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; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

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:
Upon completion of the subject, 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   10 HOURS
Introduction to Matrices and Determinants**:** Solution of Linear Equations; Cramer's rule; Inverse of a Matrix.

UNIT II   9 HOURS
Vectors and linear combinations: Rank of a matrix; Gaussian elimination; LU Decomposition; Solving Systems of Linear Equations using the tools of Matrices.

UNIT III   8 HOURS
Vector space: Dimension; Basis; Orthogonally; Projections; Gram-Schmidt or thogonali zation and QR decomposition

UNIT IV   7 HOURS
Eigenvalues and Eigenvectors; Positive definite matrices; Linear transformations; Hermit Ian and unitary matrices;

UNIT V   8 HOURS
Singular value decomposition and Principal component analysis; Introduction to their applications in Image Processing and Machine Learning.

TEXTBOOKS:
1. Higher Engineering Mathematics, B. S. Grewal.

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COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
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BTCSH107	BS	Linear Algebra	60	20	20	0	0	3	1	0	4

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REFERENCE:

1. E. Kreyszig, Advanced Engineering Mathematics, 9th Edition, Wiley, 2005.
2. R. G. Bartle and D. R. Sherbert, Introduction to Real Analysis, 5th Ed, Wiley, 1999.
3. J. Stewart, Calculus: Early Transcendentals, 5th Ed, Thomas Learning (Brooks/ Cole), Indian Reprint, 2003.
4. J. Stoer and R. Bulirsch, Introduction to Numerical Analysis, 2nd Edition, Texts in Applied Mathematics, Vol. 12, Springer Verlag, 2002.
5. J. D. Hoffman, Numerical Methods for Engineers and Scientists, McGraw Hill, 2001.
6. M.K Jain, S.R.K Iyengar and R.K Jain, Numerical methods for scientific and engineering computation (Fourth Edition), New Age International (P) Limited, New Delhi,2004.
7. S. C. Chapra, Applied Numerical Methods with MATLAB for Engineers and Scientists, McGraw Hill2008.

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

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; *__Teacher Assessment__ shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:
The student will have ability 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:
Upon completion of the subject, 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   10 HOURS
Number System: Introduction to number systems: Decimal, Binary, Octal and Hexadecimal, Base Conversion. Signed Binary Numbers: Signed magnitude, 1's Complement and 2's Complement representation and their arithmetic operations, 32-bit Floating point representation, Codes: Types of code, Binary code, BCD, Gray code, Excess-3. BCD Addition, Code Conversion, Error Detecting and Correcting code: Even and Odd Parity, Hamming code.

UNIT II   9 HOURS

Boolean algebra and Logic gates: Introduction to logic gates, Boolean Laws, De-Morgan's theorem, Consensus theorem, Implementation using logic gates, Simplification of Boolean Expression using Boolean Laws, Canonical and Standard (SOP and POS) forms. Universal gates, NAND-NOR implementation of logic functions. Karnaugh Maps (K-maps), Minimization of logic functions using K-map. Don't Care Conditions.

UNIT III   8 HOURS
Combinational circuits: Arithmetic circuits- Half adder, Full adder, Half subtract or, Full subtract or, Parallel Adder, BCD adder, Multiplexer, De-multiplexer, Encoder and Decoder. Design of Combinational circuits using Multiplexer and Decoder.

UNIT IV   7 HOURS
Sequential Circuits: Introduction, Asynchronous and Synchronous Sequential circuits, Latches and Flip Flops: SR, D, JK and T. Characteristic equation, Characteristic and Excitation table. Master-Slave Flip-flop, Race around conditions, Flip flop conversion.

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SEMESTER-II

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
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BTEC 104	BEC	Digital Logic & Circuit Design	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT V   8 HOURS
Applications of Flip-flop: Shift Register: SISO, SIPO, PISO, PIPO, Left and Right Shift Register, Bidirectional Shift Register. Counter: Ring counter, Johnson Counter, Asynchronous Up/down counter, Synchronous Up/down counters: State diagram, state table and realization, Mod-N Counter.

TEXTBOOKS:
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:
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, Zvanko Vranesic, "Fundamentals of Digital Logic Design", 3rd Edition, McGraw-Hill, 2017.

