SCHEME & SYLLABUS

(Choice Based Credit System)

For

B. TECH.

In

COMPUTER SCIENCE and ENGINEERING

(w.e.f. Session 2023-24)

Program Code: CSE 301

DEPARTMENT OF COMPUTER SCIENCE and ENGINEERING

SCHOOL OF ENGINEERING

RIMT University, Mandi Gobindgarh, Punjab

TABLE OF CONTENTS

SECTION 1
Vision & Mission of the University

VISION

- To contribute to the society through excellence in knowledge-based education utilizing the potential of computer science and engineering with a deep passion for wisdom, culture and values.

MISSION

1. To provide quality education to meet the need of profession and society.

2. Provide a learning ambience to enhance innovations, problem solving skills, leadership qualities, team-spirit and ethical responsibilities.

3. Provide exposure of latest tools and technologies in the area of computer science and engineering

SECTION 2
Vision and Mission of the Department

VISION

- To contribute to the society through excellence in scientific and technical education and research.
- To contribute the country by providing globally competent Computer Engineers capable of working in an inter-disciplinary environment which foster spirits of innovation, entrepreneurship and leadership.
- To support industry for growth, being the valuable resource for them, and remain a role model for others in the field of Computer Engineering.

MISSION

- To provide a high-quality educational experience for undergraduate and graduate students that enables them to become leaders in their chosen professions and to make them globally competitive Computer engineers.
- To create, explore, and develop innovations in engineering and science through undergraduate and graduate research.
- To develop linkages with world class R&D organizations and educational institutions in India and abroad for excellence in teaching, research and consultancy practices.

SECTION 3

About the Program

- Our B.Tech Computer Science & Engineering is a 4-year undergraduate course that primarily focuses on research and practices in Computer Science& Engineering, deals with the design, implementation, testing, security and management of information systems of both software & hardware processes.

- It is an Outcome Based Education model which is a 4 year, 8 Semester Full time Program of 164* credit hours with a Choice Based Credit System (CBCS) and Grading Evaluation System.

- It is a professional degree course aims to provide training to implement Industry oriented techniques and innovations with multidisciplinary approach.

- The course covers a wide range of subjects while highlighting the fundamentals of computer programming and networking. Logic, algorithms, abstraction, and computability are only a few of the concepts covered in Computer Science. Including software engineering, networking, distributed databases, information processing, programming languages, and various other topics.

- Computer science is used in a variety of settings, including colleges, hospitals, and financial institutions. Because of the high demand for computer science and technology in the industry, B.Tech Computer Science and Engineering courses have grown in popularity, allowing students to work as Systems Analysts, Web Developers, Finance Programmers, Software Engineers, Product Managers, Game Developers, and other roles.

SECTION 4
Programme Educational Objectives, Programme Specific Outcomes and Programme Outcomes

The PEOs are **broad statements** that describe the career and professional accomplishments that the program is preparing its graduates to achieve in four years subsequent to receiving the degree. The PEOs of the 'B.Tech (CSE)' program are as follows

> **PE01** To be able to explore areas of research, application & innovation and make impact in different types of institutional settings such as corporate entities, government bodies, NGOs, inter-government organizations, & start-ups.

> **PEO2** To be able to design, and implement strategies to the organizational problems through data analysis tools, effectively deploy knowledge of business analytics, demonstrate critical thinking skills & make the intellectual connections between quantitative and qualitative tools, theories and context to solve the organizational problems

> **PEO3** To be able to work with, lead & engage big and small teams comprising diverse people in terms of gender, nationality, region, language, culture & beliefs. To understand stated and unstated differences of views, beliefs & customs in diverse & inter disciplinary team settings

> **PEO4** To be able to continuously learn and update one's knowledge, engage in lifelong learning habits and acquire latest knowledge to perform in current work settings

> **PEO5** To continuously strive for justice, ethics, equality, honesty, and integrity both in personal and professional pursuits. Able to understand and conduct in a way that is responsible and respectful.

Programme Specific Objectives (PSOs) are **specific statements** that describe the professional career accomplishments that the program is designed for. The PSOs of the 'B.Tech. (CSE)' are as follows:

> **PSO1** To enable the graduates of Computer Science & Engineering in using problem solving skills to develop, test and implement the effective computing solutions for a given specification to meet local and global market requirements.
> **PSO2** To facilitate the graduates of the Computer Science & Engineering with logical as well as practical knowledge to implement the suitable techniques/technologies for requirements using current generation software tools or automated systems.
> **PSO3** To groom the graduates of the Computer Science & Engineering to work in multicultural with multidisciplinary teams for sustainable development and pursue lifelong professional development in engineering.

Programme Outcomes (POs) are **attributes of the post-graduates** of the programme that are indicative of the graduates' ability and competence to work as a business professional upon post-graduation. Program Outcomes are statements that describe what students are expected to know or be able to do by the time of graduation. They must relate to knowledge and skills that the students acquire from the programme. The achievement of all outcomes indicates that the student is well prepared to achieve the program educational objectives down the road. POs designed for 'B.Tech. (CSE) ' are as follows:

PO1 Ability to apply knowledge of mathematics, science and engineering fundamentals to the solution of complex engineering problems.

PO2 Able to identify, formulate and analyse complex engineering problems to obtain valid conclusions using principles of mathematics, natural sciences and engineering sciences.

PO3 Ability to design solutions of complex engineering problems as well as can design system processes that meet the specified needs with the appropriate consideration for societal and environmental considerations.

PO4 Able to use research-based knowledge and research methods including design, analysis and interpretation of data to provide valid conclusions.

PO5 Able to use modern IT tools to complex engineering activities with an understanding of the limitations.

PO6 Understanding of the social, cultural, global and environmental responsibilities of a professional engineer.

PO7 Understanding of impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.

PO8 Understanding of professional and ethical responsibilities and commitment to them.

PO9 Ability to function effectively as an individual and in a group with the capacity to be a leader or manager.

PO10 Ability to communicate effectively, not only with engineers, but also with the community at large.

PO11 Able to apply managerial skills for managing of projects and in multidisciplinary environments.

PO12 Able to recognize the need to undertake life-long learning, and possessing/acquiring the capacity to do so in the broadest context of technological change.

The following sections describe the requirements for earning a Bachelor's degree in B.Tech (CSE) and its break-down in terms of University Core courses, Program Core courses and electives at both the University and the Program levels.

SECTION 5

Curriculum / Scheme with ExaminationGrading Scheme

INDUCTION PROGRAM

Induction Program (Mandatory)	
Duration	03 weeks
Frequency	Induction program for students to be offered right at the start of the first year
Activities	• Physical Activity • Sports, Yoga & Stress Management • Creative Arts • Universal Human Values • Lectures by Eminent People • Visits to local Areas • Familiarization to Dept./Branch & Innovations

SEMESTER WISE SUMMARY OF THE PROGRAMME: B.TECH. (COMPUTERSCIENCE AND ENGINEERING)

S. No.	Semester	No. of Contact Hours	Marks	Credits
1.	I	28	900	22
2.	II	28	800	22
3	III	29	900	23
4	IV	35	900	25
5	V	31	1100	24
6	VI	26	1000	19
7	VII	26	800	19
8	VIII	00	500	10

SECTION 2
Curriculum Scheme for 'B.Tech (CSE)'

COURSE CATEGORY-WISE CREDIT DISTRIBUTION

S.N.	CATEGORY	NUMBER OF CREDITS	PERCENTAGE WEIGHTAGE
1	University Core	8	4.88%
2	University Open	3	1.83%
3	Program Core	83	50.61%
4	Program Elective	9	5.49%
5	Program Specialization	NA	NA
6	MOOCs	Up to 3	Up to 3
7	Project / Research Projects	4	2.44%
8	Thesis/Dissertation	NA	NA
9	Training/Internships/Field Trips	11	6.71%
10	Professional Skills	3	1.83%
11	Any Other (Fundamental Courses& Basic Sciences)	21	12.80%
	TOTAL CREDITS	164	100%

Semester Wise Scheme

Semester Wise Scheme							
Batch: 2023 Name of Degree- B.Tech (CSE)			Total Credits:164				
Third Semester Scheme							
Course Code	**Course Type**	**Course Name**	**L**	**T**	**P**	**S**	**C**
BCSE-2302	4 YR UG Degree (B.Tech CSE)	Mathematics-III	3	2	-	0	4
BCSE-2303	4 YR UG Degree (B.Tech CSE)	Digital circuits & logic design	3	2	-	0	4
BCSE-2304	4 YR UG Degree (B.Tech CSE)	Data structures	3	2	-	0	4
BCSE-2314	4 YR UG Degree (B.Tech CSE)	Programming With Python	3	2	-	0	4
BCSE-23AAA	4 YR UG Degree (B.Tech CSE)	Department Elective -I	3	0	-	0	3
BCSE-2371	4 YR UG Degree (B.Tech CSE)	Data Structures Lab	-	-	2	0	1
BCSE-2372	4 YR UG Degree (B.Tech CSE)	Digital circuits & logic design Lab	-	-	2	0	1
BCSE-2373	4 YR UG Degree (B.Tech CSE)	Programming With Python Lab	-	-	2	0	1
BCSE-2309	4 YR UG Degree (B.Tech CSE)	#Institutional Training	-	-		0	1
		Total	**15**	**8**	**6**	**0**	**23**

The marks will be awarded on the basis of 04 weeks Institutional Practical training conducted after 2nd semester

Fourth Semester Scheme							
Course Code	**Course Type**	**Course Name**	**L**	**T**	**P**	**S**	**C**
BCSE-2401	4 YR UG Degree (B.Tech CSE)	Operating Systems	3	2	-		4
BCSE-2402	4 YR UG Degree (B.Tech CSE)	Discrete Structures	3	0	-		3
BCSE-2403	4 YR UG Degree (B.Tech CSE)	Computer Networks-I	3	2	-		4
BCSE-2405	4 YR UG Degree (B.Tech CSE)	Database Management Systems	3	2	-		4
BCSE-2410	4 YR UG Degree (B.Tech CSE)	Web Development	3	2	-		4
BCSE-2471	4 YR UG Degree (B.Tech CSE)	Operating System Lab	-	-	2		1
BCSE-2472	4 YR UG Degree (B.Tech CSE)	Computer Networks-I Lab	-	-	2		1
BCSE-2473	4 YR UG Degree (B.Tech CSE)	Database Management System Lab			4		2
BCSE-2474	4 YR UG Degree (B.Tech CSE)	Web Development Lab			2		1
BTPD-3421	4 YR UG Degree (B.Tech CSE)	Soft Skills-I	-	-	2		1
		Total	**15**	**8**	**12**		**25**
Fifth SemesterScheme							
Course Code	**Course Type**	**Course Name**	**L**	**T**	**P**	**S**	**C**
BCSE-3501	4 YR UG Degree (B.Tech CSE)	Computer Networks –II	3	2	-		4
BCSE-3502	4 YR UG Degree (B.Tech CSE)	Relational Database Management System II	3	2	-		4
BCSE-3503	4 YR UG Degree (B.Tech CSE)	Design and Analysis of Algorithms	3	2	-		4
BCSE-3504	4 YR UG Degree (B.Tech CSE)	Computer Graphics	3	2	-		4
BCSE-35BBB	4 YR UG Degree (B.Tech CSE)	University Open Elective	3	0	-		3
BCSE-3571	4 YR UG Degree (B.Tech CSE)	Computer Networks –II Lab	-	-	2		1

BCSE-3572	4 YR UG Degree (B.Tech CSE)	Relational Database Management System II Lab	-	-	2		1
BCSE-3573	4 YR UG Degree (B.Tech CSE)	Computer Graphics Lab	-	-	2		1
BCSE-3574	4 YR UG Degree (B.Tech CSE)	Design and Analysis of Algorithms Lab	-	-	2		1
BTPD-3521	4 YR UG Degree (B.Tech CSE	Industrial Training*	-	-	-		1
		Total	**15**	**8**	**8**		**24**

Sixth Semester Scheme

Course Code	Course Type	Course Name	L	T	P	S	C
BCSE-3602	4 YR UG Degree (B.Tech CSE)	Compiler Design	3	2	-		4
BCSE-3603	4 YR UG Degree (B.Tech CSE)	Software Engineering	3	2	-		4
BCSE-3619	4 YR UG Degree (B.Tech CSE)	Artificial Intelligence & Expert System	3	2	-		4
BCSE-36XXX	4 YR UG Degree (B.Tech CSE)	Departmental Elective-II	3	-	-		3
BCSE-3671	4 YR UG Degree (B.Tech CSE)	Software Engineering Lab	-	-	2		1
BCSE-3672	4 YR UG Degree (B.Tech CSE)	Artificial Intelligence & Expert System Lab	-	-	2		1
BTPD-3622	4 YR UG Degree (B.Tech CSE)	Soft Skills-II	-	-	2		1
BCSE-3673	4 YR UG Degree (B.Tech CSE)	Industry Based Project Lab	-	-	2		1
		Total	**12**	**6**	**8**		**19**

