

Reference Books:

1. A. Anand Kumar, "Fundamentals of Digital Circuits", 4th Edition, PHI,2016.
2. Floyd and Jain,"Digital Fundamentals", 10th Edition, Pearson Education India,2011.
3. Roland J.Tocci,Widmer,Moss, "Digital Systems Principles and Applications", 10th Edition, Pearson 2009.
4. Stephen Brown, ZvankoVranesic, "Fundamentals of Digital Logic Design", 3rd Edition, McGraw Hill, 2017.

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List of Practical's:

1. To study and test of operation of all logic gates for various IC"s(IC7400,IC7403,IC408,IC74332,IC7486).
2. Verification of DeMorgan"s theorem.
3. To construct of half adder and fulladder.
4. To construct of half subtractor and full subtractor circuits.
5. Verification of versatility of NAND gate.
6. Verification of versatility of NOR gate.
7. Design a BCD to excess 3codeconverter.
8. Design a Multiplexer/Demultiplexer
9. Analysis of various flip flops with Preset and Clear capability.
10. Design of Johnson and Ring counter.
11. Design of synchronous and asynchronous up/down counters.

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BTCS202M	**DCC**	**Object Oriented Programming with C++**	**60**	**20**	**20**	**30**	**20**	**3**	0	**2**	4

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Course Educational Objectives (CEOs):

1. To explain abstract data types, classes and different types of objects.
2. To analyze the public, protected and private modes of inheriting the classes.
3. To demonstrate the overloading of functions and operators to grant them a different meaning.
4. To provide complete knowledge of Object Oriented Programming through C++ and to enhance the programming skills of the students by giving practical assignments to be done in labs.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes.

The students will be able to:

1. Identify and describe the components of object-oriented technology and justify their relevance.
2. Implement inheritance for code reusability and polymorphism.
3. Implement object oriented approach for real world scenarios.
4. Use advance features like temples and exception to make programs supporting reusability and sophistication
5. Develop the applications using object oriented programming with C++.

Syllabus

Unit-I **10HRS**

Concepts of OOP: Introduction OOP, Procedural vs. Object Oriented Programming, Principles of OOP, Benefits and applications of OOP. C++ Basic Overview, Program structure, namespace, identifiers, variables, constants, enum, operators, typecasting, control structures.

Unit-II **9HRS**

C++ Functions: The Main Function, Function prototyping, Simple functions, Call and Return by reference, Inline functions, Macro Vs. Inline functions, Overloading of functions, default arguments.

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Unit-III **8HRS**

Objects and Classes: Basics of object and class in C++, Private and public members, static data and function members, constructors and their types, destructors, operator overloading, friend function.

Inheritance: Concept of Inheritance, types of inheritance, access modifiers, overriding, virtual base class.

Unit-IV **7HRS**

Polymorphism: Polymorphism and its types, Pointers in C++, Pointes and Objects, this pointer, virtual and pure virtual functions, Implementing polymorphism, Abstract Methods and Classes. Exception Handling, Templates function and class in C++

Unit-V **8HRS**

I/O and File management: Concept of Streams, Cin and Cout Objects, C++ Stream Classes, Unformatted and Formatted I/O, Manipulators, File Stream, C++ File Stream Classes, File Management Functions, File Modes, Binary and Random Files.

Text Books:

1. David Parsons; Object oriented programming with C++; Second edition; BPB publication; 1997.
2. Robert Lafore; Object oriented programming in C++ ; Fourth edition ; Pearson publication;2002 .
3. E Balagurusamy; Object oriented programming with C++; Seven edition; TMH; 2017.
4. Herbert Schildt ; Java Complete Reference;Seven edition; McGrawHill; 2006 .

References:

1. John R Hubbard; Programming in C++ (Schaum); Third edition; TMH; 2000.
2. Venugopal; Mastering C++ ; second edition ;TMH; 2006.
3. Steven Holzner; C++ Programming Black Book; First Edition; Coriolis Group,U.S;2001.
4. E Balagurusamy; Programming with java a primer; Fourth edition; TMH ; 2011.

