B.Tech IT Subjects List

Sr.NO.	Course Code	PTU Code	Subject Name
1	C101	BTPH101-23	Engineering Physics
2	C102*	BTPH102-23	Engineering Physics Lab
3	C103	BTAM101-23	Engineering Mathematics -I
4	C104	BTEE101-18	Basic Electrical Engineering
5	C105*	BTEE102-18	Basic Electrical Engineering Lab
6	C106	BTME101-21	Engineering Graphics & Design
7	C107	BTCH101-23	Chemistry-I
8	C108*	BTCH102-18	Chemistry-I (Lab)
9	C109	BTAM201-23	Engineering Mathematics -II
10	C110	BTPS101-18	Programming for Problem Solving
11	C111*	BTPS102-18	Programming for Problem Solving Lab
12	C112*	BTMP101-18	Workshop/Manufacturing Practices
13	C113	BTHU101-18	English
14	C114*	BTHU102-18	English Lab
15	C115**	BMPD101-18	Mentoring and Professional Development
16	C116**	BMPD201-18	Mentoring and Professional Development
17	C201	BTES-301-18	Digital Electronics
18	C202	BTIT-301-18	Data structure & Algorithms
19	C203	BTIT-302-18	Object Oriented Programming
20	C204	BTAM-304-18	Mathematics-III
21	C205	BTES-302-18	Computer Architecture
22	C206*	BTES-303-18	Digital Electronics Lab
23	C207*	BTIT 303-18	Data structure & Algorithms Lab
24	C208*	BTIT 304-18	Object Oriented Programming lab.
25	C209*	BTIT 305-18	IT Workshop
26	C210*	-	Summer Institutional Training
27	C211	BTCS-401-18	Discrete Mathematics
28	C212	BTIT401-18	Computer Networks
29	C213	BTIT402-18	Operating Systems
30	C214	BTIT403-18	Design & Analysis of Algorithms
31	C215	HSMC101-18	Development of Societies
32	C216*	BTIT 405-18	Operating Systems Lab
33	C217*	BTIT-404-18	Computer Networks Lab
34	C218*	BTIT406-18	Design & Analysis of Algorithms Lab
35	C219**	EVS101- 18	Environmental Sciences

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36	C301	BTIT-501-18	Formal Language & Automata Theory
37	C302	BTIT-502-18	Database Management Systems
38	C303	BTIT503-18	Programming in Java
39	C304	BTIT504-18	Software Engineering
40	C305*	BTIT505 -18	Database Management Systems Lab
41	C306*	BTIT506-18	Programming in Java Lab
42	C307*	BTIT507-18	Software Engineering Lab
43	C308	HSMC122-18	Universal Human values-2
44	C309	BTIT 509-18	Cyber Laws and IPR
45	C310**	MC	Constitution of India
46	C311*	BTIT 513-18	Cyber Laws and IPR Lab
47	C312*	-	Industrial Training
48	C313	BTIT601-18	Big Data
49	C314	BTIT602 -18	Web Technologies
50	C315	BTEC-601-18	Wireless Communication
51	C316	BTIT604-18	Big Data Lab
52	C317*	BTIT605-18	Web Technologies Lab
53	C318*	BTIT 603-18	Project-1
54	C319	BTIT608-18	Machine Learning
55	C320	BTCS609-18	Agile Software Development
56	C321	BTIT 610-18	Cryptography and Network Security
57	C322	BTIT613-18	Cloud Computing
58	C323*	BTIT616-18	Machine Learning Lab
59	C324*	BTIT617 –18	Agile Software Development Lab
60	C325*	BTIT618 –18	Cryptography and Network Security Lab
61	C326*	BTIT621 –18	Cloud Computing Lab
62	C402	BTIT-701-18	Software Testing and Quality Assurance
63	C402	BTIT702-18	Sofware Project Management
64	C403	BTIT 706-18	Data Warehousing and Minning
65	C404	BTEC 908A-18	Airtificial Intelligence
66	C405*	BTIT 714-18	Data Warehousing and Minning Lab
67	C406*	BTIT 710-18	Sofware Project Management Lab
68	C407	BTEC 905A-18	Routing & Switching
69	C408*	BTIT 702-18	Project – II
70	C409*	BTCS 801-18	Software and Industrial Training

COURSE OUTCOMES FOR B.TECH(IT)

After the completion of this course, students will be able to:	
Engineering Physics BTPH101-23: C101	
C101.1	Relate the origin of bands inside the solids with the help of crystallography.
C101.2	Discuss the working, properties and characterization techniques of semiconductor materials and devices.
C101.3	Explain the properties of Magnetic materials and Nanomaterials along with its synthesis.
C101.4	Develop the knowledge about the Maxwell equation and Electromagnetic spectrum.
C101.5	Appraise the need for quantum mechanics, wave particle duality, uncertainty principle etc. and their applications.
C101.6	Examine the laser system, optical fibre in industries, laboratories and in communication.
Engineering Physics (Lab) BTPH102-23: C102*	
C102.1	Demonstrate some of the theoretical concepts learnt in the theory courses.
C102.2	Analyzing and applying precise measurements and handling sensitive equipment.
C102.3	Propose the methods used for estimating and dealing with experimental uncertainties and systematic "errors."
C102.4	Interpret conclusions from data and develop skills in experimental design.
C102.5	Create technical reports which communicate scientific information in a clear and concise manner.
Engineering Mathematics -I BTAM101-23: C103	
C103.1	Examine the convergence and divergence of sequences and series.
C103.2	Apply the concept of Proper integral to find length, surface area and volume of revolution of the curves and to deal with discontinuous functions using Improper integral.
C103.3	Use the concepts of partial differentiation to expand, estimate and find the extreme values of Multivariable functions .
C103.4	Evaluate area and volume of the surfaces using the concept of double and triple integration.
Basic Electrical Engineering BTEE101-18: C104	
C104.1	Categorize circuit elements, sources and mathematical analysis of DC circuits
C104.2	Analyze the behavior of AC circuits.
C104.3	Interpret the basic magnetic circuits and apply it to the working of electrical machines.
C104.4	Classify the components of low voltage electrical installations.
Basic Electrical Engineering (Lab) BTEE102-18: C105*	
C105.1	Make use of common electrical measuring instruments and interpret the fundamentals of electrical engineering.
C105.2	Construct electrical connections and measure power, power factor using appropriate equipment.
C105.3	Utilize the knowledge of basic magnetism to understand working of transformers.
C105.4	Demonstrate operation of electrical machines, components and their ratings.

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Engineering Graphics & Design BTME 101-21: C106

C106.1	Illustrate and prepare drawings.
C106.2	Apply the principles of orthographic projections
C106.3	Analyze and visualize of two and three dimensional planes and solids respectively.
C106.4	Design and fabricate surfaces of different shapes.
C106.5	Construct the objects in three dimensional appearances.

Chemistry-I BTCH101-23: C107

C107.1	Interpret concepts related to atomic and molecular structure at orbital level as well as categorize various intermolecular forces.
C107.2	Infer about thermodynamic functions, chemical equilibria, water chemistry and corrosion.
C107.3	Interpretation of data by using different spectroscopic techniques and its daily life applications.
C107.4	Explain and distinguish different periodic properties of elements such as ionization energy, electron affinity, electronegativity, oxidation state and polarizability.
C107.5	Classify major organic chemical reactions used for the synthesis of molecules as well as drugs.
C107.6	Illustrate three dimensional arrangements and isomers possible for a molecule and their properties.