Seventh Semester Scheme

Course Code	Course Type	Course Name	L	T	P	S	C
BTMC-47AA	4 YR UG Degree (B.Tech CSE)	Mandatory Courses- non credit***	2	0	0	-	-
BCSE-4702	4 YR UG Degree (B.Tech CSE)	Theory of Computation	3	2	-		4
BCSE-4703	4 YR UG Degree (B.Tech CSE)	Java Programming	3	2	-		4
BCSE-4722	4 YR UG Degree (B.Tech CSE)	Cyber Security	3	2	-		4
BCSE-47YYY	4 YR UG Degree (B.Tech CSE)	Departmental Elective-III	3	-	-		3
BCSE-4774	4 YR UG Degree (B.Tech CSE)	Cyber Security Lab	-	-	2		1
BCSE-4772	4 YR UG Degree (B.Tech CSE)	Java Programming Lab	-	-	2		1
BCSE-4773	4 YR UG Degree (B.Tech CSE)	Major Project	-	-	4		2
		Total	**14**	**6**	**8**		**19**

Eighth Semester Scheme

Course Code	Course Type	Course Name	L	T	P	S	C
BCSE-4801	4 YR UG Degree (B.Tech CSE)	Industrial Training	-	-	-		5
BCSE-4802	4 YR UG Degree (B.Tech CSE)	Software Training	-	-	-		5
		Total	**-**	**-**	**-**		**10**

*The marks will be awarded on the basis of 06 months industrial training conducted in 8th semester

CWA: Class Work Assessment   LWA: Lab Work AssessmentMTE: Mid Term Examination
          ETE: End Term Examination   EPE: End Practical Examination

Semester	Credits	Contact Hours
1st	22	28
2nd	22	28
3rd	23	29
4th	25	35
5th	24	31
6th	19	26
7th	19	26
8th	10	00
Total	164	203

B.Tech CSE-2022: List of Subjects in Department Electives

S. No	Electives	Sem	Subject Code	Subject Names
1	**Department Elective - I**	3rd	BCSE-2301	Computer Architecture
			BCSE-2305	Object Oriented Programming & Concepts
			BCSE-2308	Object oriented programming using C++ Lab
			BCSE-2310	Neural Network and Fuzzy logic
2	**University Open Elective**			Creative Writing Skill
			APBG3105	Intellectual Property Rights
				Life Skills Education
				Selection of Research Problem & Preparation of Dissertation Research
			BTEE-4703	Non- conventional Energy Resources
			AENV	Environmental Studies and Disaster Management
3	**Department Elective - II**		BCSE- 3620	Mobile Applications Development
			BCSE- 3613	Expert Systems
			BCSE-3619	Computer Peripherals & Interfaces
	Mandatory Courses-Non Credited Courses	7th	BTMC-4701	Constitution of India
			BTMC-4702	Essence of Indian Knowledge tradition
5	**Department Elective - III**	7th	BCSE- 4714	Software Testing and Quality Assurance
			BCSE- 4716	Wireless Sensor Networks
			BCSE- 4712	Cloud Computing
			BCSE- 4713	Internet of Things
			BCSE- 4717	MULTIMEDIA & VIRTUAL REALITY

RIMT UNIVERSITY

Name of Department**:**   **Computer Science and Engineering**

1.Subject Code**: BCSE-2302**   Course Title: **Mathematics-III**

2.Contact Hours: **40**   **L: 3   T: 2   P: 0**

3.Examination Duration (Hrs.):   **Theory   0   3   Practical   0   0**

4.Relative Weight**:   CWA   16   LWA   MTE   24   ETE   60   EPE**

5.Credits**:   0   4**   6. Semester **: 3**

7. Pre-requisite:

8. Subject Area: **Departmental Course (DC)**

9. Course Objectives: To teach computer based Engineering Mathematics to students. After this course the student will be able to solve complex computer oriented problems.

10. Course Outcomes:

BCSE-2302.1	Understand the concept of partial differentiation and their applications and the concept Asymptotes of, Curvature & Curve Tracing.
BCSE-2302.2	Apply the techniques of multiple integral.
BCSE-2302.3	Apply concepts of vector calculus
BCSE-2302.4	Compute various matrices by applying the concepts of linear algebra.

11. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	**Fourier series:** Periodic Functions, Euler's Formula. Even and odd Functions, Half range expansions, Fourier series of different waveforms	4
2	**Laplace transformations:** Laplace transforms of various standard functions, properties of Laplace transform.	6

3	**Partial Differential Equations:** Formation of Partial Differential Equations, linear Partial Differential Equations, Homogeneous Partial Differential Equations with constant coefficients.	11
4	**Functions of complex variables:** Limits, continuity and derivatives of the function of complex variables, Analytic function, Cauchy- Riemann equations, conjugate functions	8
5	**Linear Systems and Eigen- Values**: Gauss – elimination method, gauss- Jordan method, Gauss- Seidel iteration method, Rayleigh's Power method for Eigen values and Eigenvectors.	4
6	**Differential Equations:** Solutions of Initial values problems using Eulers, modified Eulers method and Runge- kutta (upto fourth order) methods.	7
7	**Probability distribution:** Binomial, Poisson and Normal distribution.	4
8	**Sampling Distribution & testing of Hypothesis**: Sampling, Distribution of means and variance, ChiSquare distribution, t-distribution, F- distribution. General concepts of hypothesis, Testing a statistical Hypothesis, One and two tailed tests, critical region, Confidence interval estimation. Single and two sample tests on proportion, mean and variance.	5

12. Suggested Books:

SNO.	Name of Books / Authors	Year of Publication
1	S. K. V. S. Sriramachary, M. Bhujanga Rao, D. Rama Murthy and N. Raja Sekhar , "Engineering Mathematics-III"	2018
2	E. Kreyszig," Advanced Engineering Mathematics", 5th Edition, Wiley Enstern 1985.	1985
3	P. E. Danko, A. G. Popov, T. Y. A. Kaznevnikova, " Higher Mathematics in Problems and Exercise", Part 2, Mir Publishers, 1983.	1983
4	Bali, N. P., "A Text Book on Engineering Mathematics", Luxmi Pub., New Delhi	1986
5	Peter V.O'Neil," Advanced Engineering Mathematics", Cengage Learning	1998

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NAME OF DEPT.**:**   **Computer Science and Engineering**

1.Subject Code**:** **BCSE-2303**   Course Title: **Digital Circuits & Logic Design**

2.Contact Hours: **40**   **L: 3**   **T: 2**   **P: 0**

3.Examination Duration (Hrs.):   **Theory   0   3   Practical   0   0**

4.Relative Weight**:**   **CWA** 16 **LWA**   -   **MTE** 24 **ETE**   60 **EPE**   -

5.Credits**:   0 4**   6. Semester: **3**

7. Pre-requisite:

8. Subject Area: **Departmental Course (DC)**

   9.   Course Course Objective: The objectives of this course are to:

   1. Introduce the concept of digital and binary systems
   2.   Be able to design and analyze combinational logic circuits.
   3. Be able to design and analyze sequential logic circuits.
   4.   Understand the basic software tools for the design and implementation of digital circuits and systems.
   5. Reinforce theory and techniques taught in the classroom through experiments and projects in the laboratory.

   10.   Course Outcome:

BCSE-2303.1	Understand number systems, basic logic gates, Boolean algebra and derive digital logic circuits.
BCSE-2303.2	Classify various minimization techniques and choose the best for designing logic circuit
BCSE-2303.3	Apply the knowledge of various electronic Devices and its operations
BCSE-2303.4	Analyse the problem to select suitable electronic device like amplifiers, oscillators, multiplexers, etc.
BCSE-2303.5	Interpretation of various types of memories with their operations.
BCSE-2303.6	Design the solutions related to computations through electronic circuits and devices.

7. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	**Number Systems**: Binary, Octal, Decimal, Hexadecimal. Number base conversions, 1's, 2's, rth's complements, signed Binary numbers. Binary Arithmetic, Binary codes: Weighted BCD, Gray code, Excess 3 code, ASCII – conversion from one code to another.	5
	Boolean Algebra: Boolean postulates and laws–De-Morgan'sTheorem, Principle of Duality, Boolean expression – Boolean function, Minimization of Boolean expressions – Sum of Products (SOP), Product of Sums (POS), Minterm, Maxterm, Canonical forms, Conversion between canonical forms, Karnaugh map N Minimization, Quine-McCluskey method – Don't care conditions.	**5**
3	**Logic GATES:** AND, OR, NOT, NAND, NOR, Exclusive-OR and Exclusive-NOR. Implementations ofLogic Functions using gates, NAND-NOR implementations. Study of logic families like RTL, DTL, DCTL, TTL, MOS, CMOS, ECL and their characteristics.	4
4	**Combinational Circuits:** Design procedure–Adders, Subtractors, Serial adder/ Subtractor, Parallel adder/Subtractor Carry look ahead adder, BCD adder, Magnitude Comparator, Multiplexer/Demultiplexer, encoder/decoder, parity checker, code converters. Implementation of combinational logic using MUX.	5
5	**Sequential Circuits:** Flip flops SR, JK, T, D and Master slave, Excitation table, Edge triggering, Level **T**riggering, Realization of one flip flop using other flip flops. Asynchronous/Ripple counters, Synchronous counters, Modulo-n counter, Ring Counters. Classification of sequential circuits-Moore and Mealy, Design of Synchronous counters: state diagram, Circuit implementation. Shift registers.	4
6	**Memory Devices:** Classification of memories, RAM organization, Write operation, Read operation, Memorycycle. Static RAM Cell-Bipolar, RAM cell, MOSFET RAM cell, Dynamic RAM cell. ROM organization, PROM, EPROM, EEPROM, Field Programmable Gate Arrays (FPGA).	4
7	**Signal Conversions:** Analog& Digital signals. A/D and D/A conversion techniques (Weighted type, R-2R Ladder type, Counter Type, Dual Slope type, Successive Approximation type).	4

8. Suggested Books:

SNO.	Name of Books / Authors	Year of Publication
1	Morris Mano, **Digital Design**, Prentice Hall of India Pvt. Ltd 6th Edition	2019
2	Nair, B. Somanathan, "Digital Electronics And Logic Design"	2002
3	Thomas L. Floyd, **Digital Fundamentals**, Pearson Education, Inc, New Delhi, 2003	2003

4	R.P.Jain, Modern **Digital Electronics**, 3 ed., Tata McGraw–Hill publishing company limited, New Delhi, 2003.	2003
5	Donald P.Leach and Albert Paul Malvino, **Digital Principles and Applications**, 5 ed., Tata McGraw Hill Publishing Company	2008

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NAME OF DEPT.**:**　　　　　**Computer Science and Engineering**

1.Subject Code**: BCSE-2304**　　　Course Title: **Data Structures**

2.Contact Hours: **40**　　　　**L: 3**　　　**T: 2**　　　**P:　0**

3.Examination Duration (Hrs.):　　**Theory**　　**0　3**　　**Practical　0　0**

4.Relative Weight**:**　　**CWA** 16　　**LWA**　　　**MTE** 24　**ETE**　60　**EPE**

5.Credits**:**　　**0 4**　　6. Semester **3**

7. Pre-requisite:

8. Subject Area: **Departmental Course (DC)**
9. Course Course Objective:
    1 To impart the basic concepts of data structures and algorithms
    2 To understand concepts about searching and sorting techniques
    3 To understand basic concepts about stacks, queues, lists, trees and graphs.
    4 To understanding about writing algorithms and step by step approach in solving problems
    with the help of fundamental data structures

10. Course Outcome:

BCSE-2304.1	Define data structure and demonstrate the complexity of data structure.
BCSE-2304.2	Analyse the various sorting and searching algorithms with the help of arrays and linked lists
BCSE-2304.3	Distinguish between applications of stack and queues.
BCSE-2304.4	Develop the solution for organizing data in graph and tree data structures
BCSE-2304.5	Design advance data structures using non linear data structures.

11. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	Introduction: Data Structures and data types, Efficient use of memory, Recursion, operations on data structures, time and space complexity of algorithms, Asymptotic Notations. Searching: Linear Search and Binary Search Techniques and their complexity analysis.	8
2	**Linked Lists**: Singly linked lists, operations on link list, linked stacks and queues, polynomial addition, sparse matrices, doubly linked lists and dynamic storage management, circular linked list.	7
3	**Stacks and Queues**: Concepts of stack and queues, memory representations, operations on stacks and queues, application of stacks, such as parenthesis checker, evaluation of postfix expressions, conversion from infix to postfix representation, implementing recursive functions, deque, priority queue, applications of queues. Garbage collection	6
4	**Trees**: Basic terminology, sequential and linked representations of trees, traversing a binary tree using recursive and non-recursive procedures, inserting a node, deleting a node,	4
5	**Search Tree:** brief introduction to threaded binary trees, search efficiency, importance of balancing, red black tree, comparison with AVL trees.	4
6	**Graphs:** Basic terminologies, representation of graphs (adjacency matrix, adjacency list), traversal of a graph (breadth-first search and depth-first search), and applications of graphs. Dijkstra's algorithm for shortest path, Minimal Spanning tree.	5
7	**Sorting**: Sorting arrays using bubble sort, selection sort, insertion sort, quick sort, merge sort, , shell sort and radix sort, sorting algorithms.	6

12. Suggested Books:

SNO.	Name of Books / Authors	Year of Publication
1	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein.. Introduction to Algorithm	2011
2	R. S. Salaria, Data Structures & Algorithms Using C++, KhannaBook Publishing Co. (P) Ltd.	2012
3	https://www.sciencegate.app/app/document/download#10.31224/osf.io/3xkm8	2022
4	https://ijarsct.co.in/Paper2162.pdf	2021
5	Michael T. Goodrich, Roberto Tamassia, & David Mount, Data Structures and Algorithms in C++ (Wiley India)	2016

6	Thomas H Cormen, Charles E Leiserson, Ronald L Rivest , andClifford Stein, Introduction to Algorithms.	2009
7	https://turcomat.org/index.php/turkbilmat/article/view/5476	2021
8	Malik , Data Structures using C++, Cengage Learning.	2012

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NAME OF DEPT.**:**   **Computer Science and Engineering**

1.Subject Code**: BCSE-2314**   Course Title: **Programming With Python**

2.Contact Hours: **40**   **L: 3**   **T: 2**   **P: 0**

3.Examination Duration (Hrs.):   **Theory   0   3   Practical   0   0**

4.Relative Weight**:   CWA** 16   **LWA   MTE** 24 **ETE**   60   **EPE**

5.Credits**:   0 4**   6. Semester **3**

7. Pre-requisite:

8. Subject Area: **Departmental Course (DC)**

9. Course Course Objective: The learning objectives of this course are:
1.To understand why Python is a useful scripting language for developers.
2.To learn how to design and program Python applications.
3.To learn how to use lists, Tuples, and dictionaries in Python programs.
4.To learn how to identify Python object types.
5.To learn how to use indexing and slicing to access data in Python programs.

10. Course Outcome:

BCSE-2314.1	Understand Python syntax and semantics and be fluent in the use of Python flow control and Functions
BCSE-2314.2	Develop, run and manipulate Python programs using Core data structures like Lists, Dictionaries, and use of Strings Handling methods
BCSE-2314.3	Develop, run and manipulate Python programs using File Operations and searching pattern using regular expressions.
BCSE-2314.4	Interpret the concepts of object oriented programming using Python
BCSE-2314.5	Determine the need for python modules, libraries to design games, GUI and create efficient web applications using Matplotlib, NumPy, Pandas, Django.

11. Details of the Course:

S.No.	Content	Contact Hours
1.	UNIT - I Introduction to Python: Overview, History, importance, characteristics, features and applications. Local Environment Setup, Getting Python, Installation, Environment Variables, IDE. pyCharm, Anaconda, Jupyter etc. Basics of Python: Syntax: Interactive vs Script Programming, Identifiers, Reserved Words, Lines and Indentation, Single line Multiline Statements, Command Line. Variable Types: assignment, Data Types (Numbers, String, List, Tuple, Dictionary). Operators, Decision Making, Loops and Date & Time.	13
2.	UNIT-II Functions & Packages: Define & Call Functions, Pass by reference vs value, Function Arguments (Required, Keyword, Default, Variable length), Anonymous Functions, return statement, Global vs Local vs Dir vs Reload. Import Statement, PYTHONPATH and Packages. Files I/O and Exception Handlings: Input, Opening and Closing, file Object Attributes, Reading and Writing, File Positions, Directories. Standard Exceptions, Exception Handling, Assertion, except Clauses, Argument and Raising with Exceptions, User-Defined Exceptions.	12
3.	UNIT - III Object Oriented with Python: Classes, Objects, Class-variable, Function Overloading, Operator Overloading, Instantiation, Inheritance, Garbage Collection, Overriding, Base Overloading and Data Hiding. Regular Expressions, Matching vs Searching, Modifiers, Patterns, Special Characters and Syntax.	13
4.	UNIT - IV Programming with Python Modules: Python Tools & Utilities, Matplotlib, Module Creation, Modules locating, NumPy, Pandas, SciPy, Django and etc. python examples with A.I.	12
	TOTAL	50

12 Suggested Books:

S.No.	Name of Book/Author/Readings	Year of publication
1.	Dr. Krishna Kumar Mohbey, Dr. Brijesh Bakariya, "An Introduction to Python Programming: A Practical Approach"	2022
2.	Downey, Allen B. Think Python: How to Think Like a Computer Scientist (Version 1.6.6 Ed.), 2012.	2012

3.	Hamilton, Naomi. "The A-Z of Programming Languages: Python", 2008.	2008
4.	Lutz, Mark Learning Python (5th ed.). O'Reilly Media, 2013.	2013
5.	Pilgrim, Mark Dive into Python 3. Apress, 2009.	2009
6.	JISU ELSA JACOB, BHARATH VISAM S, "Python Programming", Katson Books 2022	2022
7.	Sudhil Bhardwaj, "Introduction to Python Programming", Kalyani Publishers, 2022.	2022

RIMT UNIVERSITY

Name of Department**:**   **Computer Science and Engineering**

1.Subject Code**:**   **BCSE-2301**   Course Title: **Computer Architecture**

2.Contact Hours: **40**   **L: 3**   **T: 2**   **P: 0**

3.Examination Duration (Hrs.):   **Theory   0   3   Practical   0   0**

4.Relative Weight**:**   **CWA   16   LWA**   **MTE   24   ETE   60   EPE**

5.Credits**:   0 4**   6. Semester **3**

7.Pre-requisite:

8.Subject Area: **Departmental Elective I**

9. Course Course Objective: To have a thorough understanding of the basic structure, operation of a digital computer and study the different ways of communicating with I/O devices and standard I/O interfaces, the hierarchical memory system including cache memories and virtual memory.

10. Course Outcome:

Course Outcomes(CO)/Learning Outcomes On successful completion of this course, the learner will be able to	
BCSE-2301.1	Understand number systems, basic logic gates, Boolean algebra and derive digital logic circuits.
BCSE-2301.2	Classify various minimization techniques and choose the best for designing logic circuit
BCSE-2301.3	Apply the knowledge of various electronic Devices and its operations
BCSE-2301.4	Analyse the problem to select suitable electronic device like amplifiers, oscillators, multiplexers, etc.
BCSE-2301.5	Interpretation of various types of memories with their operations.
BTCS-2301.6	Design the solutions related to computations through electronic circuits and devices.

11. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	**General System Architecture**: Store program control concept, Flynn's classification of computers (SISD, MISD, MIMD); Multilevel viewpoint of a machine: digital logic, micro architecture, ISA, operating systems, high level language; structured organization; CPU, caches, main memory, secondary memory units & I/O; Performance metrics; MIPS, MFLOPS.	4
2	**Instruction Set Architecture**: Instruction set based classification of processors (RISC, CISC, and their comparison); addressing modes: register, immediate, direct, indirect, indexed; Operations in the instruction set; Arithmetic and Logical, Data Transfer, Machine Control Flow.	6
3	**Basic non pipelined CPU Architecture**: CPU Architecture types (accumulator, register, stack, memory/ register) detailed data path of a typical register based CPU, Fetch-Decode-Execute cycle (typically 3 to 5 stage); microinstruction sequencing, implementation of control unit, Enhancing performance with pipelining. Hardwired control design method, Micro programmed control unit.	11
4	**Memory Hierarchy & I/O Techniques**: The need for a memory hierarchy (Locality of reference principle, Memory hierarchy in practice: Cache, main memory and secondary memory, Memory parameters: access/ cycle time, cost per bit); Main memory (Semiconductor RAM & ROM organization, memory expansion, Static & dynamic memory types); Cache memory (Associative & direct mapped cache organizations. Allocation & replacement polices, segments, pages & file organization, virtual memory.	8
5	**Introduction to Parallelism:** Goals of parallelism (Exploitation of concurrency, throughput enhancement); Amdahl's law; Instruction level parallelism (pipelining, super scaling –basic features); Processor level parallelism (Multiprocessor systems overview).	4
6	**Computer Organization [80x86]:** Instruction codes, computer register, computer instructions, timing and control, instruction cycle, type of instructions, memory reference, register reference. I/O reference, Basics of Logic Design, accumulator logic, Control memory, address sequencing, micro-instruction formats, micro-program sequencer, Stack Organization, Instruction Formats, Types of interrupts; Memory Hierarchy. Programmed I/O, DMA & Interrupts.	7
	Total	40

12. Suggested Books:

SNO.	Name of Books / Authors	Year of Publication
1.	John Hennessy and David Patterson "Computer Architecture A Quantitative Approach	2017
2	M. Moris Mano, Computer System Architecture, Prentice-Hall, Revised edition	2017

3	William Stallings, 'Computer Organisation & Architecture: Designing for Performance', 4th Edn., Prentice-Hall International Edition	1996
4	David A. Patterson and John L. Hennessy, 'Computer Organization and Design', 2nd Edn., Morgan Kauffmann Publishers	1997
5	John P. Hayes, 'Computer Architecture and Organization', 3rd Edn., TMH	1998
6	Carl Hamacher and ZvonkoVranesic, 'Computer Organization', 5th Edn., SafwatZaky	2002
7	A.S. Tanenbaum, 'Structured Computer Organisation', 4th Edn., Prentice-Hall of India, Eastern Economic Edition	1999
8	W. Stallings, 'Computer Organisation & Architecture: Designing for Performance', 4th Edn., Prentice-Hall International Edition	1996
9	Nicholas Carter, 'Computer Architecture', T.M.H	2002

RIMT UNIVERSITY

Name of Department**:** **Computer Science and Engineering**

1.Subject Code**: BCSE-2371** Course Title: **Data Structures Lab**

2.Contact Hours: **32** **L: 0** **T: 0** **P:** **4**

3.Examination Duration (Hrs.): **Theory** **0** **0** **Practical** **0** **0**

4.Relative Weight**:** **CWA** **LWA 50 MTE** **ETE** **EPE** 50

5.Credits**:** **0 1** 6. Semester **3**

7 Pre-requisite:

8 Subject Area:

9**.** Course Objective: To learn the concepts of data structure and algorithms and its implementation. The course has the main ingredients required for a computer science graduate and has all the necessary topics for assessment of data structures and algorithms.

10. Course Outcome:

BCSE-2371.1	Implement linear and non linear data structures using linked list.
BCSE-2371.2	Apply various data structures such as stack, queue and tree to solve the problems.
BCSE-2371.3	Implement various searching and sorting techniques.
BCSE-2371.4	Analyze the complexity of the algorithms.
BCSE-2371.5	Choose appropriate data structure while designing the applications.

11. Detail of syllabus:

SNO.	CONTENTS	CONTACT HOURS
1	Introduction to Basics of Data Structures, algorithms and pseudo codes.	2
2	Write a program for Linear search methods	1
3	Write a program for Binary search methods.	1
4	Write a program for insertion sort, selection sort and bubble sort.	2

5	Write a program to implement Stack and its operation.	1
6	Write a program for quick sort and merge sort.	1
7	Write a program to implement Queue and its operation.	1
8	Write a program to implement Circular Queue and its operation.	1
9	Write a program to implement singly linked list for the following operations: Create, Display, searching, traversing and deletion.	1
10	Program to sort an array of integers in ascending order using insertion sort.	1
11	Program to sort an array of integers in ascending order using selection sort.	2
12	Write a program for insertion sort, selection sort and bubble sort.	2
13	Program to sort an array of integers in ascending order using quick sort.	2
14	Program to traverse graphs using BFS.	1
15	Program to traverse graphs using DFS	1

RIMT UNIVERSITY

Name of Department**:**   **Computer Science and Engineering**

1.Subject Code**: BCSE-2372**   Course Title: **Digital Circuits & Logic Design Lab**

2.Contact Hours: **32**   **L: 0**   **T: 0**   **P: 4**

3.Examination Duration (Hrs.):   **Theory   0   0   Practical   0   0**

4.Relative Weight**:   CWA   LWA 50 MTE   ETE   EPE**   50

5.Credits**:   0 1**   6. Semester **3**

7. Subject Area:

8. Course Objectives: To teach operation on digital circuits and design various logics. After this course thestudent will be able to solve complex computer oriented problems.

9. Course Outcomes:

BTCS-2307.1	Define the digital trainer Kit and associated equipment.
BTCS-2307.2	Study and design of TTL Gates.
BTCS-2307.3	Analysis the working of Half adders and full Adders.
BTCS-2307.4	Examine the procedures for the analysis and design of Multiplexers and de-multiplexers.
BTCS-2307.5	Implement the designing of BCD to seven segment displays.
BTCS-2307.6	Designing of various types of sequential circuits like flip flops, registers.