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List of Experiments:

1. Write a program to display the following output using a single cout statement. Maths=90, Physics=74, Chemistry=76
2. Write a program to read 2 numbers from the keyboard and display the larger value on the screen.
3. Write a function using reference variables as arguments to swap the values of a pair of integers.
4. Write a macro that obtains the largest of 3 numbers.
5. Define a class to represent a bank account. Include the following members:
   Data members
   1. Name of the depositor
   2. Account number
   3. Type of account
   4. Balance amount in the account

   Member functions
   1. To assign initial values
   2. To deposit an amount
   3. To withdraw an amount after checking the balance
   4. To display name and balance

   Write a main program to test the program.
6. Create two classes DM and DB which store the value of distances. DM stores distances in meters and centimeters and DB in feet and inches. Write a program that can read values for the class objects and odd one object of DM with another object of DB.

   Use a friend function to carry out the addition operation. The object that stores the results may be a DM object or DB object, depending on the units in which the result are required. The display should be in the format of feet and inches or meters and centimeters depending on the object on display.
7. Design a constructor for bank account class.
8. A book shop maintains the inventory of books that are being sold at the shop. The list includes details such as author, title, price, publisher and stock position. Whenever a customer wants a book, the sales person inputs the title and author and the system searches the list and displays whether it is available or not. If it is not, an appropriate message is displayed. If it is, then the system displays the book details and requests for the number of copies required. If the requested copies book details and requests for the number of copies required. If the requested copies are available, the total cost of the requested copies is displayed; otherwise the message "Required copies not in stock" is displayed.

   Design a system using a class called books with suitable member functions and Constructors. Use new operator in constructors to allocate memory space required.

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9. Improve the system design in exercise 8 to incorporate the following features:
   (a) The price of the books should be updated as and when required. Use a private meneber function to implement this.
   (b) The stock value of each book should be automatically updated as soon as a transaction is completed.
   (c) The number of successful transactions should be recorded for the purpose of statistical analysis. Use static data members to keep count of transaction.

10. Design a C++ Class 'Complex' with data members for real and imaginary part. Provide default and parameterized constructors. Write a program to perform arithmetic operations of two complex numbers using operator overloading (using either member functions or friend functions).
11. Assume that a bank maintains two kinds of accounts for customers, one called as savings account and the other as current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class account that stores customer name, account number and type of account. From this derive the classes cur*acct and sav*acct to make them more specific to their requirements. Include necessary member functions in order to achieve the following tasks:
    a. Accept deposit from a costumer and update the balance.
    b. Display the balance
    c. Compute and deposit interest.
    d. Permit withdrawal and update the balance.
    e. Check for the minimum balance, impose penalty, necessary and update balance.

12. Create a base class shape. Use this class to store two double type values that could be used to compute area of figures. Derive two specific classes called triangle and rectangle from the base shape. Add to the base a member function getdata() to initialize base class data member and another member function display_area() to compute and display the area of figures. Make display_area() as a virtual function and redefine it the derived class to suit their requirements.

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BTIT201M	**DCC**	**Data Communication**	**60**	**20**	**20**	**0**	**0**	**3**	0	**0**	3

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Course Educational Objectives (CEOs):

The student will have ability to:
1. To understand the concepts of data communications.
2. To be familiar with the Transmission media and Tools.
3. To study the functions of OSI layers.
4. To learn about IEEE standards in computer networking.
5. To get familiarized with different protocols and network components.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes.
The students will be able to:
1. Understand the Process and functions of data communications
2. Understand Transmission media and Tools
3. Understand the functions of OSI layers
4. Understand IEEE standards in computer networking
5. Understand different protocols and network components

Syllabus

UNIT–I 10HRS
Introduction: Data Communication Components, Types of Connections, Transmission Modes, Network Devices, Topologies, Protocols and Standards, OSI Model, Transmission Media, Bandwidth, Bit Rate, Bit Length, Baseband and Broadband Transmission, Attenuation, Distortion, Noise, Throughout, Delay and Jitter.