LIST OF PRACTICALS
1. To study the operation of various logic gates and verify their truth tables.
2. To verify De morgana theorem
3. To verify the versatility of NAND and NOR gates
4. To compare and verify standard SOP/POS expression with minimized Boolean form using K- map.
5. To design and verify Adder and sub tractor circuits.
6. To design and verify multiplexer and DE multiplexer using basic logic gates.
7. To realize 4-bit parallel adder circuit.
8. To design and verify encoder and decoder circuits using ICs.
9. To verify the truth table of different flip flops.
10. To verify the functionality of shift register.
11. To verify the functionality of counter circuit.

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

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; *Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:
The student will have ability to:
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:
Upon completion of the subject, 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	10 HOURS

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, enema, operators, typecasting, control structures.

UNIT II	9 HOURS

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.

UNIT III	8 HOURS

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	7 HOURS

Polymorphism: Polymorphism and its types, Pointers in C++, Pointes and Objects, this pointer, virtual and pure

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Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

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virtual functions, Implementing polymorphism, Abstract Methods and Classes.
Exception Handling, Templates function and class in C++

UNIT V	**8 HOURS**

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.

TEXTBOOKS:

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.

REFERENCE:

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.	Herbert Scheldt; Java Complete Reference; Seven edition; McGraw-Hill; 2006.
5.	E Balagurusamy; Object oriented programming with C++; Seven edition; TMH; 2017.

LIST OF PRACTICALS

1.	Write a program to display the following output using a single court statement. Math's=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.	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 centimetres depending on the object on display.

6.	Define a class to represent a bank account. Include the following members:
	   Data members
	     1. Name of the depositor
	     2. Account number

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

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	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.
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.
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 member 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.	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 get data () 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.
12.	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

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

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imposed. Create a class account that stores customer name, account number and type of account. From this derive the class's 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.

Check for the minimum balance, impose penalty, necessary and update balance.

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

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COURSE OBJECTIVES:
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:
Upon completion of the subject, 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   10 HOURS
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   9 HOURS
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.

UNIT III   8 HOURS
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

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

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT IV   7 HOURS
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   8 HOURS
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.

TEXTBOOKS:
1.   Behrouz A. Forouzan, "Data communication and Networking", Fourth Edition, Tata McGraw Hill, 2011.

REFERENCE:
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 the Internet", 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 OBJECTIVES:
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:
Upon completion of the subject, students will be able to:
1. The students will be able to Compare and classify the various learning styles and memory techniques and apply them in their engineering education
2. Analyse 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   10 HOURS

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.

UNIT II   9 HOURS

Emotions: Experience & Expression Understanding Emotions: Experience & Expression, Assessing Empathy, and 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 HOURS

Being Ingenious & Fixing Problem: Understanding Creative thinking process, Understanding Problem Solving, Testing Creative Problem 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 –

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

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Engineering Product Design.

UNIT IV   7 HOURS
Prototyping & Testing: What is Prototype? Why Prototype? Rapid Prototype Development process, Testing, Sample Example, 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   8 HOURS
Design Thinking & Customer Centricity: Practical Examples of Customer Challenges, Use of Design Thinking to Enhance Customer Experience, Parameters of Product experience, Alignment of Customer Expectations with Product Design, 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".

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

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

LIST OF PRACTICALS
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 makes 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

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

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:
The student will have ability to:
1. Understand enterprise Linux administration
2. Understand file systems and partitioning, logical volumes
3. Understand SE Linux, firewalling, and troubleshooting

COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Automate installations using Kick-start
2. Manage file systems and logical volumes
3. Manage scheduled jobs
4. Access network file systems
5. Manage SE Linux
6. Control firewalls
7. Perform troubleshooting tasks

SYLLABUS
UNIT I   10 HOURS
● Automate installation with Kick start
 Automate the installation of Red Hat Enterprise Linux systems with Kick start.
● Use regular expressions with grip
 Write regular expressions that, when partnered with grip, will allow you to quickly isolate or locate content within text files.
● Create and Edit text files with vim
 The vim text editors, 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.
● Manage SE Linux security
o Manage the Security Enhanced Linux (SE Linux) 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

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  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 unmounts 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

TEXTBOOKS:
1.   1 SA2 REDHAT SYSTEMADMINISTRATION II (Release en-3-20170803) By Wander Bosanko, Bruce Wolfe, Scott Mc Brien, George Hacker, Chen Chang.

LIST OF PRACTICALS
1. Automate installation with Kick start
2. Use regular expressions with grip
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 SE Linux 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

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