Chemistry-I (Lab) BTCH102-18 : C108*

C108.1	Rephrase interactions among molecules on the basis of surface tension, viscosity and Partition Coefficient.
C108.2	Develop Polymer and drug molecule as well as analyze salt samples.
C108.3	Estimate rate constants of chemical reactions as a function of time.
C108.4	Discover acidity and chloride content present in water sample.
C108.5	Evaluate adsorption isotherm and extent of adsorption using TLC

Engineering Mathematics -II BTAM201-23: C109

C109.1	Determine the existence and uniqueness of the solution of system of linear equations using matrix algebra
C109.2	Relate the concepts of Basis and Dimension of a vector space in linear transformation.
C109.3	Utilize the acquired knowledge of eigen values and eigen vectors to diagonalize the matrix
C109.4	Solve ODE using different methods
C109.5	Apply the concepts of ODE in RLC circuit, Deflection of beams, Simple harmonic motion, Simple population decay model, Orthogonal trajectories of a given family of curves
C109.6	Solve Partial Differential Equations using Lagrange's and Charpit's method

Programming for Problem Solving BTPS101-18: C110

C110.1	Demonstrate the knowledge and working of a computer with its parts.
C110.2	Formulate simple algorithms and translate the algorithms to programs (in C language).
C110.3	Evaluate conditional branching, iteration statements and recursion process.
C110.4	Develop coding using arrays and implement various operations using 1D and 2D array (Matrix arithmetic operations).

C110.5	Interpret the identified problems using functions and implementing searching and sorting algorithms on the given list as well as construct recursive functions.
C110.6	Apply programming to design pointers, structures and file handling.

Programming for Problem Solving (Lab) BTPS102-18: C111*

C111.1	Evaluate given algorithms for the development of correct program.
C111.2	Identify syntax errors and logical errors at compile and run time for correction.
C111.3	Develop iterative as well as recursive programs.
C111.4	Formulate data in arrays, strings and structures and manipulate them through a program.
C111.5	Create pointers of different types and implement them in defining self-referential structures.
C111.6	Design coding to create, read and write to and from simple text files.

Workshop/Manufacturing Practices BTMP101-18: C112*

C112.1	Interpret the different manufacturing processes which are commonly employed in the industry to fabricate components using different materials
C112.2	Apply knowledge to construct different jobs with their own hands.
C112.3	Interpret the dimensional accuracies and tolerances possible with different manufacturing processes.
C112.4	Develop small devices of their interest.

English BTHU101-18: C113

C113.1	Improve their vocabulary to use different words and phrases in formulating meaningful sentences.
C113.2	Identify and ascertain knowledge about the basic grammatical aspects and sentence structures for developing effective communication.
C113.3	Interpret the given text and employ effective writing techniques for organizing and producing clear and coherent forms of expression.
C113.4	Identify and interpret the literal and contextual meaning of the given text to Compose their responses accordingly.
C113.5	Apply their point of view effectively for developing and generating their ideas in creative written form.
C113.6	Compose varied forms of business correspondence and professional documents for the purpose of informing, recognizing, analyzing and official reporting.

English (Lab) BTHU102-18: C114*

C114.1	Build their listening and speaking skills by acquiring new forms of expressions for lucid communications.
C114.2	Formulate structured conversation and put forth their point of view fluently on a variety of topics.
C114.3	Overcome their inhibition and feel confident while demonstrating their language skills to make the transitions clear.
C114.4	Interpret, analyze and use correct language in general, academic and professional environment.
C114.5	Understand and function as per the expectations of the industry to prepare themselves for future interviews.
C114.6	Design presentation on a given topic, learn to modulate their voice along with

	exhibiting the right body language.
Mentoring & Professional Development MPD101-18: C115**	
C115.1	Improve themselves by setting and working towards individual goals.
C115.2	Demonstrate the importance of moral & ethical values that exemplify professionalism.
C115.3	Develop physical fitness, wellness & sports to promote a healthy lifestyle.
C115.4	Construct various analytical & training methods for their development.
C115.5	Utilize physical activity as a tool to manage stress, pressure & work in life.
Mentoring & Professional Development MPD201-18: C116**	
C116.1	Improve themselves by setting and working towards individual goals.
C116.2	Demonstrate the importance of moral & ethical values that exemplify professionalism.
C116.3	Develop physical fitness, wellness & sports to promote a healthy lifestyle.
C116.4	Construct various analytical & training methods for their development.
C116.5	Utilize physical activity as a tool to manage stress, pressure & work in life.

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Digital Electronics (BTES-301-18)   : C201

C201.1	Interpret and Convert different type of codes and number systems which are used in digital communication and computer systems.
C201.2	Implementation of logic functions using logic gates.
C201.3	Apply concepts of Boolean algebra for handling logical expressions.
C201.4	Interpret working and realization of combinational circuits.
C201.5	Demonstrate the operation of a flip-flop and other sequential circuits.

Data structure & Algorithms(BTIT 301-18) : C202

C202.1	Analyze the algorithms to determine the time and computation complexity and justify the correctness;
C202.2	Implement various operation like searching, insertion, deletion, traversing on various Data Structures and determine time and computational complexity;
C202.3	List an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity;
C202.4	Choose appropriate Data Structure as applied to specific problem definition
C202.5	Demonstrate the reusability of Data Structures for implementing complex iterative problems

Object Oriented Programming (BTIT 302-18) : C203

C203.1	Identify classes, objects, members of a class and the relationships among them needed to solve a specific problem.
C203.2	Demonstrate the concept of constructors and destructors. create new definitions for the operators.
C203.3	Construct function templates, overload function templates.
C203.4	Interpret and demonstrate the concept of data encapsulation, inheritance, polymorphism with virtual functions
C203.5	Demonstrate the concept of file operations, streams in C++ and various I/O manipulators.

Mathematics-III (BTAM 304-18)   : C204

C204.1	Demonstrate the concept and use of partial differentiation in various problems and examine the function for maxima and minima and discover its extreme value
C204.2	Determine if an infinite sequence is bounded, monotonic or oscillating and determine the sequence whether it is convergent or divergent by using the appropriate tests.
C204.3	To set up and evaluate multiple integrals for regions in the plane. To find Area of the region bounded by curves and to find volume and surface area of solid geometric figures.
C204.4	Create, select and utilize the learnt techniques of first degree ordinary differential equations to Model real world problems.
C204.5	Be acquainted with the knowledge required to solve higher order ordinary differential Equations.