UNIT–II 9HRS
Data Encoding: Unipolar, Polar, Bipolar, Line and Block Codes. Multiplexing: Introduction and History, FDM, TDM, WDM, Synchronous and Statistical TDM.Synchronous and Asynchronous transmission, Serial and Parallel Transmission.

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UNIT–III 8HRS

Error Detection & Correction: Correction, Introduction–Block Coding–Hamming Distance, CRC, Flow Control and Error Control, Stop and Wait, Error Detection and Error Go Back– N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, CSMA/CD, CDMA/CA

UNIT–IV 7HRS

Network Switching Techniques: Circuit, Message, Packet and Hybrid Switching Techniques.X.25, ISDN.Logical Addressing, Ipv4, Ipv6, Address Mapping, ARP, RARP, BOOTP and DHCP, User Datagram Protocol, Transmission Control Protocol, SCTP.

UNIT–V 8HRS

Application Layer Protocols: Domain Name Service Protocol, File Transfer Protocol, TELNET, WWW and Hyper Text Transfer Protocol, Simple Network Management Protocol, Simple Mail Transfer Protocol, Post Office Protocol v3.

TEXT BOOKS:

1. Behrouz A. Forouzan, “Data communication and Networking”, FourthEdition,Tata McGraw Hill, 2011.

REFERENCES:

1. Larry L.Peterson, Peter S. Davie, “Computer Networks”, Fifth Edition,Elsevier, 2012.
2. William Stallings, “Data and Computer Communication”, Eighth Edition, Pearson Education,2007.
3. James F. Kurose, Keith W. Ross, “Computer Networking: A Top–Down Approach Featuring theInternet”, Pearson Education, 2005.

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BTCS102M	DCC	Introduction to Design Thinking	60	20	20	30	20	2	0	2	3

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Course Educational Objectives (CEOs):

The student will have ability to:

1. The objective of this Course is to provide the new ways of creative thinking and Learn the innovation cycle of Design Thinking process for developing innovative products which useful for a student in preparing for an engineering career.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes.

The students will be able to

1. Compare and classify the various learning styles and memory techniques and Apply them in their engineering education.
2. Analyze emotional experience and Inspect emotional expressions to better understand users while designing innovative products.
3. Develop new ways of creative thinking and Learn the innovation cycle of Design Thinking process for developing innovative products.
4. Propose real-time innovative engineering product designs and Choose appropriate frameworks, strategies, techniques during prototype development.
5. Perceive individual differences and its impact on everyday decisions and further create a better customer experience.

Syllabus:

UNIT I 10HRS
An Insight to Learning

Understanding the Learning Process, Kolb's Learning Styles, Assessing and Interpreting. Remembering Memory- Understanding the Memory process, Problems in retention, Memory enhancement techniques.

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UNIT II **9HRS**
Emotions: Experience & Expression

Understanding Emotions: Experience & Expression, Assessing Empathy, Application with Peers. Basics of Design Thinking- Definition of Design Thinking, Need for Design Thinking, Objective of Design Thinking, Concepts & Brainstorming, Stages of Design Thinking Process (explain with examples) – Empathize, Define, Ideate, Prototype, Test.

UNIT III 8**HRS**
Being Ingenious & Fixing Problem

Understanding Creative thinking process, Understanding Problem Solving, Testing CreativeProblem Solving.
Process of Product Design- Process of Engineering Product Design, Design Thinking Approach, Stages of Product Design, Examples of best product designs and functions, Assignment – Engineering Product Design.

UNIT IV **7HRS**
Prototyping & Testing

What is Prototype? Why Prototype? Rapid Prototype Development process, Testing, SampleExample, Test Group Marketing.
Celebrating the Difference- Understanding Individual differences & Uniqueness, Group Discussion and Activities to encourage the understanding, acceptance and appreciation of Individual differences.

UNIT V **8HRS**
Design Thinking & Customer Centricity

Practical Examples of Customer Challenges, Use of Design Thinking to Enhance CustomerExperience, Parameters of Product experience, Alignment of Customer Expectations with Product Design.

