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 orthogonalization and QR decomposition

UNIT IV   7 HOURS
Eigen values and Eigen vectors; Positive definite matrices; Linear transformations; Hermitian 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
			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.

REFERENCE:
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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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*				
HUCS101	BS	Communication Skills	60	20	20	0	50	1	0	2	2

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COURSE OBJECTIVES:
The student will have ability to:
1. Develop the second language learners 'ability to enhance and demonstrate LSRW Skills.
2. Enable students to acquire English Language Skills to further their studies at advanced levels.
3. Prepare students to become more confident and active participants in all aspects of their under graduate programs

COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Enhance confidence in their ability to read, comprehend, organize, and retain written in formation.
2. Write grammatically correct sentences for various forms of written communication to express oneself.

SYLLABUS
UNIT I   10 HOURS
Communication: Nature, Meaning, Definition, Verbal and Non Verbal Communication Barriers to Communication.

UNIT II   9 HOURS
Basic Language Skills: Grammar and usage- Parts of Speech, Tenses, S-V Agreement, Preposition, Article.

UNIT III   8 HOURS
Basic Language Skills: Types of Sentence, Direct - Indirect, Active - Passive voice, Phrases& Clauses.

UNIT IV   7 HOURS
Business Correspondence: Business Letter, Parts & Layouts of Business Resume and Job application, E-mail writing.

UNIT V   8 HOURS
Report Writing: Importance of Report, Types of Report, Structure of a Report.

TEXTBOOKS:
1. Ashraf Rizvi (200**5).** Effective Technical Communication. New Delhi: Tata McGrawHill.
2. Adair, John (2003). Effective Communication. London: Pan Macmillan Ltd.

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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*				
HUCS101	BS	Communication Skills	60	20	20	0	50	1	0	2	2

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.

REFERENCE:
1. A. J. Thomsonand A. V. Martinet (1991). A Practical English Grammar (4thed). Newyork: Ox-Ford IBH Pub.
2. Kratz, Abby Robinson (1995). Effective Listening Skills. Toronto: ON: Irwin Professional Publishing.
3. Prasad, H. M.(2001) How to Prepare for Group Discussion and Interview. New Delhi: Tata McGraw-Hill.
4. Pease, Allan. (1998).Body Language. Delhi: Sudha Publications.

LIST OF PRACTICALS
1. Self-Introduction
2. Reading Skills and Listening Skills
3. Oral Presentation
4. Linguistics and Phonetics
5. JAM (Just a Minute)
6. Group Discussion

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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTPH101	BS	Applied Physics	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. To develop the comprehensive understanding of laws of physics.
2. To develop ability to apply laws of physics for various engineering applications.
3. To develop the experimental skills, ability to analyze the data obtained experimentally to reach substantiated conclusions.

COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Comprehend laws of physics.
2. Apply laws of physics for various engineering applications.
3. Determine physical parameter experimentally and will be able to analyze the data obtained experimentally to draw substantiate conclusions.

SYLLABUS
UNIT I   10 HOURS
Quantum Physics: Introduction to Quantum hypothesis, Matter wave concept, Wave Group and Particle velocity and their relations, Uncertainty principle with elementary proof. Compton Effect (Without derivation), Wave function and its physical significance, Energy and Momentum Operator, Development of time dependent and time independent Schrodinger wave equation, Determination of wave function and energy of particle in a one-dimensional box.

UNIT II   9 HOURS
Solid State Physics: Basic formulation of Free electron model and Kronig Penny Model, Intrinsic and Extrinsic semiconductors, P-N junction diode, Zener diode, Tunnel diode, Photodiode, Solar-cells, Hall Effect, Introduction to Superconductivity, Meissner effect, Type I & II Superconductors.

UNIT III   8 HOURS
Nuclear Physics: Nuclear Structure & Properties, Binding Energy and Mass Defect, Nuclear models: Comparative Study of Liquid drop and Shell Model, Particle accelerators: LINAC, Cyclotron and Betatron. Detectors and Counters: Bainbridge Mass Spectrograph, Giger-Muller counters.