10. Details of syllabus:

SNO.	CONTENTS	CONTACT HOURS
1	Study of Logic Gates: Truth-table verification of OR, AND, NOT, XOR, NAND and NOR gates	2
2	Realization of OR, AND, NOT and XOR functions using universal gates.	2
3	Half Adder / Full Adder: Realization using basic and XOR gates.	2
4	Half Subtractor / Full Subtractor: Realization using NAND gates.	2
5	4-Bit Binary-to-Gray&Gray-to-Binary Code Converter:	3

	Realization using XOR gates.	
6	4-Bit and 8-Bit Comparator: Implementation using IC7485 magnitude comparator chips.	3
7	Multiplexer: Truth-table verification and realization of Half adder and Full adder using IC74153 chip.	3
8	Demultiplexer: Truth-table verification and realization of Half subtractor and Full subtractor using IC74139	3
9	Flip Flops: Truth-table verification of JK Master Slave FF, T-type and D-type FF using IC7476 chip.	3
10	Asynchronous Counter: Realization of 4-bit up counter and Mod-N counter using IC7490 & IC7493 chip.	3
11	Study of Logic Gates: Truth-table verification of OR, AND, NOT, XOR, NAND and NOR gates;	2
12	Realization of OR, AND, NOT and XOR functions using universal gates.	2

RIMT UNIVERSITY

Name of Department**: Computer Science and Engineering**

1. Subject Code**: BCSE-2373**   Course Title: **Programming with Python lab**

2.Contact Hours: **32**   **L: 0**   **T: 0**   **P: 4**

3.Examination Duration (Hrs.):   **Theory   0   0   Practical   0   0**

4.Relative Weight**:   CWA   LWA 50 MTE   ETE   EPE   50**

5.Credits**:   0 1**   6. Semester **3**

7**.** Course Objective: To learn the concepts of data structure and algorithms and its implementation. The course has the main ingredients required for a computer science graduate and has all the necessary topics for assessment of data structures and algorithms.

8. Course Outcome:

BTCS-2315.1	Identify Python syntax and semantics and be fluent in the use of Python flow control and functions.
BTCS-2315.2	Demonstrate proficiency in handling Strings and File Systems.
BTCS-2315.3	Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions
BTCS-2315.4	interpret the concepts of Object-Oriented Programming as used in Python
BTCS-2315.5	Explain exemplary applications related to Network Programming, Web Services and Databases in Python.

9. Detail of syllabus:

SNO.	CONTENTS	CONTACT HOURS
1.	To Exchange the Values of Two Numbers Without Using a Temporary Variable.	2
2.	To Check if a Number is a Palindrome	2
3.	To Print all Integers that Aren't Divisible by Either 2 or 3 and Lie between 1 and 50	2
4.	To Print Table of a Given Number	

		2
5.	To Print Sum of Negative Numbers, Positive Even Numbers and Positive Odd numbers in a List	2
6.	To Print Numbers in a Range (1, upper) Without Using any Loops	2
7.	To Find the Sum of Sine Series	2
8.	To Find the Sum of First N Natural Numbers	2
9.	To Search the Number of Times a Particular Number Occurs in a List	2
10	To Find the Largest Number in a List	2
11	To Find the Second Largest Number in a List	2
12	To Find the Second Largest Number in a List Using Bubble Sort	2

RIMT UNIVERSITY

NAME OF DEPT.**:**   **Computer Science and Engineering**

1.Subject Code**: BCSE-2401**   Course Title: **Operating System**

2.Contact Hours: **40**   **L: 3**   **T: 2**   **P: 0**

3.Examination Duration (Hrs.):   **Theory   0   3   Practical   0   0**

4.Relative Weight**:   CWA** 16 **LWA   MTE** 24 **ETE**   60 **EPE**

5.Credits**:   0 4**   6. Semester **4**

7.Pre-requisite:

8.Subject Area: **Departmental Course (DC)**

9. Course Objective: To understand the services and design of Operating Systems. To understand the organization of file systems and process scheduling and memory management.
10. Course Outcomes:

BCSE-2401.2	Explain the structure of the operation system and Implements the process management mechanism and applications
BCSE-2401.2	Identify and solve the problems of deadlocks
BCSE-2401.2	Implement the various features such as memory management, device management and file management of operating system
BCSE-2401.2	Categorize the security threats.

11. Details of the Course:

Sl. No.	Contents	Contact Hours
1.	**Introductory Concepts:** Operating System functions and characteristics, historical evolution of operating systems, Real time systems, Distributed systems, Methodologies for implementation of O/S service, system calls, system programs, interrupt mechanisms.	5
2.	**Processes:** Processes model, process states, process hierarchies, implementation of processes, data structures used such as process table, PCB creation of processes, context switching, exit of processes. Interprocess communication: Race conditions, critical sections, problems of mutual exclusion, Peterson's solution, producer-consumer problem, semaphores, counters, monitors, message passing.	6

3.	**Process scheduling:** objective, preemptive vs non- preemptive scheduling, comparativeassessment of different algorithms such as round robin, priority bases scheduling, FCFS, SJF, multiple queues with feedback	5
4.	**Deadlocks:** conditions, modeling, detection and recovery, deadlock avoidance, deadlock prevention. **Memory Management:** Multiprogramming with fixed partition, variable partitions, virtual partitions, virtual memory, paging, demand paging design and implementation issues in paging such as page tables, inverted page tables, page replacement algorithms, page fault handling, working set model, local vs global allocation, page size, segmentation and paging	7
5.	**File Systems**: File type, attributes, access and security, file operations, directory structures,path names, directory operations, implementation of file systems, implementation of file and file operations calls, implementation of directories, sharing of files, disk space management, block allocation, free space management, logical file system, physical file system.	4
6.	**Multi-Processor Based and Virtualization Concepts:** Virtual machines; supporting multiple operating systems simultaneously on a single hardware platform, running one operating system on top of another. Reducing the software engineering effort of developing operating systems for new hardware architectures	8
7.	**Advanced Operating System:** Basics of Network Operating System, Server Operating System and Real Time Operating System	5

12. Suggested Books:

Sl. No.	Name of Books / Authors	Year of Publication
1	William Stallings, 'Operating System', 9thEdn., Pearson Education India,	2019
2	Gary Nutt, 'Operating Systems Concepts', 3rdEdn., Pearson/Addison Wesley	2004
3	Brinch, Hansen, 'Operating System Principles', PHI	2001
4	Dhamdhere, 'Systems Programming & Operating Systems', Tata McGraw-Hill Education	1999
5	J.L. Peterson &Silberschatz, 'Operating System Concepts', 4thEdn., Addison Wesley	1994
6	A.S. Tenanbaum, 'Operating System', PHI	

RIMT UNIVERSITY

NAME OF DEPT.**:**   **Computer Science and Engineering**

1.Subject Code**: BCSE-2402**   Course Title: **DISCRETE STRUCTURE**

2.Contact Hours: **40**   **L: 3**   **T: 2**   **P: 0**

3.Examination Duration (Hrs.):   **Theory   0   3   Practical   0   0**

4.Relative Weight**:   CWA** 16   **LW A**   **MTE** 24   **ETE   60   EPE**

5.Credits**:   0   3**   6. Semester: **4**

7. Pre-requisite:

8. Subject Area: **Departmental Course (DC)**

9. Course Objective: To learn the ability to distinguish between the tractability and intractability of a given computational problem. To be able to devise fast and practical algorithms for real-life problems using the algorithm design techniques and principles learned in this course.

10. Course Outcome:

BCSE-2402.1	Describe the fundamentals of set theory and the related concepts of functions and relations
BCSE-2402.2	Analyze the working of recursion and recurrence relations along with example
BCSE-2402.3	Apply the knowledge of the fundamentals related to the algebraic structures.
BCSE-2402.4	Compare the combinational mathematics along with the concepts of trees and graphs.

11. Detail of the Course

Sr. No	Contents	Contact Hours
UNIT-I	**Sets, relations and functions:** Introduction, Combination of Sets, ordered pairs, proofs of general identities of sets, relations, operations on relations, properties of relations and functions, Hashing Functions, equivalence relations, compatibility relations, partial order relations	15
UNIT-II	**Combinatorial Mathematics:** Basic counting principles Permutations and combinations Inclusion and Exclusion Principle	15

UNIT-III	**Graph Theory:** Graph- Directed and undirected, Eulerian chains and cycles, Hamiltonian chains and cycles Trees, Chromatic number Connectivity, Graph coloring, Plane and connected graphs, Isomorphism and Homomorphism. Applications	15
	Recurrence relations, Generating Function, Application.	
UNIT-IV	**Monoids and Groups:** Groups Semi groups and monoids, cyclic group and submonoids, Subgroups and Cosets. Congruence relations on semi groups. Morphisms. Normal subgroups. **Rings and Boolean algebra:** Rings, Subrings, morphism of rings ideals and quotient rings. Euclidean domains Integral domains and fields, Boolean algebra direct product morphisms Boolean sub-algebra Boolean Rings Application of Boolean algebra	15

12. Suggested books

Sl. No.	Name of Books / Authors	Year of Publication
1	Kenneth Rosen, "Discrete Mathematics and Its Applications with Combinatorics and Graph Theory (SIE)" 7th Edition	2017
2	Lipschutz, 'Discrete Mathematics (Schaum Series)', 3rd Edn., McGraw Hill, 2009.	2009
3	Alan Doerr and Kenneth Levarseur, 'Applied Discrete Structures for Computer Science', Galgotia Publications, 2009.	2009
4	N. Ch SN Iyengar, V.M. Chandrasekaran, 'Discrete Mathematics', 1st Edn., Vikas Publication House, 2003.	2003
5	Kenneth H. Rosen, 'Discrete Mathematics and its Applications', 7th Edn., McGraw Hill, 2008.	2008
6	SatinderBal Gupta, 'Discrete Mathematics and Structures', 4th Edn.,Laxmi Publications, 2008.	2008
7	C.L. Liu, 'Elements of Discrete Mathematics', 4th Edn., McGraw Hill, 2012.	2012

RIMT UNIVERSITY

NAME OF DEPT.**:**   **Computer Science and Engineering**

1.Subject Code**: BTCS-2403**   Course Title: **Computer Network-I**

2.Contact Hours: 40   **L: 3**   **T: 2**   **P: 0**

3.Examination Duration (Hrs.): **Theory   0   3   Practical   0   0**

4.Relative Weight**:   CWA** 16   **LW A**   **MTE** 24   **ETE**   60 **EPE**

5.Credits**:   0 4**   6. Semester: 4

7. Pre-requisite:

8. Subject Area: **Departmental Course (DC)**

9. Course Objective: This course introduces students to computer networks and concentrates on building a firm foundation for understanding Data Communications and Computer Networks. It is based around the OSI Reference Model which deals with the major issues in the bottom four (Physical, Data Link, Network and Transport) layers of the model. They are also introduced to the areas of Network Security and Mobile Communications.

10. Course Outcomes:

BCSE-2403.1	Apply the knowledge of data communication to define various networking and communication terminology
BCSE-2403.2	Compare the available solution and apply the knowledge to fix the issues at various layers related to networking
BCSE-2403.3	Develop the network with the knowledge of subnetting, networking, supernetting and addresses.
BCSE-2403.4	Evaluate the performance of various network algorithms and protocols for effective and efficient networking.

11. Details of the Course:

Sl. No.	Contents	Contact Hours
1.	Introduction to Computer Networks: Data Communication System and its components, Data Flow, Computer network and its goals, Types of computer networks: LAN, MAN, WAN, Wireless and wired networks, broadcast and point to point networks, Network topologies, Network software: concept of layers, protocols, interfaces and services, ISO-OSI reference model, TCP/IP reference model	8
2.	**Physical Layer:** Concept of Analog& Digital Signal, Bandwidth, Transmission Impairments: Attenuation, Distortion, Noise, Data rate limits: Nyquist formula, Shannon Formula, Multiplexing: Frequency Division, Time Division, Wavelength Division, Introduction to Transmission Media: Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (radio, microwave, infrared), Switching: Circuit Switching, Message Switching, Packet Switching & their comparisons. **Data Link Layer:** Framing, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop & Wait ARQ, Go-back-N ARQ, Selective repeat ARQ, Data link protocols: HDLC and PPP.	12
3.	**Medium Access Sub-Layer:** Static and dynamic channel allocation, Random Access: ALOHA, CSMA protocols, Controlled Access: Polling, Token Passing, IEEE 802.3 frame format, Ethernet cabling, Manchester Encoding, collision detection in 802.3, Binary exponential back off algorithm. **Network Layer**: Design issues, IPv4 classful and classless addressing, subnetting, IPv6, Routing algorithms: distance vector and link state routing, Congestion control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket and token bucket algorithms	11
4.	**Transport Layer**: Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and de-multiplexing, crash recovery, introduction to TCP/UDP protocols and their comparison, Sockets. **Application Layer**: World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), SMTP, POP, HTTP, Introduction to Network security.	9

12. Suggested Books:

Sl. No.	Name of Books / Authors	Year of Publication
1	https://www.simplilearn.com/what-is-computer-network-article	2022
2	Computer Networking, Eight Editon, By Pearson	2019
3	James F. Kurose and Keith W. Ross, 'Computer Networking', 3rd Edn., Pearson Education	2012
4	Greg Tomsho, 'Guide to Networking Essentials', 6th Ed.., Cengage	2011

	Learning,	
5	Behrouz A. Forouzan, 'Data Communication & Networking', 4th Edn., Tata McGraw Hill,	2006
6	Andrew S. Tanenbaum, 'Computer Networks', 4th Edn., Pearson Education	2002
7	Douglas E. Comer, 'Internetworking with TCP/IP', Volume-I, 2nd Edn., Prentice Hall, India, 1996.	1996
8	Michael W. Graves, 'Handbook of Networking', Cengage Learning	2014

