

FACULTY OF COMPUTER SCIENCE & IT

SYLLABUS

of

**Bachelor of Science (Honours) Information Technology
(offered under 4-Year UG Degree Programme)**

(Semester III-VI)

(Under Credit Based Continuous Evaluation Grading System)

Under NEP 2020

Session 2026-27



The Heritage Institution

**KANYA MAHA VIDYALAYA
JALANDHAR
(Autonomous)**

Program Specific Outcomes

Bachelor of Science (Information Technology) (Session 2026-27)

After completing this program, the students will be able to:

PSO1: Apply skills for development of software and websites for providing efficient solution to IT based problems.

PSO2: Comprehend development process in IT industry through ethical, defined and innovative techniques.

PSO3: Achieve leadership role and team player role to be able to work in multidisciplinary areas at various job roles.

PSO4: Identify and demonstrate the implementation of various tools and technologies involved in the field of Information Technology.

PSO5: Demonstrate proficiency in the field of Programming, Web development and IT enabled services.

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE/FOUR YEAR DEGREE PROGRAMME

Bachelor of Science (Information Technology) - Three Year Degree Programme

Bachelor of Science (Honours) Information Technology - Four Year Degree Programme

(Under Credit Based Continuous Evaluation Grading System)

Session 2026-27

Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information Technology Semester - III										
Course Code	Course Title	Course Type	Hours per week	Credit		Marks				Examination Time (in Hours)
			L-T-P	L-T-P	Total	Total	Ext.		CA	
							L	P		
BITL-3111	Computational Problem Solving	DSC	4-0-0	4-0-0	4	100	70	-	30	3
BITL-3112	Advanced Database Management System	DSC	4-0-0	4-0-0	4	100	70	-	30	3
BITL-3113	Numerical Methods and Statistical Techniques	Minor	4-0-0	4-0-0	4	100	70	-	30	3
BITL-3114	E-Business	MDC	4-0-0	4-0-0	4	100	70	-	30	3
BITP-3115	Lab on Computational Problem Solving	DSC	0-0-4	0-0-2	2	50	-	35	15	3
BITP-3116	Lab on Advanced Database Management System	DSC	0-0-4	0-0-2	2	50	-	35	15	3
BITI-3117	Internship	C	0-0-4	0-0-2	2	50	-	50	-	-
BITM-3110	Data Analysis using Spreadsheet and Tableau	SEC	2-0-2	2-0-1	3	100	40	30	30	3+3
VACE-3221	* Environmental Studies	VAC	2-0-0	2-0-0	2	50	35	-	15	3
	Total				27	700				

Note:

C – Compulsory, DSC – Discipline Specific Course, SEC – Skill Enhancement Course

MDC – Multi-Disciplinary Course, VAC – Value Added Course

***Credits/Grades Points of these courses will not be included in the SGPA/CGPA of Semester / Program, only grades will be provided.**

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE/FOUR YEAR DEGREE PROGRAMME

Bachelor of Science (Information Technology) - Three Year Degree Programme

Bachelor of Science (Honours) Information Technology - Four Year Degree Programme

(Under Credit Based Continuous Evaluation Grading System)

Session 2026-27

Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information Technology Semester - IV										
Course Code	Course Title	Course Type	Hours per week	Credit		Marks				Examination Time (in Hours)
			L-T-P	L-T-P	Total	Total	Ext.		CA	
							L	P		
BITL-4111	Web Development	DSC	4-0-0	4-0-0	4	100	70	-	30	3
BITL-4112	Applied and Discrete Mathematics	DSC	4-0-0	4-0-0	4	100	70	-	30	3
BITL-4113	System Analysis and Design	DSC	4-0-0	4-0-0	4	100	70	-	30	3
BITL-4114	Object Oriented Programming - II	DSC	4-0-0	4-0-0	4	100	70	-	30	3
BITM-4105	Effective Soft Skills	AEC	2-0-4	2-0-2	4	100	40	30	30	3
BITP-4116	Lab on Web Development	DSC	0-0-4	0-0-2	2	50	-	35	15	3
BITP-4117	Lab on Object Oriented Programming – II	DSC	0-0-4	0-0-2	2	50	-	35	15	3
VACP-4511	*Personality Development and Gender Sensitization	VAAC	2-0-0	2-0-0	2	50	35	-	15	3
	Total				26	650				

Note:

C – Compulsory, DSC – Discipline Specific Course, SEC – Skill Enhancement Course

AEC – Ability Enhancement Course, VAAC – Value Added Audit Course

Note:

***Credits/Grades Points of these courses will not be included in the SGPA/CGPA of Semester / Program, only grades will be provided.**

Kanya Maha Vidyalaya, Jalandhar (Autonomous)
SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE/FOUR YEAR DEGREE PROGRAMME
Bachelor of Science (Information Technology) - Three Year Degree Programme

Bachelor of Science (Honours) Information Technology - Four Year Degree Programme

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Session 2026-27

Bachelor of Science (Information Technology) Semester V										
Course Code	Course Title	Course Type	Hours per week	Credit		Marks				Examination Time (in Hours)
			L-T-P	L-T-P	Total	Total	Ext.		CA	
							L	P		
BITL-5111	Data Structures	DSC	4-0-0	4-0-0	4	100	70	-	30	3
BITL-5112	Web Technologies	DSC	4-0-0	4-0-0	4	100	70	-	30	3
BITL-5113	Operating System	Minor	4-0-0	4-0-0	4	100	70	-	30	3
BITL-5114	Knowledge Management	AEC	4-0-0	4-0-0	4	100	70	-	30	3
BITP-5115	Lab on Web Technologies	DSC	0-0-4	0-0-2	2	50	-	35	15	3
BITP-5116	Lab on Data Structures	DSC	0-0-4	0-0-2	2	50	-	35	15	3
BITI-5117	Internship	DSC	0-0-4	0-0-2	2	50	-	50	-	3
BITM-5110	Cybersecurity Fundamentals	SEC	2-0-2	2-0-1	3	100	40	30	30	3+3
VACJ-5551	*Job Readiness Course	VAAC	2-0-0	2-0-0	2	50	35	-	15	1
	Total				27	700				

Note:

C – Compulsory, VAAC – Value Added Audit Course, DSC – Discipline Specific Course, SEC – Skill Enhancement Course

***Credits/Grades Points of these courses will not be included in the SGPA/CGPA of Semester / Program, only grades will be provided.**

Kanya Maha Vidyalaya, Jalandhar (Autonomous)
SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE/FOUR YEAR DEGREE PROGRAMME
Bachelor of Science (Information Technology) - Three Year Degree Programme

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Session 2026-27

Bachelor of Science (Information Technology) Semester VI										
Course Code	Course Title	Course Type	Hours per week	Credit		Marks				Examination Time (in Hours)
			L-T-P	L-T-P	Total	Total	Ext.		CA	
							L	P		
BITL-6111	Computer Graphics	DSC	4-0-0	4-0-0	4	100	70	-	30	3
BITL-6112	Digital Marketing	MDC	4-0-0	4-0-0	4	100	70	-	30	3
BITP-6113	Lab on Computer Graphics	DSC	0-0-4	0-0-2	2	50	-	35	15	3
BITP-6114	Lab on Digital Marketing	DSC	0-0-4	0-0-2	2	50	-	35	15	3
BITD-6115	Project	DSC	0-0-16	0-0-8	8	200	-	140	60	3
VACH-6401	Human Rights and Constitutional Rights	VAC	2-0-0	2-0-0	2	50	35	-	15	3
	Total				22	550				

Note:

C-Compulsory, DSC – Discipline Specific Course, VAC – Value Added Course

MDC – Multi Disciplinary Course

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- III**

Session 2026-27

COURSE CODE: BITL-3111

COMPUTATIONAL PROBLEM SOLVING

Course Outcomes:

After passing course the student will be able to:

CO1: Comprehend basics of Python programming like operators, data types, control structures, etc.