UNIT IV   7 HOURS
Laser & Fiber Optics: Stimulated and Spontaneous Emission, Einstein's A & B Coefficients, Population

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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*				
BTPH101	BS	Applied Physics	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.

Inversion, Pumping, Optical Resonator, Properties and Applications of Laser, Ruby, He-Ne lasers. Introduction to Optical fibre, Acceptance angle and cone, Numerical Aperture, applications of optical fibre.

UNIT V   8 HOURS
Wave Optics: Introduction to Interference, Constructive and Destructive interference. Interference in Thin films, Newton's rings experiment, Michelson's interferometer, Introduction to Diffraction and its Types, Qualitative Study of Diffraction at single slit, double slit and n-slit (without derivation),Resolving power, Rayleigh criterion, Concept of Polarized light, Brewsters law, Double refraction, Nicho Prism.

TEXTBOOKS:
1. Engineering Physics by Dr. S. L. Gupta and Sanjeev Gupta, Dhanpat Rai Publication, New Delhi.
2. Engineering Physics by Navneet Gupta, Dhanpat Rai Publication, New Delhi.
3. Engineering Physics by H. J. Sawant, Technical Publications, Pune, Maharastra.
4. Engg Physics by M. N. Avdhanulu & P. G. Kshirsagar, S. Chand & Co. Edition (2010).
5. Fundamentals of Physics by Halliday, Wiley, India.

REFERENCE:
1. Concepts of Modern Physics by Beiser, TMH, New Delhi.
2. Solid State Physics by Kittel, Wiley India
3. Atomic and Nuclear physics by Brijlal and Subraminiyan.
4. LASERSs and Electro Optics by Christopher C. Davis, Cambridge Univ. Press (1996).
5. Optro electronics an Introduction by J. Wilson & J. F. B. Hawkes, "" Prentice-Hall II Edition.
6. LASER theory and applications by A. K. Ghatak & Tyagarajan, TMH (1984). Optics by Ghatak, TMH.

LIST OF PRACTICALS
1. Determination of radius of curvature "R" of convex lens by Newton's ring experiment.
2. Determination of Frequency of A.C. mains by electrically maintained vibrating rod.
3. Determination of Resolving Power of Telescope.
4. Determination of wavelength of LASER using Diffraction Grating.
5. Determination of Planck's constant using Photocell.
6. To study forward and reverse characteristics of Zener diode.
7. To study forward and reverse characteristics of P-N diode.
8. To study V-I characteristics of Tunnel diode.
9. To determine Young's Modulus using Cantilever method.
10. To determine the mass of cane sugar dissolved in water using Half shade Polarimeter.
11. To study characteristics of Photo diode.

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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*				
BTPH101	BS	Applied Physics	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.

12. Determination of Energy band gap (Eg) using PN Junction Diode.
13. Determination of μ and ω of given Prism using Spectrometer.
14. Measurement of height of a given object using Sextant.
15. Measurement of Numerical aperture of fiber by LASER.

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

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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.

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 .
3. E Balagurusamy; Object oriented programming with C++; Seven edition; TMH; 2017.
4. Herbert Schildt; Java Complete Reference; Seven edition; McGrawHill; 2006.

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. E Balagurusamy; Programming with java a primer; Fourth edition; TMH; 2011.

LIST OF PRACTICALS
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. 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
   3. Type of account
   4. Balance amount in the account

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COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
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BTCS202M	DCC	Object Oriented Programming with C++	60	20	20	30	20	3	0	2	4

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      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 copiesrequired. 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 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.
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 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

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

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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.

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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*				
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

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.

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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
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 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.