RIMT UNIVERSITY

NAME OF DEPT.**:**   **Computer Science and Engineering**

1.Subject Code**: BCSE-2405**   Course Title: **Database Management Systems**

2.Contact Hours: **40**   **L: 3**   **T: 2**   **P:**   **0**

3.Examination Duration (Hrs.):   **Theory   0   3   Practical   0   0**

4.Relative Weight**:   CWA** 16   **LWA**   **MTE** 24   **ETE**   60   **EPE**

5.Credits**:   0 4**   6. Semester: 4

7. Pre-requisite:

8. Subject Area: **Departmental Course (DC)**

9. Course Objective: To familiarize the students with Data Base Management system.

10. Course Outcomes:

BCSE-2405.1	Develop conceptual understanding of database management system
BCSE-2405.2	Identify, analyse and define database objects, enforce integrity constraints on a database using DBMS.
BCSE-2405.3	Use Structured Query Language (SQL) for database manipulation.
BCSE-2405.4	Design and build simple database systems and advanced applications

11. Details of the Course:

Sl. No.	Contents	Contact Hours
1.	**Introduction to Database Systems:** File Systems Versus a DBMS, Advantages of a DBMS, Describing and Storing Data in a DBMS, Database System Architecture, DBMS Layers, Data independence. **Data Models:** Relational Model, Network Model, Hierarchical Model, ER Model: Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Constraints, Weak Entities, Class Hierarchies, Aggregation, Conceptual Database Design with the ER Model, Comparison of Models.	8

Sl. No.		Hours
2.	**The Relational Model:** Introduction to the Relational Model, ER to Relational Model Conversion, Integrity Constraints over Relations, Enforcing Integrity Constraints, Relational Algebra, Relational Calculus, Querying Relational Data **Relational Query Languages: SQL:** Basic SQL Query, Creating Table and Views, SQL as DML, DDL and DCL, SQL Algebraic Operations, Nested Queries, Aggregate Operations, Integrity Constraints in SQL.	12
3.	**Database Design:** Functional Dependencies, Reasoning about Functional Dependencies, Normal Forms, Schema Refinement, 1NF, 2NF, 3NF, BCNF, 4NF, 5NF, Domain Key Normal Forms. **Transaction and Concurrency Management:** ACID Properties, Serializability, Two-phase Commit Protocol, 2PL protocol, Lost Update Problem, Inconsistent Read Problem. Concurrency Control, Lock Management, Read-Write Locks, Deadlocks Handling.	12
4.	**Database Protection:** Threats, Access Control Mechanisms: Discretionary Access Control, Mandatory Access Control, Grant and Revoke, Role Based Security, Encryption and Digital Signatures.	8

12. Suggested Books:

Sl. No.	Name of Books / Authors	Year of Publication
1.	Avi Silberschatz, Henry F. Korth, "Database System Concepts Seventh Edition"	2019
1	Raghu Ramakrishnan, Johannes Gehrke, 'Database Management Systems', 3rd Edn., Tata McGraw-Hill	2014
2	Abraham Silberschatz, Henry F. Korth, S. Sudarshan, 'Database System Concepts', 6th Edn., Tata McGraw-Hill,	2011
3	S.K. Singh, 'Database Systems Concepts, Design and Applications', 2nd Edn., Pearson Education	2011
4	Ramez Elmasri, Shamkant Navathe, 'Fundamentals of Database Systems', 5th Edn., Pearson Education	2010
5	Alexis Leon, Mathews Leon, 'Database Management Systems', Leon Press, 1st Edn.,	2008
6	C.J. Date, 'An Introduction to Database Systems', Pearson Education, 8th Edn.,	2006

RIMT UNIVERSITY

NAME OF DEPT.**:**   **Computer Science and Engineering**

1.Subject Code**: BCSE-2410**   Course Title: **Web Development**

2.Contact Hours: **40**   **L: 3**   **T: 2**   **P: 0**

3.Examination Duration (Hrs.):   **Theory   0   3   Practical   0   0**

4.Relative Weight**:   CWA** 16   **LWA   MTE** 24   **ETE**   60   **EPE**

5.Credits**:   0   4** 6. Semester **4**

7. Pre-requisite:

8. Subject Area: **Departmental Course (DC)**

9. Course Objectives: On completion of this course, a student will be familiar with client server architecture and able to develop a web application using java technologies. Students will gain the skills and project-based experience needed for entry into web application and development careers.

10. Course Outcomes:

BCSE-2410.1	Make use the fundamentals of web and there by develop web applications using various language.
BCSE-2410.2	Utilize the essential technology needed to develop and implement web
BCSE-2410.3	Make use of markup (HTML/DHTML), Scripting language (JavaScript) and programming language (Java) utilities for static and dynamic environment.
BCSE-2410.4	Design XML document with presentation using CSS, AJAX and PHP

11. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	**HTML Common Tags**- List, Tables, images, forms, Frames; Cascading Style sheets; Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script	4
2	**Web Servers and Servlets**: Tomcat web server, Introduction to Servelets: Lifecycle of a Serverlet, JSDK, The Servelet API, The	6

	javax.servelet Package, Reading Servelet parameters, Reading Initialization parameters. The java servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues	
3	Style Sheets: Need for CSS, Introduction to CSS, Basic syntax and structure, Types of CSS – Inline, Internal and External CSS style sheets.CSS Properties - Background images, Colors and properties, Text Formatting, Margin, Padding, Positioning etc., Overview and features of CSS3.	6
4	**Introduction to JSP**: The Problem with Servelet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat	6
5	**JSP Application Development**: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods	6
6	**Database Access:** Database Programming using JDBC, Studying Javax.sql.* package, Accessing a Database from a JSP Page, Application – Specific Database Actions.	6
7	**JQUERY:** overview, basics, selectors, jquery attributes, DOM traversing, CSS selector methods, DOM manipulation, events handling, AJAX.	6

13. Suggested Books:

S.NO	Name of Books / Authors	Year of Publication
1	Mayur Borse, "Modern Web Development with Deno"	2022
2	Patrick Naughton, Herbert Schildt, 'The complete Reference Java 2', 5th Edn., TMH,	2002
3	Hans Bergsten, 'Java Server Pages', 3rd Ed., SPD O'Reilly,	2003.
4	Sebesta, 'Programming World Wide Web', 4th Edn., Pearson,.	2008
5	Marty Hall, Larry Brown, 'Core Servlets and Java Server Pages Vol. 1: Core Technologies', 2nd Edn., Pearson	2003
6	Dietel, Niet, 'Internet and World Wide Web – How to Program', 5th Edn., PHI/Pearson Education	2011
7	Murach, 'Murach's Beginning JAVA JDK 5', SPD	2005
8	Wang, 'An Introduction to web Design and Programming', 1st Edn., Cengage COURSE,	2003
9	Craig D. Knuckles, 'Web Applications Technologies Concepts-Knuckles', 2nd Edn., John Wiley	2006
10	Jon Duckett, 'Beginning Web Programming', 1st Edn., WROX,	2007

RIMT UNIVERSITY

NAME OF DEPT.**: BCSE-3421**   **Computer Science and Engineering**
1. Subject Code**:**   Course Title: **Soft Skills-I**

2. Contact Hours: **16**   **L: 0**   **T: 0**   **P: 2**

3. Examination Duration (Hrs.):   **Theory   0 0   Practical   0   2**

4. Relative Weight**:   CWA   LWA 100 MTE   ETE   EPE**

5. Credits**:   0   1   6. Semester 6**

6. **Course Objectives:**
1) To help the students in building interpersonal skills.
2) To develop skill to communicate clearly.
3) To enhance team building and time management skills.
4) To learn active listening and responding skills.

7. **Course Outcomes:**

BCSE-3622.1	Make use of techniques for self-awareness and self-development.
BCSE-3622.2	Apply the conceptual understanding of communication into everyday practice
BCSE-3622.3	Understand the importance of teamwork and group discussions skill
BCSE-3622.4	Develop time management and stress management.
BCSE-3622.5	Apply business etiquette effectively an engineer requires communicate fluently and develop all the soft and profession skills required for corporate sector.
BCSE-3622.6	Learn to overcome problems associated with personality.

8. Details of the Course:

Sr. No	Contents	Contact Hours
UNIT-I	**Soft Skills** : Aspects of soft skills : Effective Communication Skills, Self-Motivation, Integrity, Problem-solving skills, Teamwork, Negotiation skill, Creativity, Leadership Skills, Emotional Intelligence, Stress & Time Management.	15
UNIT-II	**Etiquette & Manner:** Introduction, Modern etiquette, Benefit of etiquette, Importance of manner at various occasions, Professional manners, Table manners, and Mobile manners. Corporate Grooming Tips: Dressing for office : Do's and Don'ts for Man and Women, Annoying office habits.	10
UNIT-III	**Art of Listening:** Proxemics, Haptics : The language of touch, Types and tips of Listening.	5

UNIT-IV	**Digital Communication**- Email etiquette, Advantages & Characteristics of Emails, E-mail–Format, Drafting, Sending, Forwarding E-mails and reply to the E-mails, Internal communication: Notice, Circular, Memo, External Communication – Asking for Quotations, Correspondence with Banks & Financial Institutions Reports, Essay Writing.	10

9. Recommended Texts

S.No.	Name of Book/Author/Readings	Year of publication
1.	Lucas, Stephen E., 'The Art of Public Speaking', 11th Edn., International Edn., McGraw Hill Book Co.	2014
2.	Goleman, Daniel, 'Working with Emotional Intelligence', Banton Books, London	1998
3.	Thrope, edgar and Showick Trope,'Winning at Interviews', Pearson Education	2004
4.	Turk,Christopher,'Effective Speaking', South Asia Division: Taylor & Francis,	1985

RIMT UNIVERSITY

1.Subject Code**: BCSE-2471**   Course Title: **Operating System Lab**

2.Contact Hours: **L: 0   T: 0   P: 2**

3.Examination Duration (Hrs.):   **Theory   0   0   Practical   0   0**

4.Relative Weight**:   CWA   LWA 50 MTE   ETE   EPE 50**

5.Credits**:   0 1**   6. Semester: 4

7. Pre-requisite:

8. Subject Area: **Departmental Course (DC)**

9. Course Objective: To understand the services and design of Operating Systems. To understand the organization of file systems and process scheduling and memory management.

10. Course Outcomes:

BCSE-2406.1	Apply the knowledge to install Linux Operating system.
BCSE-2406.2	Execute various commands in LINUX for specific purpose.
BCSE-2406.3	Develop scripting using Shell Programming for various complex problems
BCSE-2406.4	Investigate various scheduling algorithm.
BCSE-2406.5	Implement the various algorithms used for operating system's mechanisms like Bankers algorithm for deadlock avoidance and deadlock prevention

11. Details of the Course:

Sl. no	Contents	Contact Hours
1	Virtualization, Installation of Virtual Machine Software and installation of Operating System on Virtual Machine	3
2	Basics of UNIX commands: cd, ls, cp, md, rm, mkdir, rmdir	2
3	**Commands for files & directories:**. Creating and viewing files using cat.	2
4	**Background process:** batch commands, kill, ps, who, sleep. Printing commands, grep, fgrep, find, sort, cal, banner, touch, file	3

5	File related commands ws, sat, cut, grep.	2
6	**Shell Programming:** types of shell, Shell Programming in bash,	3
7	Write programs using the following system calls of UNIX operating system fork,exec, getpid, exit, wait, close, stat, opendir, readdir	3
8	Write C programs to simulate UNIX commands like cp, ls, grep, etc.	3
9	Bankers Algorithm for Deadlock Avoidance	2
10	Implementation of Deadlock Detection Algorithm	2
11	Implementation of the following Page Replacement Algorithms a) FIFO b) LRU c) LFU	3
12	Implementation of the various File Organization Techniques	2
	Total	30

RIMT UNIVERSITY

1.Subject Code**: BCSE-2472**   Course Title: **Computer Network-I Lab**

2.Contact Hours: **16**   **L: 0**   **T: 0**   **P: 2**

3.Examination Duration (Hrs.):   **Theory   0   0   Practical   0   0**

4.Relative Weight**:   CWA   LWA 50 MTE   ETE   EPE   50**

5.Credits**:   0 1**   6. Semester: 4

7. Pre-requisite:

8. Subject Area: **Departmental Course (DC)**

9. Course Objective: To familiarize the students with Networking Components.

10. Course Outcomes:

BCSE-2407.1	Understand the structure and organization of computer networks; including the division into network layers, role of each layer, and relationships between the layers.
BCSE-2407.2	Analyze performance of various communication protocols.
BCSE-2407.3	Apply Practice packet /file transmission between nodes interconnected different networks and routing protocols.
BCSE-2407.4	Configure various routing protocols with the use of packet tracer.