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Choice Based Credit System (CBCS)-2023-27
SEMESTER-II

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS102M	DCC	Introduction to Design Thinking	60	20	20	30	20	2	0	2	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Feedback, Re-Design & Re-Create- Feedback loop, Focus on User Experience, Address "ergonomic challenges, User focused design, rapid prototyping & testing, final product, Final Presentation – "Solving Practical Engineering Problem through Innovative Product Design & Creative Solution".

Text Books:

1.E Balaguruswamy (2022), Developing Thinking Skills (The way to Success), Khanna BookPublishing Company.

References:

1. E Balaguruswamy (2022), Developing Thinking Skills (The way to Success), Khanna Book Publishing Company.

List of Practical:

1. Write a Love/Breakup Letter relating to any product covering its positive & negative features, strength, and fix, enhance and rethink.
2. Write the Design Thinking Steps i.e.. Empathize, Define the problem, Ideate, Prototype and Test relating to the product you choose.
3. Understand a real-world problem and try solving it through an Empathy Map
4. Write a persona of any celebrity or personal.
5. Understand the way advertisement make use of storytelling. Pick a particular advertisement and make a presentation on it, covering - character, plot, conflict, climax, resolution.
6. Develop a collage using four/five pictures, do storyboarding based on the collage.
7. Develop a low-level prototype like Paper Prototype
8. Find a problem statement and perform testing on it using certain testing technique.
9. Demonstrate a project using design thinking process.
10. Demonstrate the tools and techniques used in design thinking.

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RH134N	**SEC**	**Red Hat Admininistration II**	**0**	**0**	**0**	**0**	**150**	**0**	0	**2**	1

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Course Objectives:
The objective of this course is to:
1. Understand enterprise Linux administration.
2. Understand file systems and partitioning, logical volumes.
3. Understand SELinux, firewalling, and troubleshooting.

Course Outcomes:
Students should be able to demonstrate the following skills:
1. Automate installations using Kickstart
2. Manage file systems and logical volumes
3. Manage scheduled jobs
4. Access network file systems
5. Manage SELinux
6. Control firewalls
7. Perform troubleshooting tasks…

Syllabus:
- Automate installation with Kickstart

Automate the installation of Red Hat Enterprise Linux systems with Kickstart.
- Use regular expressions with grep

Write regular expressions that, when partnered with grep, will allow you to quickly isolate or locate content within text files.
- Create and Edit text files with vim

the vim text editor, with which you can open, edit, and save text files.
- Schedule future Linux tasks

Schedule tasks to automatically execute in the future.
- Manage priority of Linux processes

Influence the relative priorities at which Linux processes run.
- Control access to files with access control lists (ACL)

Manage file security using POSIX access control lists.

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- Manage SELinux security

o Manage the Security Enhanced Linux (SELinux) behavior of a system to keep it secure in case of a network service compromise.

- Connect to network-defined users and groups

o Configure systems to use central identity management services.

- Add disks, partitions, and file systems to a Linux system

Manage simple partitions and file systems.

- Manage logical volume management (LVM) storage

Manage logical volumes from the command line.

- Access networked attached storage with network file system (NFS)

Access (secure) NFS shares.

- Access networked storage with SMB

Use autofs and the command line to mount and unmount SMB file systems.

- Control and troubleshoot the Red Hat Enterprise Linux boot process
- Limit network communication with firewall

Configure a basic firewall.

- Comprehensive review

Practice and demonstrate knowledge and skills learned in this course

Text Books:

1. 1 SA2 REDHAT SYSTEMADMINISTRATION II (Release en-3-20170803) By Wander Boessenkol, Bruce Wolfe,Scott McBrien, George Hacker, Chen Chang.

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List of Experiments:

1. Automate installation with Kickstart
2. Use regular expressions with grep
3. Create and Edit text files with vim
4. Schedule future Linux tasks
5. Manage priority of Linux processes
6. Control access to files with access control lists (ACL)…
7. Manage SELinux security
8. Connect to network-defined users and groups
9. Add disks, partitions, and file systems to a Linux system
10. Manage logical volume management (LVM) storage
11. Access networked attached storage with network file system (NFS)
12. Access networked storage with SMB
13. Control and troubleshoot the Red Hat Enterprise Linux boot process