Chairperson	**Chairperson**	**Controller of Examination**	**Registrar**
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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*				
BTIT208M	SEC	Unix Programming	0	0	0	30	20	0	0	2	1

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COURSE OBJECTIVES:
The student will have ability to:
1. Provide introduction to UNIX Operating System and its File System.
2. Gain an understanding of important aspects related to the SHELL and the process
3. Develop the ability to formulate regular expressions and use them for pattern matching.
4. Provide a comprehensive introduction to SHELL programming, services and utilities
5. Develop the ability to perform different networking tasks

COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Describe the architecture and features of UNIX Operating System .
2. Distinguish UNIX Operating System from other Operating Systems
3. Demonstrate UNIX commands for file handling and process control.
4. Show the working of vi editor in all its modes using various commands
5. Write Regular expressions for pattern matching and apply them to various filters for a specific task
6. Analyze a given problem and apply requisite facets of SHELL programming in order to devise a SHELL script to solve the problem.
7. Diagnose network using different networking utilities of UNIX

SYLLABUS
UNIT I   10HOURS
Introduction to UNIX: The UNIX Operating System, The UNIX Architecture, Features of UNIX, Internal and External Commands, Command Structure.General purpose utilities: cal, date, echo, printf, bc, script, passwd, path, who, uname, tty, pwd, cd, mkdir, rmdir

UNIT II   9 HOURS
Handling Files : The File System, touch, cat, cp, rm, mv, more, file, ls, wc, pg, comm, gzip, tar, zip, df, du, The vi editor. Security by file Permissions: chmod, umask. Networking commands: ping, telnet, ftp, finger, arp, rlogin.

UNIT III   8 HOURS
Shell Basics : Types of shells, Shell Functionality, Work Environment, Writing script & executing basic script, Debugging script, Making interactive scripts, Variables (default variables), Mathematical expressions. Conditional statements: If-else-elif, Test command, Logical operators - AND, OR, NOT, Case –esac. Loops: While, For, Until, Break & continue.

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UNIT IV   7 HOURS
Command Line Arguments & Regular Expression: Command line arguments: Positional parameters, Set & shift, IFS. Functions & file manipulations: Processing file line by line, Functions. Regular Expression & Filters: Regular expression, grep, cut, paste, sort, head, tail, nl, pipe, tr, tree, meta characters.

UNIT V   8 HOURS
SED and AWK - SED: Scripts, Operation, Addresses, commands, Applications.

AWK: Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String Functions, String Functions, Mathematical Functions, User – Defined Functions, Using System commands in awk, Applications awk.

TEXTBOOKS:
1.   Sumitabha Das: "YOUR UNIX – The Ultimate Guide", Tata McGraw Hill.

REFERENCE:
1.   Behrouz A. Forouzan, Richard F. Gilbery, "Unix and Shell Programming", Cengage Learning India.
2.   Graham Glass, King Ables, "Unix for programmers and users", Pearson Education.
3.   N.B. Venkateswarlu, "Advanced Unix programming", B S Publications.
4.   Yashavant Kanetkar, "Unix Shell programming", 1st Edition, BPB Publisher.
5.   Stephen Prata "Advanced UNIX: A Programming's Guide", BPB Publications
6.   Maurice J. Bach "Design of UNIX O.S. ", PHI Learning.
7.   Brian W. Kernighan & Robe Pike, "The UNIX Programming Environment", PHI Learning.

LIST OF PRACTICALS
1.   Perform installation of UNIX/LINUX operating system.
2.   Study of UNIX general purpose utility commands
3.   Execution of various file/directory handling commands.
4.   Working with the vi editor: Creating and editing a text file with the vi text editor using the standard vi editor commands.
5.   Write a shell script for calculator (to perform basic arithmetic and logical calculations).
6.   Write a shell script that will take an input file and remove identical lines (or duplicate lines from the file).
7.   Shell scripts to explore system variables such as PATH, HOME etc
8.   Execution of various system administrative commands.
9.   Write awk script that uses all its features
10.   Write a shell script to display list of users currently logged in
11.   Write a shell script to delete all the temporary files.

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12.   Write shell script to perform different string operations of arrays.

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