11. Details of the Course:

S. No	Contents	Contact Hours
1	To study the different types of Network cables and network topologies.	1
2	Practically implement and test the cross-wired cable and straight through cable using clamping tool and network lab cable tester.	1
3	Study and familiarization with various network devices.	2
4	Familiarization with Packet Tracer Simulation tool/any other related tool.	1
5	Study and Implementation of IP Addressing Schemes	2
6	Creation of Simple Networking topologies using hubs and switches	1
7	Simulation of web traffic in Packet Tracer Task 8: Study and implementation of various router configuration commands	1
8	Creation of Networks using routers.	1
9	Configuring networks using the concept of subnetting	1

10	Practical implementation of basic network command and Network configuration commands like ping, ipconfig, netstat, tracert etc. for troubleshooting network related problems.	1
11	Configuration of networks using static and default routes.	1
12	To study the different types of Network cables and network topologies.	4
TOTAL	.	17

RIMT UNIVERSITY

NAME OF DEPT.**: Computer Science and Engineering**

1.Subject Code**: BCSE-2473**   Course Title: **Database Management System Lab**

2.Contact Hours: **32**   **L: 0**   **T: 0**   **P: 4**

3.Examination Duration (Hrs.):   **Theory   0   0   Practical   0   0**

4.Relative Weight**:   CWA   LWA 50   MTE   ETE   EPE 50**

5.Credits**:   0 2**   6. Semester : 4

7. Pre-requisite:

8. Subject Area: **Departmental Course (DC)**
9. Course Objective:

   1 To understand basic DDL, DML, DCL commands

   2 To understand the SQL queries using SQL operators

   3 To understand the concept of relational algebra, date and group functions.

   4. To learn view, cursors and triggers.

10. Course Outcomes:

BCSE-2408.1	Understand various advanced queries execution such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL.
BCSE-2408.2	Apply various software to design and build ER Diagrams, UML, Flow chart forrelated database systems.
BCSE-2408.3	Analyze the concepts of designing and creating relational database systems.
BCSE-2408.4	design and implement database applications on their own.

11. Details of the Course:

Sl. no	Contents	Contact Hours
1.	Write the queries for Data Definition Language (DDL) in RDBMS.	2
2.	Write the queries for Data Manipulation Language (DML) in RDBMS.	2
3.	Write the queries for Data Control Language (DCL) in RDBMS.	2
4.	Write SQL queries using logical operations (=, etc)	2
5.	Write SQL queries using SQL operators	2

6.	Case Study on Database Languages	2
7.	Write SQL query using character, number, date and group functions	2
8.	Write SQL queries for relational algebra	2
9.	Case Study on relational algebra	2
10.	Write SQL queries for extracting data from more than one table	2
11.	Case Study highlighting ROLLBACK AND COMMIT.	2
12.	Write SQL queries for sub queries, nested queries	2
13.	Concepts for ROLL BACK, COMMIT & CHECK POINTS	2
14	Create VIEWS, CURSORS and TR.	2
15	Case Study highlighting VIEWS, SAVE POINT.	2
16	Case Study highlighting Data storage and extraction	2
	Total	32

RIMT UNIVERSITY

NAME OF DEPT.**: Computer Science and Engineering**

1.Subject Code**: BCSE-2474**   Course Title: **Web Development Lab**

2.Contact Hours: **16**   **L: 0**   **T: 0**   **P: 02**

3.Examination Duration (Hrs.):   **Theory   0   0   Practical   0   0**

4.Relative Weight**:   CWA   LWA 50 MTE   ETE   EPE   50**

5. Credits**:   0 1**   6. Semester: 4

7. Pre-requisite:

8. Subject Area: **Departmental Course (DC)**

10.   Course Objective: To develop the ability to design and implement web enabled applications.

10. Course Outcomes:

BCSE-2412.1	Remember the Installation of PHP and develop simple PHP programs.
BCSE-2412.2	Integrate HTML forms to PHP scripts.
BCSE-2412.3	Analyze the CSS to create a website
BCSE-2412.4	Build Dynamic web site using server side PHP Programming and Database connectivity.
BCSE-2412.5	Design a responsive web site.

11. Details of the Course:

S.NO	NAME OF EXPERIMENT	CONTACT HOURS
1	Develop an HTML page to demonstrate the use of basic HTML tags, Link to different HTML page and also link within a page, insertion of images andcreation of tables.	2
2	Create an HTML file to implement the styles related to text, fonts, links using cascading style sheets	2

3	Write a program that maintains a counter for the number of the times it has accessed since it loads.	2
4	Write a program to display the grade of the student by inputting the marks of five students.	2
5	Write a JSP program to create a webpage to display your personal details such as name, address, area of interest. This page should also display a background image, current date and time. Also provide a link JSP. After clicking on this link any JSP tutorial available on Internet should be opened.	2
6	Create a user details page. The page should have First Name, Last Name, and Email address fields. On clicking the submit button, a new Web page should display the details entered by the user. Hint: Use getAttribute to display the user details.	2
7	Make a JSP page that makes a bulleted list with a random number of entries in the list, each of which is a random int.	3
8	Make a JSP page that always displays the same page content, but uses a background color of green, red, blue, or yellow, randomly chosen for each request. Make sure your page does not use the JSP-Styles style sheet, since that style sheet overrides the background color.	2
9	Develop any GUI that performs the SQL operations like insert, delete, update and retrieval.	3

RIMT UNIVERSITY

NAME OF DEPT.**: Computer Science and Engineering**

1.Subject Code**: BCSE-3501**   **Course Title**: **Computer Networks-II**

2. Contact Hours: **40**   **L: 3**   **T: 2**   **P: 0**

3. Examination Duration (Hrs.):   **Theory**   **0   3**   **Practical   0   0**

4. Relative Weight**:**   **CWA**   16   **LWA**   **MTE** 24   **ETE**   60   **EPE**

5. Credits**:   0 4**   6. Semester: 5

11.   Pre-requisite:

12.   Subject Area: **Departmental Course (DC)**

9. Course Objective: The objective of the course is to offer good understanding of the concepts of network security, wireless, Adhoc and various emerging network technologies.

10. Course Outcomes:

BCSE-3501.1	Understand the concepts of network security, wireless, Adhoc and various emerging network technologies
BCSE-3501.2	Learn and design the efficient wireless systems
BCSE-3501.3	Evaluate the performance of various advanced network algorithms and protocols for effective and efficient networking.
BCSE-3501.4	Implement the network security threats to resolve security issues.

11. Details of the Course:

S.No.	Content	Contact Hours
1.	**Network Security**: Fundamentals of network security, Basics of IPv6, IPsec: overview of IPsec, IP and IPv6, Authentication header (AH), Encapsulating Security Payload (ESP)	5
2.	**Internet Key Exchange (IKE):** History, Photuris, Simple Key-management for Internet protocols (SKIP), IKE phases, IKE encoding.	5
3.	**Adhoc networks**: Features, advantages and applications, Adhoc versus Cellular networks, Network architecture, Routing protocols-IGRP,EGRP-BGP.	5

4	**MAC protocols for Ad hoc Networks**: Design issues, Classifications, Contention based protocols, MACAW, FAMA, BTMA, DBTMA, MACABI, Real-Time MAC protocol, Multichannel protocols, Power aware MAC.	8
5	**Wireless Communication Systems**: Evolution, examples of wireless communication systems, 2G Cellular networks, Evolution for 2.5G TDMA Standards, IS-95B for 2.5G CDMA	5
6.	**3G wireless networks**: wireless local loop (WLL), Local Multipoint Distribution System (LMDS), Wireless local Area Networks (WLANs), Bluetooth and Personal Area Networks.	6
7.	**Wireless System Design:** Introduction, Frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, improving coverage and capacity in cellular systems.	6

12. Suggested Books:

S.No.	Name of Book/Author	Year of Publication
1.	Computer Networking, Eight Editon, By Pearson	2015
2.	Charlie Kaufman, Radio Perlman, Mike Speciner, Neywork security, 2nd ed., PHI.	2012
3.	Sunilkumar S. Manvi, Mahabaleshwar S. Kakkasageri, Wireless and mobile networks: concepts and protocols, Wiley India	2011
4.	Michael A. Gallo & William M. Hancock, "Computer Communications and Networking Technologies", Cengage Learning / Thomson Brooks / Cole	2012
5.	S. Keshav, "An Engineering Approach to Computer Networking", Pearson Education	2014
6.	Mayank Dave, "Computer Networks", Cengage Learning	2014
7	https://iot.eetimes.com/2022-wireless-networks-and-beyond-the-future-of-connectivity/	2022

RIMT UNIVERSITY

NAME OF DEPT.**:** **Computer Science and Engineering**

1.Subject Code**: BCSE-3502** Course Title: **Relational Database Management System-II**

2. Contact Hours: **40** **L: 3** **T: 2** **P: 0**

3. Examination Duration (Hrs.): **Theory** **0** **3** **Practical** **0** **0**

4. Relative Weight**:** **CWA** 16 **LWA** **MTE** 24 **ETE** 60 **EPE**

5. Credits**:** **0 4** 6. Semester **5**

7. Pre-requisite:

8. Subject Area: **Departmental Course (DC)**

9. ObjectiveThis course offers a good understanding of advanced database concepts and technologies. It prepares the student to be in a position to use and design databases for a variety of applications.

10. Course Outcomes:

BCSE-3501.1	Acquire the knowledge of Relational database design methodology for implementing real life applications
BCSE-3501.2	Design an information model expressed in the form of ER diagram.
BCSE-3501.3	Apply structured query language to automate the real time problems of databases.
BCSE-3501.4	Analyze the redundancy problem in database tables using normalization.
BCSE-3501.5	Identify the broad range of Relational database management issues including data integrity, security and recovery in terms of transactions.

11. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	**Introduction to Database Systems:** Database System Concepts and Architecture- Data Abstraction, Data Independence, Data Definitions and Data Manipulation Languages, Data Models Normalization, E-R models	3
2	**Query Processing and Optimization:** Query Processing, Syntax Analyzer, Query Decomposition, Query Optimization, Heuristic Query Optimization, Cost Estimation, Cost Functions for Select, Join, Query	6

	Evaluation Plans.	
3	**Transaction Processing and Concurrency Control:** Transaction Processing Concepts, Concurrency Control Techniques: Two-phase Locking, TimestampOrdering, Multiversion, Validation, Multiple Granularity Locking.	6
4	**Object Oriented and Object Relational Databases:** Object Oriented Concepts, Object Oriented Data Model, Object Definition Language, Object QueryLanguage, Object Relational Systems, SQL3, ORDBMS Design	4
5	**Distributed Databases:** Distributed Database Concepts, Advantages and Disadvantages, Types of Distributed Database Systems, Data Fragmentation, Replication and Allocation Techniques for Distributed Database Design, Five Level Schema Architecture, Query Processing, Concurrency Control and Recovery in Distributed Databases.	6
6	**Backup and Recovery:** Types of Database Failures, Types of Database Recovery, Recovery Techniques: Deferred Update, ImmediateUpdate, Shadow Paging, Checkpoints, Buffer Management.	5
7	**Introduction to Data Warehousing and Data Mining:** Introduction to OLAP, OLTP, Data Warehouse Architecture – Operational Data, load manager, meta data, Data Marts, Data mining – Introduction, techniques, Big Data	5
8	**Enterprise Database Products:** Enterprise Database Products, Familiarity with IBM DB2 Universal Database, Oracle, Microsoft SQL Server,MySQL, their features.	5

12. Suggested Books:

SNO.	Name of Books / Authors	Year of Publication
1	Ramez Elmasri, Shamkant Navathe, Fundamentals of Database Systems, Fifth Edition, Pearson Education	2007
2	Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, Tata McGraw-Hill.	2010
3	C.J. Date, An Introduction to Database Systems, Eighth Edition, Pearson Education.	2009
4	Alexis Leon, Mathews Leon, Database Management Systems, Leon Press.	2012
5	Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, Tata McGraw-Hill.	2006
6	S. K. Singh, Database Systems Concepts, Design and Applications, Pearson Education.	2015
7	Chris Eaton, Paul Zikopoulos, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data.	2009
8	https://www.cockroachlabs.com/blog/what-is-a-distributed-database/	2022

RIMT UNIVERSITY

NAME OF DEPT.**:**   **Computer Science and Engineering**

1.Subject Code**: BCSE-3503**   Course Title:**Design & Analysis of Algorithm**

2. Contact Hours:**40**   **L: 3**   **T: 2**   **P: 0**

3. Examination Duration (Hrs.):   **Theory   0   3   Practical   0   0**

4. Relative Weight**:   CWA** 16 **LWA   MTE** 24   **ETE**   60 **EPE**

5. Credits**:   0 4**   6. Semester **5**

7. Pre-requisite:

8. Subject Area: **Departmental Course (DC)**

9. Course Objective: To learn the ability to distinguish between the tractability and intractability of a given computational problem. To be able to devise fast and practical algorithms for real-life problems using the algorithm design techniques and principles learned in this course.
10. Course Outcomes:

BCSE-3502.1	Acquire the knowledge of Relational database design methodology forimplementing real life applications
BCSE-3502.2	Design an information model expressed in the form of ER diagram..
BCSE-3502.3	Apply structured query language to automate the real time problems of databases.
BCSE-3502.4	Analyze the redundancy problem in database tables using normalization.
BCSE-3502.5	Identify the broad range of Relational database management issues including data integrity, security and recovery in terms of transactions.

