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
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
			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*				
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 sub tractor, Full sub tractor, 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.

| 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*				
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 morgans 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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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, 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 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

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UNIT V   8 HOURS
I/O and File management: Concept of Streams, Cen and Court 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 Scheldt Java Complete Reference Seven edition; McGraw-Hill; 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; Cariole's 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 centimetre's 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
			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

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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 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 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. 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 imposed. Create a class account that stores customer name, account number and type of account. From this derive the classes cor*rect and sav*acct to make them more specific to their requirements. Include necessary member functions in order to achieve the following tasks:

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

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

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

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*				
BTIT208M	SEC	Unix Programming	0	0	0	30	20	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. 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   10 HOURS
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, print, bc, script, passed, 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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| 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

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

| 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*				
BTAIML201M	DCC	Data Fundamentals	60	20	20	30	20	2	0	2	3

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COURSE OBJECTIVES:
The student will have ability to:
1.   To introduce the concepts of Cloud Computing.
2.   To understand the concepts Data Behaviour on Cloud.
3.   To familiar various tool to Handling Data on Azure

COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1.   Understand Core data concepts on Azure.
2.   Familiar with the use of relational data in Azure.
3.   Understand the use of non-relational data in Azure.

SYLLABUS
UNIT I   **10 HOURS**
Explore core data concepts: Describe features of structured data, Describe features of semi-structured, Describe features of unstructured data, Describe common formats for data files, Describe types of databases, Describe features of transactional workloads, Describe features of analytical workloads, Identify roles and responsibilities for data workloads, Describe responsibilities for database administrators, Describe responsibilities for data engineers, Describe responsibilities for data analysts.

UNIT II   **9 HOURS**
Identify considerations for relational data on Azure: Identify features of relational data, Describe normalization and why it is used, Identify common structured query language (SQL) statements, Identify common database objects, Describe the Azure SQL family of products including Azure SQL Database, Azure SQL Managed Instance, and SQL Server on Azure Virtual Machines, Identify Azure database services for open-source database systems.

UNIT III   **9 HOURS**
Describe considerations for working with non-relational data on Azure: Describe capabilities of Azure storage, Describe Azure Blob storage, Describe Azure File storage, Describe Azure Table storage, and Identify use cases for Azure Cosmos DB, Describe Azure Cosmos DB APIs.

UNIT IV   **8 HOURS**
Describe an analytics workload on Azur workload on Azure: Describe common elements of large-scale analytics, Describe considerations for data ingestion and processing, Describe options for analytical data stores, Describe Azure services for data warehousing, including Azure Synapse Analytics, Azure Data bricks, Azure HD

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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*				
BTAIML201M	DCC	Data Fundamentals	60	20	20	30	20	2	0	2	3

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Insight, and Azure Data Factory, Describe consideration for real-time data analytics, Describe the difference between batch and streaming data, Describe technologies for real-time analytics including Azure Stream Analytics, Azure Synapse Data Explorer, and Spark structured streaming.

UNIT V   **9 HOURS**
Microsoft Power BI: Describe data visualization in Microsoft Power BI, Identify capabilities of Power BI, Describe features of data models in Power BI, Identify appropriate visualizations for data.

REFERENCE:
1. https://docs.microsoft.com/en-us/learn/modules/explore-core-data-concepts/
2. https://docs.microsoft.com/en-us/learn/modules/explore-roles-responsibilities-world-of-data/
3. https://docs.microsoft.com/en-us/learn/modules/explore-relational-data-offerings/
4. https://docs.microsoft.com/en-us/learn/modules/explore-provision-deploy-relational-database- offerings-azure/
5. https://docs.microsoft.com/en-us/learn/modules/explore-provision-deploy-non-relational-data- services-azure/
6. https://docs.microsoft.com/en-us/learn/modules/explore-non-relational-data-stores-azure/
7. https://docs.microsoft.com/en-us/learn/modules/examine-components-of-modern-data-warehouse/
8. https://docs.microsoft.com/en-us/learn/modules/explore-fundamentals-stream-processing/
9. https://docs.microsoft.com/en-us/learn/modules/explore-fundamentals-data-visualization/

LIST OF PRACTICALS
1. Provision Azure relational database services.
2. Explore Azure Storage.
3. Explore Azure Cosmos DB.
4. Explore Azure Synapse Analytics.
5. Analyze streaming data.
6. Process streaming data using Spark.
7. Explore Azure Synapse Data Explorer
8. Visualize data with Power BI
9. Basic SQL command on SQL Server 18

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