Computer Architecture(BTES 302-18) : C205

C205.1	To Interpret the Architecture as well functioning of 8085 microprocessor
C205.2	Identify the various Instruction levels, microinstructions & microprogammed control units
C205.3	Apply the concepts of pipelining and memory organization
C205.4	Demonstrate the concept of Peripheral devices and other input -output devices
C205.5	Implementation of instruction set language programs

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Digital Electronics Lab(BTES 303-18) : C206*	
C206.1	Interpret the demonstration of basic logic gates ICs.
C206.2	Interpret the construction/designing of logic circuits using different logic gate ICs.
C206.3	Experiment with combinational circuits using logic gates.
C206.4	Experiment with sequential circuits using logic gates.
C206.5	Demonstrate various types of Flip-flops and counters
Data structure & Algorithms Lab(BTIT 303-18) : C207*	
C207.1	Infer practical skills in designing and implementing basic linear data structure algorithms
C207.2	Infer practical skills in designing and implementing Non-linear data structure algorithms
C207.3	Make use of Linear and Non-Linear data structures to solve relevant problems;
C207.4	Construct appropriate Data Structure as applied to specific problem definition
C207.5	Implement Various searching algorithms and become familiar with their design methods
Object Oriented Programming lab(BTIT 304-18) : C208*	
C208.1	Develop classes incorporating object-oriented techniques
C208.2	Construct and implement object-oriented concepts of inheritance and polymorphism;
C208.3	Illustrate and implement STL class of containers and need for exceptions to handle errors for object oriented programs;
C208.4	Construct and implement any real world based problem involving GUI interface using object-oriented concepts.
C208.5	Develop classes incorporating object-oriented techniques
IT Workshop (BTIT 305-18): C209*	
C209.1	Identify various data structures available and apply them in solving computational problems.
C209.2	Develop and implement programs to process data.
C209.3	Apply control structures, use lists and tuple, set and file operations to organize the data in real world problems.
C209.4	Discover the usage of exception handling methodology.
C209.5	Design the basics of database interaction with the front-end technology.
Summer Institutional Training : C210*	
C210.1	Recognize the basic terminology used in computer programming.
C210.2	Solve programs using Object oriented concepts.
C210.3	Recall the concepts of Data Structures and their role in programming languages.
C210.4	Define programming languages for solving real time problems.
C210.5	Construction & development of software projects.
Discrete Mathematics (BTCS-401-18) : 211	
C211.1	Illustrate logical sentence in terms of predicates, quantifiers, and logical connectives
C211.2	Construct the solution for a given problem using deductive logic and prove the solution based on logical inference.
C211.3	Analyze a given a mathematical problem, classify its algebraic Structure.
C211.4	Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.

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C211.5	Implement the given problem as graph networks and solve with techniques of graph theory.
Computer Networks(BTIT 401-18) : C212	
C212.1	Explain and define the functions of the different layer of the OSI Protocol.
C212.2	Outline the Knowledge of each block of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs)
C212.3	Develop the network programming for a given problem related TCP/IP protocol
C212.4	Construct DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.
C212.5	Elaborate basic concept of cryptography.
Operating Systems(BTIT 402-18) : C213	
C213.1	Explain basic operating system concepts such as overall architecture, system calls, user mode and kernel mode
C213.2	Distinguish concepts related to processes, threads, process scheduling, race conditions and critical sections
C213.3	Analyze and apply CPU scheduling algorithms, deadlock detection and prevention algorithms
C213.4	Examine and categorize various memory management techniques like caching, paging, segmentation, virtual memory, and thrashing
C213.5	Design and implement file management system
Design & Analysis of Algorithms(BTIT 403-18) : C214	
C214.1	Analyze the Time and Space Complexity of Algorithms based on Asymptotic Notations.
C214.2	Explore algorithm design techniques like divide and conquer, greedy, dynamic programming, backtracking.
C214.3	Apply various problem solving techniques related to Trees and graphs.
C214.4	Relate the relationship between P, NP, NP-hard and NP-complete problems
C214.5	Compare Approximation, randomized and Heuristic Algorithms
Development of Societies(HSMC 101-18) : C215	
C215.1	Develop strong natural familiarity with humanities and able to eliminate conflict and strife in the individual and Society
C215.2	Interpret Political System with different models of governing system.
C215.3	Analyze the issues of local communities and evaluate them.
C215.4	Interpret historical economics system.
Computer Networks Lab (BTIT 404-18) : C216*	
C216.1	Interpret fundamental underlying principles of computer networking.
C216.2	Interpret details and functionality of layered network architecture.
C216.3	Apply mathematical foundations to solve computational problems in computer networking.
C216.4	Analyze performance of various communication protocols.
C216.5	Compare routing algorithms.
Operating Systems Lab(BTIT 405-18) : C217*	
C217.1	Interpret and implement basic services and functionalities of the operating system
C217.2	Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority

C217.3	Implement commands for files and directories
C217.4	Interpret and implement the concepts of shell programming
C217.5	Elaborate file allocation and organization techniques

Design & Analysis of Algorithms Lab(BTIT 406-18) : C218*

C218.1	Improve practical skills in designing and implementing complex problems with different techniques
C218.2	Interpret comparative performance of strategies and hence choose appropriate, to apply to specific problem definition
C218.3	Implement Various tree and graph based algorithms and become familiar with their design methods
C218.4	Design and Implement heuristics for real world problems.
C218.5	Compare Approximation, randomized and Heuristic Algorithms

Environmental Sciences (EVS101- 18) : C219**

C219.1	Interpret environmental variables and results
C219.2	Evaluate local, regional and global environmental topics related to resource use and management
C219.3	Build solutions to environmental problems related to resource use and management
C219.4	Interpret the results of scientific studies of environmental problems
C219.5	Discover threats to global biodiversity, their implications and potential solutions

Formal Language & Automata Theory(BTIT 501-18) : C301

C301.1	Interpret a formal notation for strings, languages and machines
C301.2	Design finite automata to accept a set of strings of a language.
C301.3	Design context free grammars to generate strings of context free language.
C301.4	Write the hierarchy of formal languages, grammars and machines.
C301.5	Distinguish between computability and non-computability and Decidability and undecidability.

Database Management Systems (BTIT 502-18) : C302

C302.1	Interpret database integrity constraints and design the databases using different data models.
C302.2	Write expressions in relational algebra, Calculus and SQL queries using commercial DBMS.
C302.3	Identify data dependencies in RDBMS and to normalize the data.
C302.4	Interpret the transaction processing, ACID properties and concurrency control techniques for DBMS.
C302.5	Summarize the storage techniques, importance of security in databases and advanced database structures.

Programming in Java (BTIT 503-18) : C303

C303.1	Interpret the concept of OPPS, Platform Independence, operators, Selection statements and iterations.
C303.2	Interpret the features of Java such as classes, objects, overloading and Garbage Collection.
C303.3	Implement real time applications using Inheritance, Packages and Exception Handling

C303.4	Implement competence in Java through the use of multithreading, applets
C303.5	Elaborate advance concepts like socket and database connectivity.

Software Engineering (BTIT 504-18) : C304

C304.1	Interpreting of Software Process Models.
C304.2	Interpret the role of project management.
C304.3	Interpreting of Object, Data, Behavioral and Context models.
C304.4	Describe implementation issues such as modularity and coding standards.
C304.5	Elaborate software testing approaches such as unit, integration and system testing.