CO2: Apply list and dictionaries for handling and accessing data through iterations.

CO3: Implement various built-in and user defined function, libraries to solve mathematical problems

CO4: Comprehend Object Oriented Programming and modules in Python.

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- III**

Session 2026-27

COURSE CODE: BITL-3111

COMPUTATIONAL PROBLEM SOLVING

L-T-P: 4-0-0

Credits: 4

Examination Time: 3 Hours.

Max. Marks: 100

Theory: 70

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (14 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Introduction to Python: Process of Computational Problem Solving, Introduction to Artificial Intelligence, Basics of Machine Learning, Generative AI Overview, Python Programming Language Data and Expressions: Literals, Variables and Identifiers, Operators, Expressions, Statements and Data Types, Control Structures

UNIT-II

Lists: List Structures, Lists (Sequences) in Python, Iterating Over Lists (Sequences) in Python
Dictionaries: Dictionaries and Files, Looping and dictionaries, advanced text parsing Iteration: While statement, definite loops using For, Loop Patterns, Recursive Functions, Recursive Problem Solving, Iteration vs. Recursion

UNIT-III

Functions: Fundamental Concepts, Program Routines, Flow of Execution, Parameters & Arguments
Files: Opening Files, Using Text Files, String Processing, Exception Handling,
Introduction to Libraries: NumPy, Pandas, Matplotlib, Reading CSV Files, Data Cleaning, Data Visualization

UNIT-IV

Objects and Their Use: Introduction to Object Oriented Programming Modular Design: Modules, Top-Down Design, Python Modules Using Databases and SQL: Database Concepts, SQLite Manager Firefox Add-on, SQL basics summary, basic Data Modelling, Programming with multiple tables

References/Textbooks:

1. Charles Severance, Python for Informatics, Version 0.0.7.
2. Charles Dierbach, Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, Wiley Publications, 2012.
3. Guttag John V, Introduction To Computation And Programming Using Python, PHI, 2014.
4. Jeeva Jose and Sojan P. Lal, Introduction to Computing & Problem Solving Through Python, Khanna Publishers, 2015.
5. Mark J. Guzdial, Introduction to Computing and Programming in Python, Pearson Education, 2015.
6. Kenneth Lambert, Fundamentals of Python, Course Technology, Cengage Learning, 2015
7. Mark Lutz, Learning Python, O'Reilly Media, 2013

Note: The latest editions of the books should be followed.

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- III
Session 2026-27
COURSE CODE: BITL-3112
ADVANCED DATABASE MANAGEMENT SYSTEM**

Course Outcomes:

After passing course the student will be able to:

CO1: Gain knowledge of transaction management and Concurrency control.

CO2: Create, manage and access database using PL/SQL.

CO3: Create and manage database using NoSQL

CO4: Comprehend the implementation of queries using MongoDB

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- III**

Session 2026-27

COURSE CODE: BITL-3112

ADVANCED DATABASE MANAGEMENT SYSTEM

L-T-P: 4-0-0

Credits: 4

Examination Time: 3 Hours.

Max. Marks: 100

Theory: 70

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (14 Marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

SQL: Join methods & sub query, Union, Intersection, Minus, Indexes, Views.

Transaction Management-ACID Properties, Concurrency Control, Security amongst users.

UNIT-II

PL/SQL: Introduction, advantages and limitations, block structure, constant and variables, input and output, control statements, data-types. Triggers, functions and procedures, cursors, packages, exceptions.

Big Data: Meaning, Characteristics, Benefits, CAP Theorem

UNIT III

NoSQL: Overview, Need of NoSQL, Structured Data Vs. Unstructured Data, Types of Database in NoSQL, Features of NoSQL, Advantages of NoSQL, Eventual Consistency, ACID vs BASE Properties.

MongoDB: Overview, Install MongoDB server, Environment, Create Database, Data Model, Collection (Creation and Deletion), Data types in MongoDB, CRUD: Create, Update, Delete And Query Database.

UNIT IV

SQL to MongoDB Mapping, Projection. Sorting, Limiting and Counting records. Indexes in MongoDB: Creation of Index, Options, Dropping and fetching of Index. Analyze Query performance, Plan and Profiler. MongoDB Aggregation Query: Aggregate Framework (sum, avg, min, max, push, first, etc). Replication and Sharding, MapReduce Function. Creating database backup.

Reference/ Textbooks:

1. C.J. Date, An Introduction to Database Systems, Pearson Education 2000.
2. H. F. Korth&Silverschatz, A., Database System Concepts, Tata McGraw Hill, 2010.
3. Elmasri&Navathe, Fundamentals of Database Systems, Addison-Wesley, 2011.
4. Hoffer, Prescott, Mcfadden, Modern Database Management, Paperback International, 2012.
5. Adam Fowler, “NoSQL For Dummies”, Wiley, First Edition, 2015.
6. Gerardus Blokdyk, “NoSQL A Complete Guide”, 5STARCooks, Second Edition, 2021.

Note: The latest editions of the books should be followed.

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- III
Session 2026-27
COURSE CODE: BITL-3113
NUMERICAL METHODS AND STATISTICAL TECHNIQUES**

Course Outcomes:

After the completion of this course, the student will be able to:

CO1: Solve non-linear and linear equations using different methods.

CO2: Comprehend interpolation and numerical integration.

CO3: Calculate different means and deviations using statistical techniques.

CO4: Comprehend correlation, curve fitting and regression for finding solutions to various statistical problems

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- III
(Session 2026-27)**

COURSE CODE: BITL-3113

NUMERICAL METHODS AND STATISTICAL TECHNIQUES

L-T-P: 4-0-0

Credits: 4

Examination Time: 3 Hours.

Max. Marks: 100

Theory: 70

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (14 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section. Students can use non-storage and non-programmable scientific calculator.

UNIT-I

Introduction: Numerical Methods, Numerical methods versus numerical analysis, Types of Error, Errors and Measures of Errors.

Non-linear Equations: Bisection Method and Newton Raphson's Method

Linear Equations: Gauss Elimination Method, Gauss Jordan Method.

UNIT-II

Interpolation: Newton's Methods: Forward Difference Method, Backward Difference Method, and Divided Difference Method.

Numerical Integration: Trapezoidal Rule, Simpson's 1/3 method and Simpson's 3/8 Method

UNIT-III

Statistical Techniques:

Measure of Central Tendency: Arithmetic mean, Median, Mode.