11. Details of the Course:

S. No	Contents	Contact Hours
1.	**Introduction**. Algorithms and its Properties, Time and space complexity of an algorithm. Comparing the performance of different algorithms for the same problem. Different orders of growth. Asymptotic notation. Polynomial vs. Exponential running time. **Basic Algorithm Design Techniques.** Divide-and-conquer, greedy,	11

	Backtracking, Branch andBound, dynamic programming and randomization. Overall technique with example, problems and algorithms illustrating the use of these techniques.	
2.	**Graph Algorithms**. Graph traversal: breadth-first search (BFS) and depth-first search (DFS).Applications of BFS and DFS. Topological sort. Shortest paths in graphs: Dijkstra and Bellman-Ford (Single source shortest path, And All pair shortest path (Floyd Warshal algorithm). Minimum spanning Trees: Prim's and Kruskal Algorithm.	12
3.	**Sorting and searching**. Binary search in an ordered array. Sorting algorithms such as Mergesort, Quick sort, Heap sort, Radix Sort, and Bubble sort with analysis of their running times. Lower bound on sorting, searching and Merging, Median and order statistics. **NP-completeness**. Definition of class P, NP. NP-hard and NP-complete problems. 3SAT isNP-complete. Proving a problem to be NP-complete using polynomial-time reductions. Examples of NP-complete problems. Approximation algorithms for various NP-complete problems: TSP, Hamiltonian Cycle, Knapsack.	12
4.	**Advanced topics**. Pattern matching algorithms: Knuth-Morris-Pratt algorithm, Brute Force.	5

12. Suggested Books:

Sl. No.	Name of Books / Authors	Year of Publication
1	Gajendra Sharma , Design and Analysis of Algorithms	2019
2	Michael T. Goodrich and Roberto Tamassia, 'Algorithm Design: Foundations, Analysis, and Internet Examples', 1stEdn., Wiley India Pvt Ltd,	2006
3	S. Dasgupta, C.H. Papadimitriou, and U.V. Vazirani, 'Algorithms', McGraw-Hill Education	2006
4	J. Kleinberg and E. Tardos, 'Algorithm Design', 1stEdn., Pearson Publications	2005
5	Donald Knuth, 'The Art of Computer Programming', Volumes 1, 2, and 3, 2ndEdn., Addison-Wesley Professional	1998
6	Rupinder Kaur Gurm, Jasmeet Singh Gurm 'Design Analysis of Algorithms', Kalyani Publishers	2014
7	https://memgraph.com/blog/graph-algorithms-applications	2022

RIMT UNIVERSITY

NAME OF DEPT.**:**   **Computer Science and Engineering**

1.Subject Code**: BCSE-3504**   Course Title: **Computer Graphics**

2. Contact Hours: **40**   **L: 3**   **T: 2**   **P: 0**

3. Examination Duration (Hrs.):   **Theory   0   3   Practical   0   0**

4. Relative Weight**:   CWA** 16   **LWA   MTE** 24   **ETE   60   EPE**

5. Credits**:   0 4**   6. Semester **5**

7. Pre-requisite:

8. Subject Area: **Departmental Course (DC)**

9. **Course Course Objective:**   Understanding the fundamental graphical operations and the implementation on computer, Get a glimpse of recent advances in computer graphics, Understanding user interface issues that make the computer easy for the novice to use.

10. Course Outcomes:

BCSS-3504.1	Analyze knowledge of various graphics primitives, systems and algorithms.
BCSE-3504.2	Apply geometric transformations on graphics objects and their application in composite form.
BCSE-3504.3	Acquire the knowledge of windowing and clipping algorithms for rendering operations in computer graphics.
BCSE-3504.4	Explore projections and visible surface detection techniques for display of 3Dscene on 2D screen
BCSE-3504.5	Understand the concept of Curves, Surfaces and Hidden portion of graphics objects

9. **Details of the Course:**

Sl. No.	Contents	Contact Hours
1	**Introduction**: Computer Graphics and its applications, Elements of a Graphics, Graphics Systems: Video Display Devices, Raster Scan Systems, Random Scan Systems, Input devices.	5
2	**Basic Raster Graphics**: Scan conversion- Point plot technique, Line	4

	drawing, Circle generating and Ellipse generating algorithms.	
3	**Two-dimensional Geometric Transformations**: Basic Transformations-Translation, Rotation and Scalling, Matrix Representation and Homogeneous Coordinates, Composite Transformations, Reflection and Shearing transformations	6
4	**Clipping:** Window to viewport transformation, Clipping Operations-Point Clipping, Line Clipping, Polygon Clipping and Text Clipping.	3
5	**Filling Techniques**: Scan line algorithms, Boundary-fill algorithm, Flood-fill algorithm, Edge fill and fence fill algorithms,	2
6	**Elementary 3D Graphics**: 3D geometric transformation ,parallel and prospective projection	4
7	**Visibility**: Image and object precision, Hidden edge/surface removal or visible edge/surface determination techniques; z buffer algorithms, Depth sort algorithm, Scan line algorithm and Floating horizon technique.	6
8	**Color Models**: Properties of Light, Intuitive Color Concepts, concepts of chromaticity, RGB Color Model, CMY Color Model, HLS and HSV Color Models, Conversion between RGB and CMY color Models, Conversion between HSV and RGB color models, Color Selection and Applications.	5
9	**Advance Topics**: Introduction of Rendering, Raytracing, Antialiasing, Fractals, Gourard and Phong shading.	5

11. Suggested Books:

Sl. No.	Name of Books / Authors	Year of Publication
1	"**Fundamentals of Computer Graphics**": International Student Edition 5th Edition by Steve Marschner, Peter Shirley , **A K Peters/CRC Press**	2022
2	Zhigand xiang, Roy Plastock, Schaum's outlines,**ComputerGraphics Second Edition",** Tata Mc-Grawhill edition.	2010
3	C, Foley, VanDam, Feiner and Hughes, **"Computer Graphics Principles & Practice"**, **Second Edition**, Pearson Education	2014
4	"**Computer Graphics from Scratch**" : A Programmer's Introductionto 3D Renderin By Gabriel Gambetta	2021

RIMT UNIVERSITY

NAME OF DEPT.**:** **Computer Science and Engineering**

1.Subject Code**: BTCS-3505**   Course Title: **Computer Peripherals and Interfaces**

2. Contact Hours: **40**   **L: 3**   **T: 2**   **P: 0**

3. Examination Duration (Hrs.):   **Theory   0   3   Practical   0   0**

4. Relative Weight**:   CWA** 16 **LWA   MTE** 24 **ETE   60 EPE**

5. Credits**:   0   4**   6. Semester   **5**

7. Pre-requisite:

8. Subject Area: **Departmental Course (DC)**

9. Objective: 1. Introduce the students to the I/O Interfaces & peripherals for some of the most frequently encountered computational problems. 2. To learn functional and operational details of various peripheral devices.

10. Course Outcomes:

CO1	Understand the operation of a sophisticated computer system, including high performance peripheral interfaces.
CO2	Analyze digital interface circuits.
CO3	Apply appropriate and compatible computer/peripherals combinations
CO4	Design digital interface circuits for Input, Output, Keyboard, and Display Circuits

10. Details of the Course:

Sl. No.	Contents	Contact Hours
1	**SYSTEM RESOURCES**: Interrupt, DMA Channel, I/O Port Addresses and resolving and resolving the conflict of resources. I/O buses- ISA, EISA, Local bus, VESA Local bus, PCI bus, PCI Express, Accelerated graphics port bus.	6
2	**IDE & SCSI Interfaces**: IDE origin, IDE Interface ATA standards ATA1 to ATA7. ATA feature, ATA RAID and SCSI RAID, SCSI Cable and pin Connector pin outs SCSI V/s IDE Advantages and limitation	6
3	**Video Hardware:** Video display technologies, DVI Digital signals for CRT Monitor, LCD Panels, Video adapter types, Integrated Video/ Motherboard chipset, Video RAM, Video driver and multiple Monitor, Graphic accelerators. Advanced 3D Technologies, TV Tuner and Video Capture upgrades troubleshooting Video Cards and Drivers.	6
4	**I/O Interfaces:** I/O Interfaces from USB and IEEE1394, I/O	6

	Interface from serial and Parallel to IEEE1394 and USB 961, Parallel to SCSI converter. Testing of serial and parallel port, USB Mouse/ Keyboard Interfaces.	
5	**Input/ Output Driver software aspects:** Role of device driver DOS and UNIX/ LINUX device drivers.	5
6	Design & Integration of Peripheral devices to a computer system as a Case Study	5
7	**Future Trends:** Detailed Analysis of recent Progress in the Peripheral and Bus systems. Some aspects of cost Performance analysis while designing the system	6

11. Suggested Books:

Sl. No.	Name of Books / Authors	Year of Publication
1	Douglas V. Hall ,"**Microprocessors and Interfacing",** Tata McGraw Hill.	2006
2	Barry B. Brey & C.R.Sarma**" The intel microprocessors,"** Pearson	2003
3	P. Pal Chandhari , **"Computer Organization and design"** Prentice Hall of India Pvt. Ltd.	1994
4	Del Corso, H.Kirrman, JD Nicond **"Microcomputer buses & links"** Academic Press	1986

RIMT UNIVERSITY

NAME OF DEPT.**: Computer Science and Engineering**

1.Subject Code**: BCSE-3571**   Course Title: **Computer Network-II Lab**

2. Contact Hours: **16**   **L: 0**   **T: 0**   **P: 2**

3. Examination Duration (Hrs.):   **Theory   0   0   Practical   0   0**

4. Relative Weight**:   CWA   LWA 50 MTE   ETE   EPE 50**

5. Credits**:   0 1**   6. Semester **5**

7. Pre-requisite:

8. Subject Area: Departmental Course (DC)

9. Course Objective: To familiarize the students with Networking Components.
10. Course Outcomes:

BCSE-3506.1	Understand the structure and organization of computer networks.
BCSE-3506.2	Analyze network layers, role of each layer, and relationships between the layers.
BCSE-3506.3	Analyze performance of various communication protocols.
BCSE-3506.4	Configure various routing protocols with the use of packet tracer.
BCSE-3506.5	Practice packet /file transmission between nodes interconnected different networks and routing protocols.

11. Details of the Course:

S. No	Contents	Contact Hours
1	To configure the IP address for a computer connected to LAN and to configure network parameters of a web browser for the same computer.	2
2	To plan IPv6 address scheme for a local area network comprising of 'n' terminals.	2

3	To develop programs for implementing / simulating routing algorithms for Adhoc networks.	2
4	To install any one open source packet capture software like wireshark etc.	2
5	To configure Wireless Local Loop.	1
6	To plan Personal Area Network.	1
7	To configure WLAN.	1
8	To configure Adhoc networks.	1
9	To install and configure wireless access points.	2
10	To configure the IP address for a computer connected to LAN and to configure network parameters of	2

RIMT UNIVERSITY

NAME OF DEPT.**: Computer Science and Engineering**

1. Subject Code**:**	**BCSE-3572**	Course Title:	**Relational Database Management System-II Lab**

2. Contact Hours: **L: 0** **T: 0** **P: 2**

3. Examination Duration (Hrs.): **Theory 0 0 Practical 0 2**

4. Relative Weight**: CWA LWA 50 MTE ETE EPE 50**

5. Credits**: 0 1** 6. Semester **5**

6. Pre-requisite:

7. Subject Area: **Departmental Course (DC)**

13. Course Objective: To offer a good understanding of advanced database concepts and technologies

14. Course Outcomes:

BCSE-3507.1	Apply the knowledge to use the SQL fundamental operations
BCSE-3507.2	Analyze the unary and binary operations of the table.
BCSE-3507.3	Create solutions using different database languages like DDL and DML.
BCSE-3507.4	Demonstrate and understand relational algebra in Database which is helpfulto design related database software components
BCSE-3507.5	Investigate the conditional structure in procedural language.

9. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	To Study SQL and installation of SQL Server / Oracle.	2
2	Write a query of Data Types, Creating Tables, Retrieval of Rows using Select statement, Conditional Retrieval of Rows, Alter and Drop Statements.	2
3	Write a query of Working with Null Values, Matching a Pattern from a Table, Ordering the Result of a Query,	6
4	Write a query of Aggregate Functions, Grouping the Result of a Query, Update and Delete Statements.	2

5	Write a query of Set Operators, Nested Queries, Joins, Sequences.	2
6	Write a query of Views, Indexes, Database Security and Privileges: Grant and Revoke Commands, Commit and Rollback Commands.	2
7	To study a PL/SQL Architecture, Assignments and Expressions	2
8	Writing a code of PL/SQL Code, Referencing Non-SQL parameters.	2
9	Write a program for Stored Procedures and Exception Handling.	2
10	Write a program for Triggers and Cursor Management in PL/SQL.	2

RIMT UNIVERSITY

NAME OF DEPT.**: Computer Science and Engineering**

1. Subject Code**: BCSE-3573**   Course Title: **Computer Graphics Lab**

2. Contact Hours: **16**   **L: 0**   **T: 0**   **P: 02**

3. Examination Duration (Hrs.):   **Theory   0   0   Practical   0   0**

4. Relative Weight**:   CWA   LWA 60   MTE   ETE   EPE 50**

5. Credits**:   0 1**   6. Semester **5**

6. Pre-requisite:

7. Subject Area: **Departmental Course (DC)**

8. Course Objective: To familiarize the students with Data Base Management system.

9. Course Outcomes:

BCSE-3508.1	Analyze Computer graphics and its techniques.
BCSE-3508.2	Apply geometric transformations on graphics objects and their application incomposite form.
BCSE-3508.3	Apply computer graphics in computer games, information visualization, and business applications.
BCSE-3508.4	Explore projections and visible surface detection techniques for display of 3Dscene on 2D screen
BCSE-3508.5	Understand the concept of Curves, Surfaces and Hidden portion of graphics objects.