Database Management Systems Lab(BTIT 505-18) : C305*

C305.1	How to retrieve data from relational databases using SQL.
C305.2	Implement generation of tables using datatypes
C305.3	Design and execute the various data manipulation queries.
C305.4	Execute Database Security and Privileges commands

Programming in Java Lab(BTIT 506-18) : C306*

C306.1	Implement the features of Java such as operators, classes, objects, inheritance, packages and exception handling
C306.2	Design problems using latest features of Java like garbage collection, Console class, Network interface, APIs
C306.3	Develop competence in Java through the use of multithreading, Applets etc
C306.4	Apply advance concepts like socket and database connectivity, and develop project based on industry orientation

Programming in Software Engg.(BTIT 507-18) : C307*

C307.1	Interpreting of Software process models such as the waterfall, prototyping and spiral models
C307.2	Interpreting of the role of project management including planning, scheduling, risk management, etc.
C307.3	Interpreting of object models, data models, context models and behavioral models.
C307.4	Describe implementation issues such as modularity and coding standards.
C307.5	Interpreting of software testing approaches such as unit testing, integration testing and system testing

Universal Human values-2 (HSMC12 2-18) : C308

C308.1	Comprehend the need of getting value based education in technical and professional institutions.
C308.2	Interpret the process and content of self-exploration and natural acceptance and its need in the present scenario.
C308.3	Interpret the basic human aspirations and the ways to fulfill these aspirations.
C308.4	Identify the comprehensive human goal for a sustainable happiness and prosperity for all and the state of society and clean environment for the healthy life today.
C308.5	Recognize their role as individual and their responsibility in life towards their own self and towards one's family, society and nature.

Cyber Laws and IPR(BTIT 509-18)   : C309*

C309.1	Explain the various digital crimes and comprehend the basic features of these crimes.
C309.2	Analyze how laws are enforced in the digital and cyber environment and the challenges that are forced in their enforcement.
C309.3	Comprehensive analytical study of IT Act 2000 covering its positive and negative aspects both.
C309.4	Interpret to identify what is a Protectable Subject matter under Copyright Laws and what is the manner of obtaining Copyright protection.
C309.5	Build knowledge in application of various provisions of Copyright law to determine the rights to which the IP holder will be entitled.

Constitution of India (MC) : C310**

C310.1	Impart basic knowledge about the Constitution of India.
C310.2	Illustrate the students about their obligations, responsibilities, privileges and rights, duties and get insights on administrative and judicial setup of the country.
C310.3	Develop national and patriotic spirit among the students as responsible citizens of the country.
C310.4	Impart knowledge about state and central policies, fundamental duties, electoral process, amendment procedure and emergency provisions.
C310.5	Analyze the History, features of Indian constitution, the role Governor and Chief Minister, role of state election commission, the decentralization of power between central, state and local self-government.
C310.6	Apply the knowledge on directive principle of state policy, the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

Cyber laws and IPR lab (BTIT 513-18) : C 311*

C311.1	Interpret various searching sources for retrieval of case study.
C311.2	Demonstrate the techniques for identified the cybercrimes.
C311.3	Interpret the concept and procedure for registering the Patents.
C311.4	Interpret the concept and procedure for registering the copyrights.
C311.5	Interpret the concept and procedure for registering the trademarks.

Industrial Training   : C312*

C312.1	Acquire knowledge about latest software, hardware and modern engineering tools.
C312.2	Analyze, design and develop solutions for various problems by conducting systematic study of projects.
C312.3	Apply engineering and mathematical concepts for solving problems faced by society and industry.
C514.4	Develop technical interpersonal communicative projects and finance management skills applicable to the industry.
C312.5	Develop moral values such as responsibility, commitment, teamwork spirit and ethics during training and achieve continuous learning.
C312.6	Identify real work environment and gain knowledge in report writing in technical works/projects.

Big Data (BTIT 601-18) : C313	
C313.1	Interpret fundamental concepts of Big Data and its technologies
C313.2	Apply concepts of Map Reduce framework for optimization
C313.3	Analyze appropriate NoSQL database techniques for storing and processing large volumes of structured and unstructured data
C313.4	Interpret various components of Hadoop ecosystems
C313.5	Explore modern tools and packages for data visualization
Web Technologies(BTIT 602-18) : C314	
C314.1	Interpret and apply the knowledge of web technology components to deploy various web services.
C314.2	Analyze and design web pages using HTML and DHTML.
C314.3	Design and develop interactive Web portals that accommodate user specific requirements and constraint analysis.
C314.4	Construct latest web technologies and tools by creating dynamic pages with an Interpreting of functions and objects.
C314.5	Develop web-based application using suitable server-side web technologies.
Wireless Communication (BTEC-601-18) : C315	
C315.1	Interpret the basic elements of Cellular Radio Systems and its Design
C315.2	Learn about the concepts of Digital communication through fading Multipath Channels
C315.3	Interpret Various Multipath Access Techniques for Wireless communication
C315.4	Know about the wireless standards and systems
C315.5	Learn about evolution of communication generations
Big Data Lab(BTIT 604-18) : C316*	
C316.1	Define Hadoop
C316.2	Demonstrate the knowledge of big data analytics and implement different file management task
C316.3	Interpret Map Reduce Paradigm
C316.4	Analyze and perform different operations on data using R Script
C316.5	Analyze data using R
Web Technologies Lab(BTIT 605-18) : C317*	
C317.1	Demonstrate the basic of HTML elements
C317.2	Interpret the basics of PHP Console.
C317.3	Explain Client side scripting with JavaScript and AJAX.
C317.4	Demonstrate the use of web site designing tools such as Joomla, WordPress
C317.5	Demonstrate the use of Loops and arrays in PHP
Project-1(BTIT 603-18) : C318*	
C318.1	Interpret various issues while developing project.
C318.2	Interpret strategies of project development.
C318.3	Interpret the nature of software development.
C318.4	Tell the basics of testing.

C318.5	Interpret need of project management.
C318.6	Construct and test the project successfully.

Machine Learning(BTIT 608-18) : C319

C319.1	Analyze methods and theories in the field of machine learning
C319.2	Analyze and extract features of complex datasets
C319.3	Deploy techniques to comment for the Regression
C319.4	Comprehend and apply different classification and clustering techniques
C319.5	Interpret the concept of Neural Networks and Genetic Algorithm

Agile Software Development(BTIT 609-18) : C320

C620.1	Interpret concept of agile software engineering and its advantages in software development.
C620.2	Explicate the role of design principles in agile software design.
C320.3	Define the core practices behind Scrum framework.
C320.4	Interpret key principles of agile software development methodology-Kanban.
C320.5	Describe implications of functional testing, unit testing, and continuous integration.

Cryptography and Network Security(BTIT 610-18) : C321

C321.1	Interpret basics of Cryptography and Network Security and Describe network security services and mechanisms.
C321.2	Explore about how to maintain the Confidentiality, Integrity and Availability of a data and to Interpret the use of modular mathematics in Cryptography.
C321.3	Analyze and design classical encryption techniques and block ciphers and thus Interpret, Analyze design and implement classical encryption techniques, block ciphers, Symmetric Key and Asymmetric Key Algorithms.
C321.4	Analyze and design hash and MAC algorithms, and digital signatures.
C321.5	Interpret and learn about Various network security applications, IPSec, Firewall, IDS, Web security, Email security, and Malicious software etc.

Cloud Computing(BTIT 613-18) : C322

C322.1	Interpret the core concepts of the cloud computing paradigm
C322.2	Interpreting importance of virtualization along with their technologies
C322.3	Analyze various cloud computing service and deployment models and apply them to solve problems on the cloud.
C322.4	Implementation of various security strategies for different cloud platform

Machine Learning lab(BTIT 616-18) : C323*

C323.1	Interpret fundamental concepts to collect data
C323.2	Analyze and apply various data pre-processing techniques
C323.3	Implement various machine learning algorithms
C323.4	Compare machine learning models
C323.5	List powerful analysis

Agile Software Development lab(BTIT 617-18) : C324*

C324.1	Interpret concept of agile software engineering and its advantages in software development.
C324.2	Explain the role of design principles in agile software design.