Measures of dispersion: Range, Quartile Deviation, Mean deviation, Standard deviation, Co-efficient of variation.

UNIT -IV

Correlation: Introduction, Karl Pearson's Coefficient of Correlation, Rank Correlation method

Regression: Regression line and regression equations, Regression Coefficient

References / Textbooks:

1. Amrinder Pal Singh, Jaspal Singh, Anshuman Sharma, Fundamentals Of Numerical Methods And Statistical Techniques, Lakhanpal Publishers, 4th edition.
2. Kandasamy P.& et Al., Numerical Methods, S. Chand & Company (2006), Reprint Edn. 2006 Edition.
3. B.S. Grewal, Numerical Methods in Engineering & Science, Khanna Publishers (2013), 11th Edition.
4. E. Balagurusamy, Numerical Methods, Tata McGraw Hill Education (2017)
5. H.S.G. Rao, Numerical Methods, IK International Publishing House (2011)
6. S.S. Sastry, Introductory methods of Numerical Analysis, PHI (2012), 5th Edition

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- III
(Session 2026-27)**

COURSE CODE: BITL–3114

E-BUSINESS

Course Outcomes:

After passing this course student will be able to:

CO1: Comprehend the basic terms of E-Commerce, aims, benefits and E-Commerce models.

CO2: Acquaint about the working and components of EDI.

CO3: Identify Electronic Payment systems, various issues involved in relation to secure electronic transactions and various E-Payment options.

CO4: Comprehend BPR and Case Studies of E-Business related applications.

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- III**

(Session 2026-27)

COURSE CODE: BITL-3114

E-BUSINESS

L-T-P: 4-0-0

Credits: 4

Examination Time: 3 Hours.

Max. Marks: 100

Theory: 70

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (14 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT – I

Introduction to E – Commerce: Meaning and Concept, Features, Benefits, E-Commerce v/s. Traditional Commerce. E-Commerce Framework, VAN and EDI as Promoters. E-Commerce Models.

Steps involved in opening your own online business, Role of Website and the technologies needed to build a website.

UNIT - II

EDI: EDI Vs Traditional Systems, components and working of EDI system, EDI implementation issues, Factors for successful EDI Implementation, EDI service providers in India.

UNIT – III

Concerns for E – Commerce: Legal and regulatory issues, Laws for E – Commerce, E-Commerce in India, Sections of IT Act for E-Commerce transactions.

Electronic Payment Systems: Various Methods of Electronic Payments – Google pay, Paytm, Debit and Credit Cards, UPI. E-Commerce security Issues and Measures.

UNIT – IV

Re – Engineering for Change: Business process re – engineering (BPR), Methodology and Planning Methods for change.

Case Studies: To demonstrate usefulness of E – Commerce in various business areas like Banks, Reservations, E–Governance and E-Retailing.

References / Textbooks:

1. Chaffey, E-Business and E-Commerce Managemet: strategy, Implementation and Practice, Pearson Education India (2013), 5th Edition
2. Kenneth C. Laudon and Carol Guercio Traver, E-Commerce, Pearson (2018), 13th Edition
3. S.J. P.t. Joseph, E-Commerce: An Indian Prespective, PHI Learning Pvt. Ltd. (2019), 6th Revised Edition
4. Shruti Mathur, Ecommerce, Pinnacle Learning (2020)
5. David Whiteley, E-Commerce: Strategy, Technologies and Applications, McGraw Hill Education (2017).
6. Nidhi Dhawan, A handbook of E-Commerce, Sun India Publications (2017)
7. Laudon, Kenneth C and Carol Guercio Traver, E–Commerce business. Technology Pearson Education Delhi (2011).

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- III**

Session 2026-27

**COURSE CODE: BITP-3115
LAB ON COMPUTATIONAL PROBLEM SOLVING**

**L-T-P: 0-0-2
Credits: 2**

**Max. Marks: 50
Practical: 35
CA: 15**

Lab-I: Lab on Computational Problem Solving.

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- III**

Session 2026-27

COURSE CODE: BITP-3116

LAB ON ADVANCED DATABASE MANAGEMENT SYSTEM

L-T-P: 0-0-2
Credits: 2

Max. Marks: 50
Practical: 35
CA: 15

Lab based on Advanced Database Management System

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- III
(Session 2026-27)
COURSE CODE: BITI - 3117
INTERNSHIP**

**L-T-P: 0-0-2
Credits: 2**

Max. Marks: 50

Internship with Local / Public / Private Industry / Business organization / MOOCs / Online Internship / Certifications from the recognized organization.

Important points to be considered:

- MOOCs tenure should not be less than 8 weeks.
- The tenure of the Online Certification must be more than 60 hours.
- Online / Offline Internship tenure should be 6-8 weeks.
- The requisite certificate and Internship report to be submitted to HOD in print form by the third week of November.

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- III
(Session 2026-27)
COURSE CODE: BITM-3110
DATA ANALYSIS USING SPREADSHEET AND TABLEAU**

Course Outcomes:

After the completion of this course, the student will be able to:

CO1: Understand the scope of data analysis with Spreadsheet

CO2: To enable students to create applications and tools to deal with complex.

CO3: To comprehend hands-on experience with Spreadsheet and Tableau

CO4: To enable the students to create a Tableau dashboard.

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- III
(Session 2026-27)**

COURSE CODE: BITM-3110

DATA ANALYSIS USING SPREADSHEET AND TABLEAU

L-T-P: 2-0-1

Credits: 3

Examination Time: 3+3 Hours

Max. Marks: 100

Theory: 40

Practical: 30

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (8 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section. Students can use non-storage and non-programmable scientific calculator.

UNIT - I

Spreadsheet: Font Formatting, changing the Color of a cell, Currency symbols in Spreadsheet, Merging cells, Using Auto fill, using paste special, adding comment to a cell.

Templates: Introduction, creating basic spreadsheet template. Data Validation.

Advanced Spreadsheet Formulas: Logical Functions – IF, AND, OR, NOT, Nested IF, Nested IF vs IFS, LOOKUP Functions, VLOOKUP with Match, INDEX Function, INDEX+MATCH function, Text Functions, MID Function, DATE & TIME Function

UNIT - II

Introduction to Time series, Analysis of Time Series Data: Forecasting/Data Relationship Tools –Graphical Analysis.

Advanced Data Management & Visualization: Named Ranges in Spreadsheet, Structured referencing in Table, Advanced Charting – Sparklines, WHAT-IF Analysis, Error Handling.

Advanced Functions: Power Query, Power Pivot, DAX Functions, Macros.

UNIT – III

Tableau: Introduction, Installation, Architecture, File Types & Extensions.

Tableau Basics: Connecting Tableau to a Data File – CSV File, Navigating Tableau, Creating calculated Fields, Adding Colors, Adding Labels and Formatting, Exporting worksheet, Working with Data extracts in Tableau, Working with Time Series, Understanding Aggregation, Granularity and level of Detail.