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C324.3	Define the core practices behind Scrum framework.
C324.4	Interpret key principles of agile software development methodology-Kanban
C324.5	Describe implications of functional testing, unit testing, and continuous integration.

Cryptography and Network Security lab(BTIT 618-18) : C325*

C325.1	Develop and Implement concept and use of Modular Mathematics in Cryptography.
C325.2	Interpret and implement the most common type of conventional(Traditional) cryptographic algo
C325.3	Design and Implement public-key cryptography, RSA and other public-key cryptosystems
C325.4	Develop and Implement different key management algorithms such as Diffie-Hellman Key Exchange, ElGamal Cryptosystem, etc.

Cloud Computing lab(BTIT 621-18) : C326*

C326.1	Configure various virtualization tools such as Virtual Box, VMware workstation.
C326.2	How to simulate a cloud environment to implement new schedulers.
C326.3	Implement an insight into managing and scheduling of various cloud resources
C326.4	Examine the case studies of different cloud service providers to recapitulate the concepts of Cloud Computing.

Software Testing and Quality Assurance(BTIT 701-18) : C401

C401.1	Interpret software testing and quality assurance as a fundamental component of software life cycle
C401.2	Define the scope of SW T&QA projects
C401.3	Evaluate T&QA activities using modern software tools and Estimate cost of a T&QA project and manage budgets
C401.4	Configure test plans and schedules for a T&QA project and Develop T&QA project staffing requirements
C401.5	List a T&QA project

Software Project Management(BTIT 702-18) : C402

C402.1	Explain project management in terms of the software development process.
C402.2	Estimate project cost and perform cost-benefit evaluation among projects.
C402.3	Apply the concepts of project scheduling and risk management.
C402.4	Explain Software configuration management and the concepts of contract management.
C402.5	Apply quality models in software projects for maintaining software quality and reliability.

Data Warehousing and Mining(BTIT 706-18) : C403

C403.1	Interpret the role of data warehouse and data mining in organizations to implement projects.
C403.2	Identify and Formulate solutions for complex data mining problems using data mining algorithms and data classification techniques.
C403.3	Illustrate and investigate the complex data mining problem with the help of data mining tools for interpretation of data and valid conclusions.
C403.4	Apply Association rules, classification and clustering methods on different datasets based on real world problems like public health, safety etc.
C403.5	Explore web data mining to assess social, health, safety, legal and cultural issues.

Artificial Intelligence (BTEC908A-18) : C404

C404.1	Learn about the basic Interpreting of Artificial Intelligent system.

C404.2	Explain about various types of Artificial Neural Networks & their models
C404.3	Describe Artificial Neural networks methods, operation and parameters
C404.4	Explore Neural Network MATLAB Toolbox
DWM LAB (BTIT 714-18) : C405*	
C405.1	Identify different data mining tools used to analyze data
C405.2	Demonstrate the classification & clustering in large data sets
C405.3	Tell effective visualization for representing data
C405.4	Apply & add mining algorithms as a component to the exiting tools
C405.5	Interpret the working of algorithms for data mining tasks such association rule mining, classification, clustering and regression.
SPM Lab (BTIT 710-18) : C406*	
C406.1	Plan and manage projects.
C406.2	Consolidate and communicate information about their project.
C406.3	Create Gantt charts and PERT (Project Evaluation Review Technique) chart of their project
C406.4	Outline resources, assignments, work allocation and generate reports to assess project status, project cost status and resource utilization.
C406.5	Identify factors affecting the critical path of their project.
Routing and Switching(BTEC-905A-18) : C407	
C407.1	Demonstrate a basic Interpreting of small and medium-sized networks, including general network terminologies and technologies.
C407.2	Interpret the concept of routing and implementation of various routing protocols and algorithms.
C407.3	Explain awareness about various techniques and principles used in constructions of different networks.
C407.4	Construct simple networks and integrate voice, wireless, cloud, security, and storage technologies into their networks in order to support a variety of applications.
C407.5	Interpreting of various Network Security Concepts and its implementations.
Project-II (BTIT 702-18) : C408*	
C408.1	Interpret how to apply software development methodology on application development.
C408.2	Acquire knowledge about advance programming languages and techniques.
C408.3	How to identify and solve real world problems.
C408.4	Interprets how to write technical report.
C408.5	How to generate Test cases and to perform software Testing.
C408.6	Interpret the security aspects and backup recovery
Software and Industrial Training (BTCS 801-18) : C409*	
C409.1	Explore different professional engineering practices and prepare a technical report based on the industrial/software exposure and project undertaken.
C409.2	Explore the organizational structure, business strategies, and administrative functions.
C409.3	Examine industrial etiquette like punctuality and target oriented working.
C409.4	Motivate the students to handle responsibilities and work pressure effectively.
C409.5	Tell interpersonal and technical communication skills.

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B.Tech AIML AIDS Subjects List

Sr.NO.	Course Code	PTU Code	Subject Name
1	C101	BTPH101-23	Engineering Physics
2	C102*	BTPH102-23	Engineering Physics Lab
3	C103	BTAM101-23	Engineering Mathematics -I
4	C104	BTEE101-18	Basic Electrical Engineering
5	C105*	BTEE102-18	Basic Electrical Engineering Lab
6	C106	BTME101-21	Engineering Graphics & Design
7	C107	BTCH101-23	Chemistry-I
8	C108*	BTCH102-18	Chemistry-I (Lab)
9	C109	BTAM201-23	Engineering Mathematics -II
10	C110	BTPS101-18	Programming for Problem Solving
11	C111*	BTPS102-18	Programming for Problem Solving Lab
12	C112*	BTMP101-18	Workshop/Manufacturing Practices
13	C113	BTHU101-18	English
14	C114*	BTHU102-18	English Lab
15	C115**	BMPD101-18	Mentoring and Professional Development
16	C116**	BMPD201-18	Mentoring and Professional Development
17	C201	BTES 301-18	Digital Electronics
18	C202	BTCS 301-18	Data structure & Algorithms
19	C203	BTCS 302-18	Object Oriented Programming
20	C204	BTAM 304-18	Mathematics-III
21	C205	HSMC 101-18	Development of Societies
22	C206*	BTES 302-18	Digital Electronics Lab
23	C207*	BTCS 303-18	Data structure & Algorithms Lab
24	C208*	BTCS 304-18	Object Oriented Programming lab.
25	C209*	BTCS 305-18	IT Workshop
26	C210*	-	Summer Institutional Training
27	C211	BTCS 401-18	Discrete Mathematics
28	C212	BTES 401-18	Computer Architecture and Organization
29	C213	BTCS 402-18	Operating Systems
30	C214	BTCS 403-18	Design & Analysis of Algorithms
31	C215	HSMC 122-18	Universal Human Values 2
32	C216*	BTCS 404-18	Operating Systems Lab
33	C217*	BTES 402-18	Computer Architecture and Organization Lab
34	C218*	BTCS 405-18	Design & Analysis of Algorithms Lab
35	C219**	EVS101- 18	Environmental Sciences