Combining Data: Basics Data Modeling, Logical & Physical Layers, Joins, Union, Relationships, Data Blending

Filtering & Sorting Data: Understand Tableau Filters, steps to Create Filters, Customizing Filters

UNIT – IV

Tableau Calculations: Number Functions, String Functions, Date Functions, Null Functions, Logical Functions, Aggregate Functions, Attribute Function ATTR(), Fixed, Exclude, Include

Tableau Chart Types: Relationship vs Joins, Joining Data in Tableau, Creating and area chart, creating a map and working with Hierarchies, Creating a scatterplot, Applying Filters to multiple Worksheets, Using Line Chart, Using Heat Maps, Using Histograms, Using Pie Charts.

Tableau Dashboard: Build Interactive Dashboards, Best practices for creating effective dashboards, creating a Dashboard and Importing Sheets, Use of Running Actions, Using Dashboard Actions.

References / Textbooks:

1. Joyce Cox, Joan Lambert and Curtis Frye, Microsoft office Professional 2010 Step by Step, Microsoft Press, 2010.
2. V. Rajaraman, Neeharika Adabala, Fundamentals of Computers, PHI Learning, 2015.
3. P.K. Sinha, Computer Fundamentals, BPB Publications, 2004
4. Jumpstart Tableau: A Step-By-Step Guide To Better Data Visualization, Apress Publication

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- IV
(Session 2026-27)**

COURSE CODE: BITL-4111

WEB DEVELOPMENT

Course Outcomes:

After passing course the student will be able to:

CO1: Comprehend basics of internet and email along with their effective use.

CO2: Apply HTML for development of static webpages.

CO3: Implement styling and behavior in webpages through the use of CSS.

CO4: Create and manage websites through the application of WordPress content management system.

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- IV
(Session 2026-27)**

**COURSE CODE: BCAL-4111
WEB DEVELOPMENT**

L-T-P: 4-0-0

Credits: 4

Examination Time: 3 Hours.

Max. Marks: 100

Theory: 70

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (14 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section

UNIT - I

Introduction to Web Design and Development: Overview of web technologies and the web development process, Understanding the difference between web design and development, Introduction to HTML, CSS, and JavaScript

HTML: The structure of a Webpage, Creating a full webpage, Header tags, Paragraph tags, Formatting tags, List, Image tags, Image map Forms in HTML, Image as link, Tables, Nested Table, Links, HTML entities, Frames, iframe, embed audio and video in HTML, Forms, adding structure to the form

UNIT - II

CSS: What is CSS, Inline CSS, Internal CSS, Class and id, Div, Color, background, Floating, Positions, Margins, Padding, Borders, Font style, height and width, font, text properties, list properties, Styling links, FlexBox in CSS, Transformation, Animation effects, Difference between Div and Span

UNIT III

JavaScript: Introduction to JavaScript, Data types, Operators, Control Statements, Arrays, Functions, Advanced Functions in JS, String, Data object, Call Back in JS, JS Promises.
DOM: Finding elements, node types, Traversing, DOM manipulation in JS, Events in JS, Client side Form Validation and its types.

UNIT IV

WordPress: Installation, Configuration, Management - Managing Posts, pages, categories, Plugins, Widgets, Tags, images, users, Import and export content.

Useful Plugins – MailChimp, Creating Gallery, Google Maps, Google Analytics.

References / Textbooks:

1. Anshuman Sharma, Fundamentals of Internet Applications, Lakhanpal Publications, 2016.
2. Ikvinderpal Singh, Internet Applications, Khanna Book Publishing Company, 1st Edition, 2011
3. P. Rizwan Ahmed, Internet & its Applications, Margham Publications, 2013.
4. Douglas E. Comer, Computer Networks and Internet with Internet Applications, Pearson, 4th Edition, 2008.
5. Satish Jain/Vineeta Pillai, Wireless Communication & Networking made Simple, BPB Publishers, 2007.
6. Laura Lerney, Rafe Colburn, Jennifer Kyrnin, Mastering HTML, CSS & Javascript Web Publishing, BPB Publishers, 1st Edition, 2016.
7. Lisa Sabin-Wilson, WordPress for Dummies, Wiley, 8th Edition, 2021.

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- IV
Session 2026-27
COURSE CODE: BITL-4112
APPLIED AND DISCRETE MATHEMATICS**

Course Outcomes:

After passing course the student will be able to:

CO1: Have knowledge of matrices, sets, relations, propositional logic.

CO2: Have knowledge of Boolean algebra.

CO 3: represents world knowledge in symbolic notation through propositional calculus.

CO 4: Apply discrete mathematical concepts to obtain analytical and numerical solutions.

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- IV
Session 2026-27
COURSE CODE: BITL-4112
APPLIED AND DISCRETE MATHEMATICS**

L-T-P: 4-0-0

Credits: 4

Examination Time: 3 Hours.

Max. Marks: 100

Theory: 70

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (14 Marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Logic and Propositional Calculus: Proposition and Compound Propositions, basic Logical Operations, Propositions and Truth Tables, Tautologies and Contradictions, Logical Equivalence, Laws of propositional logic, Algebra of propositions, Conditional and Bi conditional Statements, Arguments, Logical Implication, Propositional Functions, inference theory of proposition calculus, truth sets, Predicates and Quantifiers, Negation of Quantified Statements, Inference theory of the predicates calculus.

UNIT-II

Sets: Definition of sets, set representation, types of sets, operations on sets, Venn diagram, cardinality of sets (formulae), laws of set theory, Countable and uncountable sets, minset, maxset, normal forms, Partitions of sets, Cartesian products.

Relations: Basic definitions, domain and range of relations, representation of relations (arrow diagram). Types of relations, properties of relations, inverse of relation, closure of relation, equivalence classes, composition of relation.

UNIT-III

Functions: Basic definitions, domain, co-domain and range of functions, types of functions (Surjective, injective, bijective), inverse of a function, composition of function.

Matrices: Introduction, types of matrix, matrix addition, subtraction and scalar multiplication, multiplication of matrices, properties of matrix multiplication, transpose and its properties.

UNIT IV

Symmetric, skew-symmetric, nilpotent, unitary, orthogonal, Hermitian, skew-Hermitian, Identity matrix, involuntary matrix.

Determinant, minors and co-factors, adjoint of a matrix, Inverse of matrix, properties of determinant, rank of matrix, equation solving using Crammer's rule and matrix inversion method.

References/Textbooks:

1. Seymour Lipschutz, Marc Lars Lipson, Discrete Mathematics (Schaum's outlines Series), McGraw-Hill, 1997.
2. Bernard Kolman, Robert C. Busby, Discrete Mathematical structures for Computer Science, Prentice-Hall, 1984.
3. Alan Doerr, Kenneth Levasseur, Applied Discrete Structures for Computer Science, Galgotia Publications, 1989.
4. J.P.Tremblay. and R Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw-Hill, 1997.

Note: The latest editions of the books should be followed.

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- IV
Session 2026-27
COURSE CODE: BITL-4113
SYSTEM ANALYSIS AND DESIGN**

Course Outcomes:

After passing course the student will be able to:

CO1: Gather data to analyze and specify the requirements of a system.

CO2: Comprehend various system analysis and design processes.

CO3: Identify different types of testing and involved documentation.