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COURSE OUTCOMES FOR B.TECH(AIML & AIDS)

After the completion of this course, students will be able to:	
Engineering Physics BTPH101-23: C101	
C101.1	Relate the origin of bands inside the solids with the help of crystallography.
C101.2	Discuss the working, properties and characterization techniques of semiconductor materials and devices.
C101.3	Explain the properties of Magnetic materials and Nanomaterials along with its synthesis.
C101.4	Develop the knowledge about the Maxwell equation and Electromagnetic spectrum.
C101.5	Appraise the need for quantum mechanics, wave particle duality, uncertainty principle etc. and their applications.
C101.6	Examine the laser system, optical fibre in industries, laboratories and in communication.
Engineering Physics (Lab) BTPH102-23: C102*	
C102.1	Demonstrate some of the theoretical concepts learnt in the theory courses.
C102.2	Analyzing and applying precise measurements and handling sensitive equipment.
C102.3	Propose the methods used for estimating and dealing with experimental uncertainties and systematic "errors."
C102.4	Interpret conclusions from data and develop skills in experimental design.
C102.5	Create technical reports which communicate scientific information in a clear and concise manner.
Engineering Mathematics -I BTAM101-23: C103	
C103.1	Examine the convergence and divergence of sequences and series.
C103.2	Apply the concept of Proper integral to find length, surface area and volume of revolution of the curves and to deal with discontinuous functions using Improper integral.
C103.3	Use the concepts of partial differentiation to expand, estimate and find the extreme values of Multivariable functions .
C103.4	Evaluate area and volume of the surfaces using the concept of double and triple integration.
Basic Electrical Engineering BTEE101-18: C104	
C104.1	Categorize circuit elements, sources and mathematical analysis of DC circuits
C104.2	Analyze the behavior of AC circuits.
C104.3	Interpret the basic magnetic circuits and apply it to the working of electrical machines.
C104.4	Classify the components of low voltage electrical installations.
Basic Electrical Engineering (Lab) BTEE102-18: C105*	
C105.1	Make use of common electrical measuring instruments and interpret the fundamentals of electrical engineering.
C105.2	Construct electrical connections and measure power, power factor using appropriate equipment.
C105.3	Utilize the knowledge of basic magnetism to understand working of transformers.
C105.4	Demonstrate operation of electrical machines, components and their ratings.

Engineering Graphics & Design BTME 101-21: C106

C106.1	Illustrate and prepare drawings.
C106.2	Apply the principles of orthographic projections
C106.3	Analyze and visualize of two and three dimensional planes and solids respectively.
C106.4	Design and fabricate surfaces of different shapes.
C106.5	Construct the objects in three dimensional appearances.

Chemistry-I BTCH101-23: C107

C107.1	Interpret concepts related to atomic and molecular structure at orbital level as well as categorize various intermolecular forces.
C107.2	Infer about thermodynamic functions, chemical equilibria, water chemistry and corrosion.
C107.3	Interpretation of data by using different spectroscopic techniques and its daily life applications.
C107.4	Explain and distinguish different periodic properties of elements such as ionization energy, electron affinity, electronegativity, oxidation state and polarizability.
C107.5	Classify major organic chemical reactions used for the synthesis of molecules as well as drugs.
C107.6	Illustrate three dimensional arrangements and isomers possible for a molecule and their properties.

Chemistry-I (Lab) BTCH102-18 : C108*

C108.1	Rephrase interactions among molecules on the basis of surface tension, viscosity and Partition Coefficient.
C108.2	Develop Polymer and drug molecule as well as analyze salt samples.
C108.3	Estimate rate constants of chemical reactions as a function of time.
C108.4	Discover acidity and chloride content present in water sample.
C108.5	Evaluate adsorption isotherm and extent of adsorption using TLC

Engineering Mathematics -II BTAM201-23: C109

C109.1	Determine the existence and uniqueness of the solution of system of linear equations using matrix algebra
C109.2	Relate the concepts of Basis and Dimension of a vector space in linear transformation.
C109.3	Utilize the acquired knowledge of eigen values and eigen vectors to diagonalize the matrix
C109.4	Solve ODE using different methods
C109.5	Apply the concepts of ODE in RLC circuit, Deflection of beams, Simple harmonic motion, Simple population decay model, Orthogonal trajectories of a given family of curves
C109.6	Solve Partial Differential Equations using Lagrange's and Charpit's method

Programming for Problem Solving BTPS101-18: C110

C110.1	Demonstrate the knowledge and working of a computer with its parts.
C110.2	Formulate simple algorithms and translate the algorithms to programs (in C language).
C110.3	Evaluate conditional branching, iteration statements and recursion process.
C110.4	Develop coding using arrays and implement various operations using 1D and 2D array (Matrix arithmetic operations).

C110.5	Interpret the identified problems using functions and implementing searching and sorting algorithms on the given list as well as construct recursive functions.
C110.6	Apply programming to design pointers, structures and file handling.

Programming for Problem Solving (Lab) BTPS102-18: C111*

C111.1	Evaluate given algorithms for the development of correct program.
C111.2	Identify syntax errors and logical errors at compile and run time for correction.
C111.3	Develop iterative as well as recursive programs.
C111.4	Formulate data in arrays, strings and structures and manipulate them through a program.
C111.5	Create pointers of different types and implement them in defining self-referential structures.
C111.6	Design coding to create, read and write to and from simple text files.

Workshop/Manufacturing Practices BTMP101-18: C112*

C112.1	Interpret the different manufacturing processes which are commonly employed in the industry to fabricate components using different materials
C112.2	Apply knowledge to construct different jobs with their own hands.
C112.3	Interpret the dimensional accuracies and tolerances possible with different manufacturing processes.
C112.4	Develop small devices of their interest.

English BTHU101-18: C113

C113.1	Improve their vocabulary to use different words and phrases in formulating meaningful sentences.
C113.2	Identify and ascertain knowledge about the basic grammatical aspects and sentence structures for developing effective communication.
C113.3	Interpret the given text and employ effective writing techniques for organizing and producing clear and coherent forms of expression.
C113.4	Identify and interpret the literal and contextual meaning of the given text to Compose their responses accordingly.
C113.5	Apply their point of view effectively for developing and generating their ideas in creative written form.
C113.6	Compose varied forms of business correspondence and professional documents for the purpose of informing, recognizing, analyzing and official reporting.

English (Lab) BTHU102-18: C114*

C114.1	Build their listening and speaking skills by acquiring new forms of expressions for lucid communications.
C114.2	Formulate structured conversation and put forth their point of view fluently on a variety of topics.
C114.3	Overcome their inhibition and feel confident while demonstrating their language skills to make the transitions clear.
C114.4	Interpret, analyze and use correct language in general, academic and professional environment.
C114.5	Understand and function as per the expectations of the industry to prepare themselves for future interviews.
C114.6	Design presentation on a given topic, learn to modulate their voice along with

	exhibiting the right body language.
Mentoring & Professional Development MPD101-18: C115**	
C115.1	Improve themselves by setting and working towards individual goals.
C115.2	Demonstrate the importance of moral & ethical values that exemplify professionalism.
C115.3	Develop physical fitness, wellness & sports to promote a healthy lifestyle.
C115.4	Construct various analytical & training methods for their development.
C115.5	Utilize physical activity as a tool to manage stress, pressure & work in life.
Mentoring & Professional Development MPD201-18: C116**	
C116.1	Improve themselves by setting and working towards individual goals.
C116.2	Demonstrate the importance of moral & ethical values that exemplify professionalism.
C116.3	Develop physical fitness, wellness & sports to promote a healthy lifestyle.
C116.4	Construct various analytical & training methods for their development.
C116.5	Utilize physical activity as a tool to manage stress, pressure & work in life.