CO4: Comprehend implementation of system along with its maintenance.

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- IV**

Session 2026-27

**COURSE CODE: BITL-4113
SYSTEM ANALYSIS AND DESIGN**

L-T-P: 4-0-0

Credits: 4

Examination Time: 3 Hours.

Max. Marks: 100

Theory: 70

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (14 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

System Planning and Analysis: Introducing System Analysis and Design, SA&D Concepts, Qualifications and Responsibilities of System Analyst as an agent of change, Systems development life cycle and role of different stages Determining Feasibility, types of feasibility, Feasibility Study.

Information Requirements analysis: Sampling and investigating data through Interviews and Questionnaires, use of Structured English, Decision tables.

UNIT-II

System Analysis Process: Using data flow diagrams, data dictionaries, describing Process specifications and system proposal

System Design: Architectural Design, User Interface Design, Data Design, Module specifications, Module coupling and cohesion, Top-down and bottom-up design,

UNIT-III

Tools for Structured design and System design considerations.

System Development and Testing: Introduction to testing and its types, Types of Documentation and Documentation Tools.

UNIT-IV

System Implementation: Quality Assurance, Managing system implementation, Transition to new system. Different modes for training users.

System Maintenance: Concept of maintenance and its importance, compare and contrast different types of maintenance.

References/Textbooks:

1. Marvin R. Gore and John W. Stubbe, Elements of System Analysis, Dubuque, Iowa Wm.C. Brown 1988.
2. Thapliyal M.P., System Analysis and Design, JBD Publisher, 2002.
3. Hoffer, Modern Systems Analysis and Design, George and Valacich, Pearson, 2014.
4. Dorny C. Nelson, Understanding Dynamic System: Approaches to Modelling, Analysis and Design, Pearson, 1993.
5. Perry Edwards, System Analysis and Design, McGraw-Hill, 1993.
6. Elias M. Awad, System Analysis and Design, Galgotia Publications, 1997.
7. James A. Senn, Analysis and Design of Information Systems, McGraw-Hill, 1989.
8. Silver and Silver, System Analysis and Design, Addison Wesley, Last Edition

Note: The latest editions of the books should be followed.

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- IV**

(Session 2026-27)

COURSE CODE: BITL-4114

OBJECT ORIENTED PROGRAMMING- II

Course Outcomes:

After passing this course the student will be able to:

CO1: Understand the basic fundamentals of Object Oriented Programming using Java.

CO2: Identify the use of inheritance, interfaces and packages in Java.

CO3: Identify the utilization of multithreading and Exception handling.

CO4: Connect Java application with an existing database and access it through JDBC.

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- IV**

(Session 2026-27)

COURSE CODE: BITL-4114

OBJECT ORIENTED PROGRAMMING- II

L-T-P: 4-0-0

Credits: 4

Examination Time: 3 Hours.

Max. Marks: 100

Theory: 70

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (14 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT - I

JAVA BASICS: Introduction to Java, Features of Java, Structure of a Java Program, primitive data types.

OOPS: Object oriented concepts Advantage of OOPs, Objects and Classes,

Strings: Declaring a string, Immutable string, string comparison, concatenation, substring, string tokenizer.

UNIT - II

Inheritance: what is inheritance, types of inheritance, static import, Method overloading, method overriding, Runtime polymorphism, super keyword, final keyword

Interfaces: Abstract classes, declaring an interface, relationship between classes and interface, interface inheritance, implementing multiple inheritance using interface

Packages: what are packages, advantages of using packages, accessing package from another package.

UNIT - III

Exception Handling: what is exception handling, checked and unchecked exceptions, try-catch, try-multiple catch, try – finally, throw and throws

Multithreading: What is a thread, life cycle of a thread, creating a thread, sleeping a thread, joining a thread, thread priority

Creating GUI Applications using AWT: java awt packages, awt controls, Frame class, Buttons, Checkboxes, Choice, Lists, Scrollbar, Grid Layout

UNIT - IV

Input/Output: File input stream, File output stream, Buffered output stream, Buffered input stream.

Database connectivity: JDBC, JDBC drivers, steps to connect to the database, connectivity with MYSQL.

Java with AI: Introduction to Artificial Intelligence and Machine Learning, Data Handling, AI Libraries in Java, Linear Regression, Perceptron, K-Means, Naive Bayes

References/Textbooks:

1. HurbertSchildt, Java The Complete Reference, Tata McGraw Hill, 2014.
2. Y. Daniel Liang, Introduction to Java Programming, Pearsons Publications, 2015.
3. Jon Duckett, Beginning Web Programming with HTML, XHTML, and CSS, John Wiley & Sons, 2004.
4. Thomas A. Powell, HTML & CSS: The Complete Reference, McGraw-Hill, 2010.

Note: The latest editions of the books should be followed.

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- IV**

(Session 2026-27)

COURSE CODE: BITP-4116

LAB ON WEB DEVELOPMENT

L-T-P: 0-0-2

Credits: 2

Max. Marks: 50

Practical: 35

CA: 15

Lab on Web Development.

**Bachelor of Science (Information Technology) /Bachelor of Science (Honours) Information
Technology Semester- III**

(Session 2026-27)

COURSE CODE: BITP-4117

LAB ON OBJECT ORIENTED PROGRAMMING- II

L-T-P: 0-0-2

Credits: 2

Max. Marks: 50

Practical: 35

CA: 15

Lab on Object Oriented Programming – II.

Bachelor of Science (Information Technology) Semester – V

Session 2026-27

COURSE CODE: BITL-5111

DATA STRUCTURES

Course Outcomes:

After passing course the student will be able to:

CO1: Analyse complexity of algorithms to determine their efficiency.

CO2: Comprehend various hashing method, sorting and searching algorithms.

CO3: Comprehend various operations of stack and queue along with different scenarios.

CO4: Comprehend advanced data structures such as tree and graph.

Bachelor of Science (Information Technology) Semester – V

Session 2026-27

COURSE CODE: BITL-5111

DATA STRUCTURES

L-T-P: 4-0-0

Credits: 4

Examination Time: 3 Hours.

Max. Marks: 100

Theory: 70

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (14 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Data Structure: Introduction, Common Operations on Data Structures, Algorithm Complexity, Big O Notation, Time – Space tradeoff between Algorithms.

Arrays: Array Defined, Representing Arrays in Memory, Operations (Traversing, Inserting, Deleting), Bubble Sort, Linear Search, Binary Search, Selection Sort, Insertion Sort, Merge Sort.

UNIT-II

Hashing: Hash Functions: Division Method, Mid-Square Method & Folding Method and Collision Resolution methods.

Linked Lists: Introduction, Types of Linked Lists, Representing Linked Lists in Memory using Array and Linked List, Advantages of using Linked Lists over Arrays, Various Operations on Linked Lists.

UNIT-III

Stacks: Description of STACK structure, Implementation of Stack in memory, Applications of Stacks – Converting Arithmetic expression from infix notation to reverse polish and their subsequent evaluation and Quicksort method.

Queues: Description of queue structure, Implementation of queue in memory, Priority Queue, Dequeues.