Digital Electronics (BTES 301-18): C201	
CO1	Interpret the number system, binary arithmetic, binary codes and their applications
CO2	Demonstrate the role of logic gates in the realization of Boolean function
CO3	Design and development of combinational circuits using problem formulation and logic optimization
CO4	Design and development of sequential circuits using problem formulation and logic optimization
CO5	Construct digital logic circuits using ROM, PLA and PAL units
CO6	Analyzing the operation and performance of A/D and D/A converters and their application in system design
Data Structures & Algorithms (BTCS 301-18): C202	
CO1	Demonstrate how the data is organized as well as categorize into various data structures and solve complex engineering problems.
CO2	Utilize appropriate data structure to solve problems efficiently and provide better solution to reduce space and time complexity.
CO3	Illustrate various methods of organizing large amounts of data and identify systematic approach to retrieve data and solve problems.
CO4	Identify and analyze linear and non-linear data structures to understand and design algorithmic solutions for their applications.
CO5	Formulate new solutions for real world problems or improve existing code using well defined algorithms.
Object Oriented Programming (BTCS 302-18): C203	
CO1	Interpret the behaviour of simple programs involving the fundamental programming concepts.
CO2	Outline the meaning of object-oriented paradigm with implementation.

CO3	Illustrate various forms of inheritance and identify systematic approach to access class hierarchy.
CO4	Elaborate the concept of polymorphism and generic programming.
CO5	Combine the concept of exception handling and I/O streams in object-oriented programs

Mathematics-III (BTAM 304-18): C204

CO1	Demonstrate the concept and use of partial differentiation in various problems and examine the function for maxima and minima and discover its extreme value.
CO2	Determine if an infinite sequence is bounded, monotonic or oscillating and determine the sequence whether it is convergent or divergent by using the appropriate tests.
CO3	Construct and evaluate multiple integrals for regions in the plane and to find Area of the region bounded by curves and to find volume and surface area of solid geometric figures.
CO4	Create, select and utilize the learnt techniques of first degree ordinary differential equations to Model real world problems.
CO5	Obtain the generated solution of an inhomogeneous linear constant coefficient second order differential equation by combining its complementary function with particular integral

Development of Societies (HSMC 101-18): C205

CO1	Apply the knowledge of the basic social concepts for understanding the different social systems.
CO2	Interpret the different models of Social Structures and their evolution.
CO3	Evaluate the political ideology and comprehend all the governing systems since its emergence.
CO4	Analyze the working scenario of development in pre-British, British and post British period.
CO5	Compare the economic development ideas according to different economists in different eras.

Digital electronics Lab (BTES 302-18): C206*

CO1	Demonstrate and understand the operations of digital trainer and logic gates using integrated circuits.
CO2	Design and realization of combinational circuits and verification of their operations.
CO3	Design and realization of sequential circuits and verification of their operations.
CO4	Evaluation of operation of different ICs for various applications

Data structure & Algorithms Lab (BTCS 303-18): C207*

CO1	Apply the knowledge of programming skills to implement and analyze different data structure.
CO2	Outline and implement various data structures algorithms in high level programming language.

CO3	Identify and apply the appropriate data structure to solve real world problems.
CO4	Design and analyze the time and space efficiency of the data structures.
CO5	Implement appropriate searching and sorting techniques for application development.

Object Oriented Programming Using C++ Lab (BTCS 304-18): C208*

CO1	Develop classes incorporating object-oriented techniques.
CO2	Make use of C++ features to program design and implement.
CO3	Illustrate and evaluate the file Input Output mechanisms.
CO4	Utilize C++ to demonstrate practical experience in developing object oriented solutions.
CO5	Implement virtual function to achieve dynamic polymorphism.

IT Workshop (BTIT 305-18):   C209*

C209.1	Identify various data structures available and apply them in solving computational problems.
C209.2	Develop and implement programs to process data.
C209.3	Apply control structures, use lists and tuple, set and file operations to organize the data in real world problems.
C209.4	Discover the usage of exception handling methodology.
C209.5	Design the basics of database interaction with the front-end technology.

Summer Institutional Training: C210**

CO1	Apply knowledge and skills they learned in previous classes to solve real-life problems.
CO2	Make use of techniques, skills and modern engineering tools for engineering practice.
CO3	Develop communication, interpersonal and other critical skills in the job interview process.
CO4	Adapt the professional and ethical responsibilities.
CO5	Analyze the functioning of internship organization and recommend changes for improvement in processes.

Discrete Mathematics (BTCS 401-18): C211

CO1	Elaborate logical sentence in terms of predicates, quantifiers, and logical connectives.
CO2	Construct the solution for a given problem using deductive logic and prove the solution based on logical inference.
CO3	Analyze a given a mathematical problem, classify its algebraic structure.
CO4	Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.
CO5	Design the given problem as graph networks and solve with techniques of graph theory.

Computer Organization & Architecture (BTES 401-18): C212

| CO1 | Identification of functional units and internal architecture of a microprocessor |

CO2	Illustration of instruction set of a microprocessor and performing the arithmetic and logical operations on binary data.
CO3	Categorization of design approaches of control unit and I/O data transfer approaches
CO4	Evaluation and classification of pipelined and parallel processors
CO5	Determine the functions and role of memory systems in processors

Operating System (BTCS 402-18): C213

CO1	Interpret the basic operating system mechanisms such as overall architecture, system calls, user mode and kernel mode
CO2	Compare and contrast concepts related to processes, threads, process scheduling, race conditions and critical sections
CO3	Evaluate and apply CPU scheduling algorithms, deadlock detection and prevention algorithms
CO4	Examine and categorize various memory management techniques like caching, paging, segmentation, virtual memory, and thrashing
CO5	Formulate and implement file management system
CO6	Appraise high-level operating systems concepts such as file systems, disk-scheduling algorithms and various file systems

Design & Analysis of Algorithms (BTCS 403-18): C214

CO1	Compare the correctness of algorithms using inductive proofs and analyze worst-case running times of algorithms using asymptotic analysis.
CO2	Explain important algorithmic design paradigms (brute force, greedy method, dynamic-programming and Backtracking, branch and bound) and apply when an algorithmic design situation calls for it.
CO3	Explain the major graph algorithms and Employ graphs to model engineering problems, when appropriate.
CO4	Describe the classes P, NP, and NP Complete and be able to prove that a certain problem is NP-Complete.
CO5	Analyze approximation/randomized/heuristic algorithms and recite analyses of these algorithms that employ this method of analysis.