UNIT-IV

Trees: Description of Tree Structure and its Terminology, Binary Trees, B Tree, AVL Tree, Binary Search Trees and their representation in Memory and Heapsort.

Graphs: Description of Graph Structure, Implement Graphs in Memory using Adjacency Matrix, Adjacency List, Operations (Find, Insert, Delete), Path Matrix and Graph traversal techniques - DFS, BFS, Dijkstra Algorithm and Bellman Ford Algorithm.

References / Textbooks:

1. Seymour Lipschutz, Data Structures with C (Schaum's Outline Series), McGraw Hill Education (2017), 1st Edition
2. Reema Thareja, Data Structures Using C, Oxford Publication (2014), 2nd Edition
3. Sahni Horowitz, Fundamentals of Data Structures in C (2008), 2nd Edition
4. Narasimha Karumanchi, Data Structures and Algorithms made easy, Careermonk Publications (2016), 5th Edition
5. S.K. Srivastava and Deepali Srivastava, Data Structures through C, BPB Publications (2004)
6. YedidyahLangsam, Augestein and Tanenbaum, Data Structures using C and C++, Pearson Education India (2015), 2nd Edition

Bachelor of Science (Information Technology) Semester – V

Session 2026-27

COURSE CODE: BITL-5112

WEB TECHNOLOGIES

Course Outcomes:

After passing course the student will be able to:

CO1: Apply JavaScript ES6 and implementation of BOM and work with Frontend Framework

CO2: Apply PHP as server side scripting language for control of flow, file handling, cookie and session handling, database interactions, etc.

CO3: Comprehend the application of XML, AJAX, JQuery and REST.

CO4: Use Laravel framework to create web applications.

Bachelor of Science (Information Technology) Semester – V

Session 2026-27

COURSE CODE: BITL-5112

WEB TECHNOLOGIES

L-T-P: 4-0-0

Credits: 4

Examination Time: 3 Hours.

Max. Marks: 100

Theory: 70

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (14 Marks) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

JavaScript Language: JavaScript ES6+

BOM: Window, Screen, History, Navigation.

Introduction to Frontend Framework (ReactJS Basic).

Introduction to Server Side Scripting using PHP: Basics, Control Statement, Array, Functions.

Introduction to Server Side Scripting using PHP: Basics, Control Statement, Array, Functions.

UNIT-II

Core PHP Concepts: Superglobals, Form Handling, PHP Include, Sessions, PHP File Handling, File Upload, Cookies, Error Handling, Exception Handling.

Introduction to OOPs in PHP: Classes, Object, Constructor, Inheritance. Access MySQL Database in PHP.

Introduction to Node.js and Express.js.

UNIT-III

XML: Basics, Structure, Namespace, Parsing.

AJAX: Fetching response from server (Textual and XML form), Basics of JQuery.

Introduction to **REST**.

Introduction to Prompt Engineering, Chatbots integration in websites.

UNIT-IV

Laravel: MVC Framework, Role of Model-View-Controller, Routing, Blade Templating.

Components, Form Handling and Validation, Session Handling, Pagination.

Handling Database: Creating Table, Inserting Data, Update, Delete and Query data.

Basic of GIT & GITHUB, Hosting on Vercel/ Render.

Auto Content Generation (Blogs, UT Text).

References / Textbooks:

1. Jeffery C Jackson, “Web Technology- A Computer Science perspective”, Pearson Education, 1st Edition, 2007.
2. Chris Bates, “Web Programming- Building Internet Applications”, Wiley India, 1st Edition, 2006.
3. Achyut S Godbole and Atul Kahate, “Web technologies”, Tata McGraw Hill, 1st Edition, 2008.
4. Web Technologies, Uttam K Roy, Oxford University Press, 1st Edition, 2010.
5. Kirupa Chinnathambi, Learning React, Addison-Wesley Professional, 1st Edition, 2019.
6. Mark Masse, REST API Design Rulebook, O'Reilly Media, 2011.
7. Lynn Beighley, Michael Morrison, Head First PHP & MySQL, O'Reilly Media, 2009.
8. Vikram Vaswani, PHP: A Beginner's Guide, O'Reilly Media, 2008.
9. Gregory Blake, Laravel Basics, CreateSpace Independent Publishing Platform, 2016.
10. Matt Stauffer, Laravel: Up & Running: A Framework for Building Modern PHP Apps, O'Reilly Media; 2nd edition, 2019.

Note: The latest editions of the books should be followed.

Bachelor of Science (Information Technology) Semester – V

Session 2026-27

COURSE CODE: BITL-5113

OPERATING SYSTEM

Course Outcomes:

After passing course the student will be able to:

CO1: Describe, contrast and compare different types of Operating System.

CO2: Understand the process synchronization policies and CPU scheduling.

CO3: Describe and analyze the memory management and its allocation policies.

CO4: Comprehend about the application of virtual memory and disk scheduling.

Bachelor of Science (Information Technology) Semester – V

Session 2026-27

COURSE CODE: BITL-5113

OPERATING SYSTEM

L-T-P: 4-0-0

Credits: 4

Examination Time: 3 Hours.

Max. Marks: 100

Theory: 70

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (14 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT – I

Introduction: Definition, Batch Processing, Multi programming, Time Sharing Systems, Multitasking, multiprocessing, Parallel Systems, Distributed Systems, Real-time Systems, Cloud Based System, Mobile Based System, OS Architecture (Monolithic, Microkernel, Hybrid).

Processes: Process Concepts, Process Scheduling, Threads.

UNIT - II

CPU–Scheduling: Basic concepts, Scheduling Criteria, Scheduling Algorithms, Algorithm Evaluation: Response Time, Turnaround Time, Waiting Time, Throughput, Multilevel Queue.

Process Synchronization: Critical-section problem, semaphores and its Types (Binary and Counting), Mutex, Monitors, Classical problems of synchronization and their solutions.

UNIT – III

Deadlocks: System Model, Deadlock characterization, Methods for handling deadlocks, Deadlocks Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Approach to Deadlock handling.

Memory Management: Background, Logical v/s Physical Address Space, Swapping, Continuous Allocation, Paging, Segmentation.

UNIT – IV

Virtual Memory: Background, Page Fault, Demand Paging, Page Replacement, Page Replacement Algorithms, Thrashing.

Secondary Storage Structures: Disk structures, Disk scheduling, SSD vs HDD.

References/Textbooks:

1. Avi Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Concepts, Wiley, 2013.
2. Charles Crowley, Operating Systems: A Design-Oriented Approach , Tata McGraw Hill, 2001.
3. Deitel, An Introduction to Operating Systems, Second Edition, Addison Wesley, 1990.
4. William Stallings, Operating Systems: Internals and Design Principles, Pearson Education Limited, 2014.

Note: The latest editions of the books should be followed.

Bachelor of Science (Information Technology) Semester – V

Session 2026-27

COURSE CODE: BITL-5114

KNOWLEDGE MANAGEMENT

Course Outcomes:

After passing course the student will be able to:

CO1: To make the students realize the importance of knowledge element in the organizations, and Knowledge Management Cycle.

CO2: To Comprehend various methods of Knowledge capture and acquisition.

CO3: To use Knowledge application, knowledge sharing and Bloom's taxonomy.

CO4: To understand Knowledge Management Tools and Strategies.

Bachelor of Science (Information Technology) Semester – V

Session 2026-27

COURSE CODE: BITL-5114

KNOWLEDGE MANAGEMENT

L-T-P: 4-0-0

Credits: 4

Examination Time: 3 Hours.

Max. Marks: 100

Theory: 70

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (14 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT – I

Knowledge Management: Meaning, types, information management to knowledge management, multi-disciplinary nature of knowledge management, Timeline, Levels of Intellectual capital, Significance and challenges of Knowledge Management. Major Approaches to KM cycle and integrated KM cycle.

UNIT – II

Stages of Knowledge Management Process , Knowledge management mechanism, Knowledge capture, Knowledge acquisition and conversion, Knowledge codification approaches using Cognitive map, decision tree, Knowledge application - individual knowledge worker , communities of practice.

UNIT – III

Implications of Knowledge sharing, Knowledge Application at Individual Level, Bloom's Taxonomy of cognitive domain, EPSS, Knowledge Application at Group and Organizational Levels, Implications of Knowledge Application.

UNIT – IV

Knowledge Management Tools, Data Mining and Knowledge Discovery, Content Management Tools, Social Bookmarking, PKM, Knowledge Dissemination tools, Developing Knowledge Management Strategy.

References:

1. Knowledge Management in Theory and Practice, Kimiz Dalkir, The MIT Press, Cambridge, Massachusetts, London, England

2. Knowledge Management: Concepts and Best Practices, 2e, Peter Heisig , Jens Vorbeck , Springer (India) Pvt. Ltd.
3. The Knowledge Manager's Handbook: A Step-By-Step Guide to Embedding Effective Knowledge Management in Your Organization Nick Milton , Patrick Lambe , Kogan Page
4. ESSENTIALS of Knowledge Management, Bryan Bergeron, John Wiley & sons Inc.
5. Knowledge Management,T.S. Ravi, Margham Publication
6. Knowledge Management , Mruthyunjaya H. C. , Prentice-Hall of India Pvt.Ltd
7. Knowledge Management , S. Mohapatra,Laxmi Publications
8. Knowledge Management, Dr. R.K. Jain, Vayu Education of India
9. Knowledge Management, Awad, E.M (2007),Pearson India, Delhi.
10. Knowledge Management: System and Resources , Fernandez I. B. and Sabherwal, R. ,PHI Delhi.

Bachelor of Science (Information Technology) Semester – V

Session 2026-27

COURSE CODE: BITP-5115

LAB ON WEB TECHNOLOGIES

L-T-P: 0-0-2

Credits: 2

Examination Time: 3 Hours.

Max. Marks: 50

Practical: 35

CA: 15

Lab on Web Technologies.

Bachelor of Science (Information Technology) Semester – V

Session 2026-27

COURSE CODE: BITP-5116

LAB ON DATA STRUCTURES

L-T-P: 0-0-2

Credits: 2

Examination Time: 3 Hours.

Max. Marks: 50

Practical: 35

CA: 15

Implementation of different algorithm in C / C++.

Bachelor of Science (Information Technology) Semester – V
(Session 2026-27)
COURSE CODE: BITI-5117
INTERNSHIP

L-T-P: 0-0-2
Credits: 2

Max. Marks: 50

Internship with Local / Public / Private Industry / Business organization / MOOCs / Online Internship / Certifications from the recognized organization.

Important points to be considered:

- MOOCs tenure should not be less than 8 weeks.
- The tenure of the Online Certification must be more than 60 hours.
- Online / Offline Internship tenure should be 6-8 weeks.
- The requisite certificate and Internship report to be submitted to HOD in print form by the third week of November.

Bachelor of Science (Information Technology) Semester – V
(Session 2026-27)

COURSE CODE: BITM-5110
CYBERSECURITY FUNDAMENTALS

(Theory)

L-T-P: 2-0-1

Credits: 3

Examination Time: 3 Hours.

Max. Marks: 100

Theory: 40

Practical: 30

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (8 Marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT – I

Introduction to the Internet, IP address, MAC address; Client-Server/P2P Architecture, Cloud Computing; Computation/ Storage as a service; confidentiality, Integrity, availability of information; desktop and mobile apps; Authentication & authorization; Data trails of an Internet user; cookies; Why security matters?

UNIT – II

Threats: Malicious software, Cyber threats, hackers, trackers, types of hackers, hacker motives; Types of Attacks: virus, worms, Trojan horse, spam, spoofing, phishing, spear-phishing, whaling, social engineering, ransomware, spyware, adware, malvertising, supply-chain attacks, zero-day viruses - software/hardware vulnerabilities, exploits; denial of service attacks; bots, botnets; Data breaches; risks of using public Wi-Fi; Cyber bullying.

UNIT – III

How to Safeguard: Using http/https; Anti-virus software, analysis of the tools available in the market; strong passwords/passphrases, password managers, changing passwords regularly; Cryptography: Encryption, Decryption, public/private cryptography, Digital signatures; Virtual private networks; Setting up private and secure Wi-Fi; Data backup and recovery – full/incremental/differential backup, backup vs archive; software updates/patches; URL filtering;

UNIT – IV

Privacy vs security vs anonymity, privacy settings in apps/browsers and popular social networking sites such as Facebook, Instagram, Snapchat; using web browser incognito mode, the tor browser;

Laws, regulations, and compliance; cybercrimes, Intellectual Property, Licensing, Compliance, Provisions in the IT act.

References:

1. Kenneth Einar Himma and Herman T. Tavani, Handbook of Information and Computer Ethics, Wiley.
2. Douglas E Comer, The Internet Book: Everything You Need to Know About Computer Networking and How the Internet Works, CRC Press
3. Introduction to cyber security: stay safe online, The Open University
4. Justice Yatindra Singh, Cyber Laws, Universal Law Publishing Co. (ULPC)
5. Anirudh Rastogi, Cyber Law-Law Of Information Technology And Internet, Lexis Nexis
6. James Graham, Ryan Olson Rick Howard, Cyber Security Essentials By, CRC PRESS
7. R. K. Dhamija, Cybersecurity: An Introduction, BPB Publications
8. Charles J. Brooks, Christopher Grow, and Philip Craig, Cybersecurity Fundamentals by McGraw-Hill

Bachelor of Science (Information Technology) Semester – V
(Session 2026-27)

COURSE CODE: BITM-5110
CYBERSECURITY FUNDAMENTALS

(Practical)

L-T-P: 2-0-1

Credits: 3

Examination Time: 3 Hours.

Max. Marks: 100

Theory: 40

Practical: 30

CA: 30

Lab Exercises based on:

- Find IP/MAC addresses on personal devices
- Set up a simple cloud service (e.g., Google Drive)
- Check browser cookies and understand privacy settings
- Conduct a phishing simulation to identify red flags
- Analyze secure connections, creation of strong passwords
- Configure a VPN on personal devices
- Data backup routine using a cloud service or external drive
- Adjust privacy settings on popular platforms like Facebook and Instagram
- Understand anonymity using Tor network
- Install and configure antivirus and anti-malware software
- Configure a firewall rule using pfSense or similar tools
- Use OpenSSL to encrypt and decrypt messages.