Universal Human Values (HSMC 122-18): C215

CO1	Identify the need of Self-Exploration and Basic requirements for fulfilment of Aspirations of every Human Being
CO2	Analyse the value of Harmony in the Human Being
CO3	Illustrate the existence of Human being with the Family and Society and understand the idea of Human- Human relationship
CO4	Examine the existence of a Human Being with the Nature to Coexist
CO5	Apply the human values to achieve Ethical Human Conduct and Universal Human Order

Operating System Lab (BTCS 404-18): C216*

CO1	Identify and implement basic services and functionalities of the operating system
CO2	Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority
CO3	Construct the virtual machine to install the various operating systems.
CO4	Implement the commands for files and directories.
CO5	Compute and simulate the concepts of shell programming, files and directories
CO6	Examine the concepts of deadlock in operating systems and implement them in multiprogramming system

Computer Organization & Architecture Lab (BTES 402-18): C217*

CO1	Identification and recognition of computer anatomy - Memory, Ports, Motherboard etc.
CO2	Make use of the computer parts for assembling a PC
CO3	Define the functional units of the processor such as the registers, memory space and other parts available on trainer
CO4	Illustration of instruction set of a microprocessor and perform the arithmetic and logical operations on binary data.

Design & Analysis of Algorithms Lab (BTCS 405-18): C218*

CO1	Implement Algorithm to solve problem by iterative search
CO2	Design algorithms using divide and conquer, greedy and dynamic programming.
CO3	Execute sorting algorithms such as sorting, graph related and combinatorial algorithm in a high level language
CO4	Analyze the performance of merge sort and quick sort algorithms using divide and conquer technique.
CO5	Apply the dynamic programming technique to solve real world problems such as knapsack and TSP.

Environmental Studies (EVS 101-18): C219**

CO1	Develop the knowledge on various natural resources, their utilization for sustainable lifestyles and their repercussion.
CO2	Discuss the values, threats and conservation of biodiversity and classify various Ecosystems
CO3	Identify and implement technological and economical solution to environmental problems.
CO4	Outline the environmental solutions and perform activities to generate public awareness.
CO5	Demonstrate individuals to conduct activities on social issues, environment awareness campaigns etc.

M.Tech Subjects List

Sr.NO.	Course Code	PTU Code	Subject Name
1	C101	MTCS 101-18	Mathematical foundations of Computer Science
2	C102	MTCS 102-18	Advanced Data Structures
3	C103	MTCS 109-18	Distributed system
4	C104	MTIT 205-18	Network Security
5	C105	MTRM-101-18	Research Methodology and IPR
6	C106	MTCS 102-18	Advanced Data Structures Lab
7	C107*	MTIT 101-18	Network Security Lab
8	C108	MTCS 201-18	Advance Algorithms
9	C109	MTCS 202-18	Soft Computing
10	C110	MTIT 204-18	Cloud Computing
11	C111	MTCS 105-18	Machine Learning
12	C112*	MTCS 203-18	Soft Computing Lab
13	C113*	MTIT 201-18	Cloud Computing Lab
14	C114	MTIT 202-18	Mini Project with Seminar
15	C201	MTCS 207-18	Secure Software Design & Enterprise Computing
16	C202	MTOE 303-18	Operations Research

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COURSE OUTCOMES FOR M.TECH(IT)

Mathematical Foundations of Computer Science (MTCS 101-18)	
1	To Interpret the basic notions of discrete and continuous probability.
2	To Interpret the methods of statistical inference, and the role that sampling distributions planthouse methods.
3	To be able to perform correct and meaningful statistical analyses of simple to moderate complexity.

Advanced Data Structures (MTCS 109-18)	
1	Interpret the implementation of symbol table using hashing techniques.
2	Develop and analyze algorithms for red-black trees, B-trees, and Splay trees.
3	Develop algorithms for text processing applications.
4	Identify suitable data structures and develop algorithms for computational geometry problems.

Distributed system (MTCS 109-18)	
1	Design trends in distributed systems.
2	Apply network virtualization.
3	Apply remote method invocation and objects.

Network Security (MTIT 205-18)	
1	To Interpret basics of security and issues related to it.
2	Interpreting of biometric techniques available and how they are used in today's world.
3	Security issues in web and how to tackle them.
4	Learn mechanisms for transport and network security.

Research Methodology and IPR (MTRM-101-18)	
1	Interpret research problem formulation.
2	Analyze research related information.
3	Interpret that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
4	Interpreting that when IPR would take such important place in growth of individuals &nation, itis needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.

Advanced Data Structures Lab (MTCS 103-18)*	
1	Implement List ADTs and their operations.
2	Develop programs for sorting.
3	Develop programs for implementing trees and their traversal operations.

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4	Implement graph traversal algorithms.

Network Security Lab (MTIT 101-18)*

1	Install and navigate through Wireshark.
2	Capturing and managing data.
3	Track various activities over the network.
4	Perform packet sniffing.

Advanced Algorithms (MTCS 201-18)

1	Analyze the complexity/performance of different algorithms.
2	Determine the appropriate data structure for solving a particular set of problems.
3	Categorize the different problems in various classes according to their complexity.
4	Students should have an insight of recent activities in the field of the advanced data structure.

Soft Computing (MTCS 202-18)

1	Identify and describe soft computing techniques and their roles in building intelligent machines.
2	Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems.
3	Apply genetic algorithms to combinatorial optimization problems.
4	Evaluate and compare solutions by various soft computing approaches for a given problem.

Cloud Computing (MTIT 204-18)

1	Identify security aspects of each cloud model.
2	Develop a risk-management strategy for moving to the Cloud.
3	Implement a public cloud instance using public cloud service provider.
4	Apply trust-based security model to different layer.

Machine Learning (MTCS 105-18)

1	Extract features that can be used for a particular machine learning approach in various IOT applications.
2	To compare pros and cons of various machine learning techniques and to get an insight of when to apply a particular machine learning approach.
3	To mathematically analyze various machine learning approaches and paradigms.

Soft Computing Lab (MTCS 203-18)*

1	Explore methods that implements neural network techniques.
2	Practice the fuzzy set relations using different operations.
3	Design Regression techniques for a set of data points.
4	Capture an appropriate classification model for analytical tasks.

5	Implement best practices and techniques for computing efficiently.

Cloud Computing Lab (MTIT 201-18)*

1	Implement virtualization using VM Ware.
2	Configure Hadoop.
3	Execute basic scheduling algorithms for load balancing.
4	Demonstrate working of Microsoft Azure.

Mini Project with Seminar (MTIT 202-18)*

1	Demonstrate a sound technical knowledge of their selected mini project topic.
2	Undertake problem identification, formulation, and solution.
3	Design engineering solutions to complex problems utilizing a systems approach.
4	Communicate with engineers and the community at large.
5	Demonstrate the knowledge, skills, and attitudes of a professional engineer.

Secure Software Design & Enterprise Computing (MTCS 207-18)

1	Differentiate between various software vulnerabilities.
2	Software process vulnerabilities for an organization.
3	Monitor resources consumption in a software.
4	Interrelate security and software development process.

Operations Research (MTOE 303-18)

1	Solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained
2	Optimize the allocation of resources to Demand points in the best possible way using various techniques and minimize the cost or time of completion of number of jobs by number of persons.
3	Model competitive real-world phenomena using concepts from game theory. Analyze pure and mixed strategy games
4	Formulate Network models for service and manufacturing systems, and apply operations research techniques and algorithms to solve these Network problems
5	Determine optimal strategy for Minimization of Cost of shipping of products from source to Destination/ Maximization of profits of shipping products using various methods, Finding initial basic feasible and optimal solution of the Transportation problems.