Bachelor of Science (Information Technology) Semester – VI
(Session 2026-27)

COURSE CODE: BITL - 6111

COMPUTER GRAPHICS

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend the background mechanism involved in display devices like CRT, LCD, LED, etc.

CO2: Comprehend basic concepts involved in drawing basic shapes.

CO3: Implement various algorithms and techniques to clip and transform various objects and viewports.

CO4: Identify the importance of viewing and projections.

**Bachelor of Science (Information Technology) Semester – VI
(Session 2026-27)**

COURSE CODE: BITL - 6111

COMPUTER GRAPHICS

L-T-P: 4-0-0

Credits: 4

Examination Time: 3 Hours.

Max. Marks: 100

Theory: 70

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (14 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT – I

Overview of Graphics System: Computer Graphics and their applications.

Display Devices: CRT Monitors, Random Scan, Raster Scan, LED & LCD Monitors, Virtual Reality and Workstation.

UNIT – II

Elementary Drawing: Points and various line drawing Algorithms and their comparisons and Circle & Ellipse Generating Algorithms.

UNIT – III

Two Dimensional Transformations: Basic Transformations - Translation, Rotation, Scaling, Reflection and Shearing. Matrix representation of Basic Transformations, Homogenous Coordinates and Composite transformations.

Windowing and Clipping: Windowing Concepts, Clipping and its Algorithms and Window-to-View Port Transformations.

UNIT - IV

Three Dimensional concepts: 3D Coordinate Systems, 3D Transformations - Translation, Rotation, Scaling, Reflection and Shearing,

Projection: Parallel Projections, Perspective Projection, Vanishing Point, View Confusion and Topological Distortion.

References / Textbooks:

1. Hearn D, Baker P, Computer Graphics, PHI Eastern Economy (2002), 2nd Edition.
2. Zhigang Xiang, Plastock R, Kalley G, Computer Graphics, McGraw Hill Education (2006), 2nd Edition.

3. Rajesh K. Maurya, Computer Graphics with Virtual Reality System, Wiley (2018), 3rd Edition
4. Udit Aggarwal, Computer Graphics, SK Katria and Sons (2013), Reprint 2013 Edition
5. Padeep K. Bhatia, Computer Graphics, Dreamtech Press (2019)
6. Andries Van Dam, Foley, Steven, John, Computer Graphics Principles and Practice, Peson Education India (2002), 2nd Edition

**Bachelor of Science (Information Technology) Semester – VI
(Session 2026-27)**

COURSE CODE: BITL - 6112

DIGITAL MARKETING

Course Outcome:

After passing the course the student will be able to:

CO1: Identify impact of digital space and digital marketing in reaching out to customers.

CO2: Comprehend importance of Keywords in Search Engine Optimization.

CO3: Outline factors affecting Social Media Marketing.

CO4: Comprehend importance of Tools and Analytics in social media marketing.

**Bachelor of Science (Information Technology) Semester- VI
(Session 2026-27)**

COURSE CODE: BITL-6112

DIGITAL MARKETING

L-T-P: 4-0-0

Credits: 4

Examination Time: 3 Hours.

Max. Marks: 100

Theory: 70

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (14 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT – I

Introduction to Marketing: Meaning, 4 Ps of Marketing, Value creation, communication, delivery and exchange. Segmentation, target marketing and positioning.

Consumer Behavior, Environmental and Psychological factors, decision making process and its stages. AIDAA model, Marketing Mix.

UNIT - II

Introduction to Digital Marketing: Introduction, Search Engine Optimization – Keywords, on page and off page optimization, Ad-Words, Meta-tags

Search Engine Marketing: Advertising, PPC, SEM Strategy, SEM Auction models.

UNIT – III

Social Media Marketing: Word of Mouth, factors affecting social media marketing, social media platforms- B2B and B2C.

UNIT – IV

Social Media Marketing Tools: Mobile marketing, website planning and creation, e-mail marketing, content marketing, online reputation management, digital analytics.

.

References / Textbooks:

1. Phillip Kotler and Lane Keller Kevin, Marketing Management, Pearson Education
2. Seema Gupta, Digital Marketing, Tata McGraw Hill Education (2018)

3. Ian Dodson, The Art of Digital Marketing: The defensive guide to Creating Strategic, Targeted and measurable Online campaigns, Wiley Publishers
4. Stephanie Diamond, Digital Marketing - All in One for Dummies, Wiley Publishers
5. Digital Marketers, The Ultimate Guide to Digital Marketing,
<https://www.digitalmarketer.com/digital-marketing/assets/pdf/ultimate-guide-to-digital-marketing.pdf>
6. Damian Ryan, Understanding Digital Marketing: Marketing strategies for engaging, Cogan page Publishers Third Edition

Bachelor of Science (Information Technology) Semester – VI
(Session 2026-27)

COURSE CODE: BITP - 6113

LAB ON COMPUTER GRAPHICS

L-T-P: 0-0-2

Credits:

Examination Time: 3 Hours.

Max. Marks: 50

Practical: 35

CA: 15

Lab on implementation of applications of Computer Graphics in C / C++.

**Bachelor of Science (Information Technology) Semester – VI
(Session 2026-27)**

COURSE CODE: BITP - 6114

LAB ON DIGITAL MARKETING

L-T-P: 0-0-2

Credits:

Examination Time: 3 Hours.

Max. Marks: 50

Practical: 35

CA: 15

Lab on Digital Marketing.

**Bachelor of Science (Information Technology) Semester – VI
(Session 2026-27)**

COURSE CODE: BITD - 6115

PROJECT

Course Outcomes:

After passing course the student will be able to:

CO1: Apply the tools and techniques learnt to frame problems and their corresponding solutions.

CO2: Develop skills necessary to structure, manage and execute projects.

CO3: Learn to work as a member of a cohesive unit.

CO4: Develop presentation skills.

**Bachelor of Science (Information Technology) Semester – VI
(Session 2026-27)**

COURSE CODE: BITD - 6115

PROJECT

L-T-P: 0-0-8

Credits: 8

Examination Time: 3 Hours.

Max. Marks: 200

Theory: 140

CA: 60

General Instructions:

1. 1. A software module based on the work done in the entire course is to be developed.
2. Candidates have to submit one hard copy and two CDs/DVDs of documentation which shall be kept with the HoD in the college only. Further, supervisor/guide shall forward one copy of DVD/CD containing all the documentation files of the students (file name to be saved as Rollno_of_the_student.pdf) to the COE Office. The Covering letter (duly signed by the guide and Head of the department) should contain the following information. Candidate name, Candidate Roll no, Project Title of the student and .pdf file name of her project documentation.
3. The software module / website may be developed in groups, consisting of at most two students in a group.
4. The college shall depute guide(s)/supervisor(s) under whose supervision the software module shall be developed. The guide/supervisor shall clarify that the work done is original and authenticated. The certificate found to be incorrect at any stage shall attract the proceedings against all the stakeholders, as per rules.
5. The evaluation of the module shall be done as per the common ordinance of UG/PG under semester system.