10. Details of the Course:

S. No.	Contents	Contact Hours
1	To plot a point (pixel) on the screen.	1
2	To draw a straight line using DDA Algorithm.	2
3	To draw a straight line using Bresenham's Algorithm.	2
4	Implementation of mid-point circle generating Algorithm.	1
5	Implementation of ellipse generating Algorithm.	1

6	To translate an object with translation parameters in X and Y directions	2
7	To scale an object with scaling factors along X and Y directions.	2
8	To rotate an object with a certain angle about origin	1
9	Perform the rotation of an object with certain angle about an arbitrary point.	2
10	To perform composite transformations of an object.	1
11	To perform the reflection of an object about major axis.	1

RIMT UNIVERSITY

NAME OF DEPT.**: Computer Science and Engineering**

1.Subject Code**: BCSE-3574**   Course Title: **Design and Analysis of Algorithms LAB**

2. Contact Hours: **16**   **L: 0**   **T: 0**   **P: 02**

3. Examination Duration (Hrs.):   **Theory   0 0   Practical   0 0**

4. Relative Weight**:   CWA   LWA 50 MTE   ETE   EPE 50**

5. Credits**:   0   1   6. Semester 5**

6. Pre-requisite:

7. Subject Area: **Departmental Course (DC)**

8. Course Objective: To get a first-hand experience of implementing well-known algorithms in a high-level language. To be able to compare the practical performance of different algorithms for the same problem

9. Course Outcomes:

BCSE-3509.1	Implement algorithm to solve problems by iterative approach.
BCSE-3509.2	Implement algorithm to solve problems by divide and conquer approach.
BCSE-3509.3	Implement algorithm to solve problems by Greedy algorithm approach.
BCSE-3509.4	Implement algorithm to solve problems by Dynamic programming, backtracking, branch and bound approach.
BCSE-3509.5	Implement algorithm to solve problems by branch and bound approach.
BCSE-3509.1	Implement algorithm to solve problems by iterative approach.

10. .Details of the Course:

S.No	Contents	Contact Hours
1	Code and analyze to sort an array of integers using Heap sort.	1
2	Code and analyze to sort an array of integers using Merge sort.	1
3	Code and analyze to sort an array of integers using Quick sort.	1
4	Code and analyze solutions to following problem with given strategies: i. Knap Sack using greedy approach ii. Knap Sack using dynamic approach	1

5	Code and analyze to find an optimal solution to matrix chain multiplication using dynamic programming.	1
6	Code and analyze to find an optimal solution to TSP using dynamic programming.	1
7	Implementing an application of DFS such as: i. to find the topological sort of a directed acyclic graph ii. to find a path from source to goal in a maze.	1
8	Implement an application of BFS such as: i. to find connected components of an undirected graph ii. to check whether a given graph is bipartite..	1
9	Code and analyze to find shortest paths in a graph with positive edge weights using Dijkstra's algorithm.	1
10	Code and analyze to find shortest paths in a graph with arbitrary edge weights using Bellman-Ford algorithm.	1
11	Code and analyze to find shortest paths in a graph with arbitrary edge weights using Flyods' algorithm.	1
12	Code and analyze to find the minimum spanning tree in a weighted, undirected graph using Prims' algorithm	1
13	Code and analyze to find the minimum spanning tree in a weighted, undirected graph using Kruskals' algorithm.	2
14	Coding any real world problem or TSP algorithm using any heuristic technique	2

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NAME OF DEPT.**:**   **Computer Science and Engineering**

1.Subject Code**: BCSE-3602**   Course Title: **Compiler Design**

2. Contact Hours: **40**   **L: 3**   **T: 02**   **P: 0**

3. Examination Duration (Hrs.):   **Theory   0   3   Practical   0   0**

4. Relative Weight**:   CWA** 16   **LWA**   **MTE** 24   **ETE**   60   **EPE**

5. Credits**:   0   4**   6. Semester **6**

6. Pre-requisite:

7. Subject Area: **Departmental Course (DC)**

8. Course Course Objective: This course will provide the in-depth knowledge of different concepts involved while designing a compiler.

9. Course Outcomes:

BCSE-3602.1	Acquire knowledge of different phases and passes of the compiler and implement phases using compiler tools like LEX, YACC, etc
BCSE-3602.2	Design and implement different types of parsers i.e. Top-Downand Bottom-up parsersand construct LL, SLR, CLR, and LALR parsing table.
BCSE-3602.3	Apply syntax-directed translation method using synthesized and inherited attributes togenerate intermediate code
BCSE-3602.4	Analyze data structures used for symbol table and runtime organization and errors invarious phases
BCSE-3602.5	Apply code optimization and code generation techniques to create target code

10. Details of the Course:

Sl. No.	Contents	Contact Hours
1	Module1: Overview of compilation- The structure of a compiler and applications of compiler technology; Lexical analysis - The role of a lexical analyzer, specification of tokens, recognition of tokens.	3
2	Module2: Introduction to syntax analysis -Role of a parser, use of	6

	context-free grammars (CFG) in the specification of the syntax of programming languages, techniques for writing grammars for programming languages (removal left recursion, etc.), non- context-free constructs in programming languages, parse trees and ambiguity, examples of programming language grammars.	
3	Module3: Top-down parsing- FIRST & FOLLOW sets, LL(1) conditions, predictive parsing, recursive descent parsing, error recovery. LR-parsing - Handle pruning, shift-reduce parsing, viable prefixes, valid items, LR(0) automaton, LR-parsing algorithm, SLR(1), LR(1), and LALR(1) parsing. .	5
4	Module 4: Syntax-directed definitions (attribute grammars)-Synthesized and inherited attributes, examples of SDDs, evaluation orders for attributes of an SDD, dependency graphs. S-attributed and L-attributed SDDs and their implementation using LR-parsers and recursive descent parsers respectively.	6
5	Module5: Semantic analysis- Symbol tables and their data structures. Semantic analysis of expressions, assignment, and control-flow statements, declarations of variables and functions, function calls, etc., using S- and L-attributed SDDs (treatment of arrays and structures included).	5
6	Module 6: Intermediate code generation - Different intermediate representations –quadruples, triples, trees, flow graphs, SSA forms, and their uses. Translation of expressions (including array references with subscripts) and assignment statements. Translation of control-flow statements – it- then-else, while-do, and switch.	5
7	Module 7: Introduction to code optimization, machine independent optimization techniques. Storage Allocation: Static and Dynamic.	5
8	Module 8: Simple machine code generation, Directed Acyclic Graph (DAG), machine dependent optimization.	5

11. Suggested Books:

Sl. No.	Name of Books / Authors	Year of Publication
1	Chattopadhyay and Santanu, Compiler Design	2022
2	K.D. Cooper, and Linda Torczon, Engineering a Compiler, Morgan Kaufmann, 2nd edition	2011
3	K.C. Louden, Compiler Construction: Principles and Practice, Cengage Learning	1997
4	D. Brown, J. Levine, and T. Mason, LEX and YACC, O"ReillyMedia	1992
5	Holub: Compiler Design in C, PHI	2009
6	Aho, Ullman:Principles of Compiler Design. Narosa Publication	2002
7	Dhamdhere:Compiler Construction- Principles and Practice ,Macmillan, India	

RIMT UNIVERSITY

NAME OF DEPT.**:** **Computer Science and Engineering**

1.Subject Code**:** **BCSE-3603**   Course Title: **Software Engineering**

2. Contact Hours: **40**   **L: 3**   **T: 2**   **P: 0**

3. Examination Duration (Hrs.):   **Theory   0   3   Practical   0   0**

4. Relative Weight**:**   **CWA** 16   **LWA**   **MTE**   24   **ETE**   60   **EPE**

5. Credits**:**   **0   4**   6. Semester **6**

7. Pre-requisite:

8. Subject Area: **Departmental Course (DC)**

9. Course Objective: This course introduces the concepts and methods required for the construction of large software intensive systems. It aims to develop a broad understanding of the discipline of software engineering.

10. Course Outcomes:

BCSE-3603.1	To understand of software engineering, process and software process models.
BCSE-3603.2	To Interprets minimum requirements, types of requirements for the development of application.
BCSE-3603.3	To identify various system models for business processes and understanding the existing system.
BCSE-3603.4	Develops and maintains efficient reliable software solutions by creating a blue print for further development.
BCSE-3603.5	Constructs SW engineering testing and risk strategies, and develops their appropriate applications.
BCSE-3603.6	Develops critical thinking and evaluate assumptions and argument.

11. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	Evolution and impact of Software engineering, software life cycle models: Waterfall, prototyping, Evolutionary, and Spiral models. Feasibility study, Functional and Non-functional requirements, Requirements gathering, Requirements analysis and specification	10
2	Basic issues in software design, modularity, cohesion, coupling and	10

	layering, function-oriented software design: DFD and Structure chart, object modeling using UML, Object-oriented software development, user interface design. Coding standards and Code review techniques	
3	Fundamentals of testing, White-box, and black-box testing, Test coverage analysis and test case design techniques, mutation testing, Static and dynamic analysis, Software reliability metrics, reliability growth modeling.	10
4	Software project management, Project planning and control, cost estimation, project scheduling using PERT and GANTT charts, cost-time relations: Rayleigh-Norden results, quality management, ISO and SEI CMMI, PSP and Six Sigma. Computer aided software engineering, software maintenance, software reuse, Component-based software development	10

11. Suggested Books:

SNO.	Name of Books / Authors	Year of Publication
1	Sommerville," **Software Engineering, Tenth Edition By Pearson**	2017
2	Watts Humphrey," **Managing software process**", Pearson education.	2003
3	James F. Peters and Witold Pedrycz, " **Software Engineering – An Engineering Approach"**, Wiley	2014
4	Pankaj Jalote, **"An integrated approach to Software Engineering"**, Springer/Narosa, 5th edition	2005
5	https://www.educative.io/blog/software-process-model-types	2021

RIMT UNIVERSITY

NAME OF DEPT**.:**   **Computer Science and Engineering**

1.   Subject Code**:**   BCSE-3619   Course Title: **Artificial Intelligence and Expert System**

2.   Contact Hours: **40**   **L: 3**   **T: 2**   **P:**   **0**

3.   Examination Duration (Hrs.):   **Theory**   **0 3**   **Practical**   **0**   **0**

4.   Relative Weight**:**   **CWA**   16   **LWA**   **MTE** 24   **ETE** 60   **EPE**

5.   Credits**:**   **0**   **4**   6. Semester **6**

   7. Pre-requisite:

 8. **Subject Area:** Departmental Course (DC)

 9. **Course Course Objective:**   This course will introduce the basic principles in artificial intelligence research. It will cover simple representation schemes, problem solving paradigms, constraint propagation, and search strategies. Areas of application such as knowledge representation, natural language processing, expert systems, vision and robotics will be explored.

 10. **Course Outcomes**:

BCSE-3619.1	Demonstrate fundamental understanding of artificial intelligence (AI) and expert systems.
BCSE-3619.2	Apply basic principles of AI in solutions that require problem solving, inference, perception,knowledge representation, and learning.
BCSE-3619.3	Demonstrate proficiency in applying scientific method to models of machine learning.
BCSE-3619.4	Discuss the basics of ANN and different optimizations techniques.
BCSE-3619.1	Demonstrate fundamental understanding of artificial intelligence (AI) and expert systems.

11. Details of the Course:

Sr. No.	Content	Contact Hours
1.	Introduction: History of AI - Intelligent agents – AI and Applications - Problem spaces and search - Heuristic Search techniques – Best-first search – Informal search strategies-A* algorithm, Iterative deepening A*(IDA), small memory A*(SMA). Game Playing: Minimax search procedure - Adding alpha-beta cut-offs.	8
2.	Expert systems, Definitions types, components, expert system development process, knowledge elicitation, Conceptualization, battering formulizations methods of knowledge acquisition, interviewing, sensor data capturing.	8
3.	Knowledge Representation: Approaches and issues in knowledge representation Knowledge - Based Agent- Propositional Logic – Predicate logic –Reasoning.	8
4.	Reasoning under uncertainty: Basic probability, Bayes rule, Bayesian networks, Fuzzy Logic.	8
5.	Planning and Learning: Basic representation of plans, types of planning. Forms of Learning – Supervised, unsupervised and reinforcement learning, decision trees, Neural Networks.	8
	TOTAL	40

12.Suggested Books:

S.No.	Name of Book/Author/Readings	Year of publication
1	Database and Expert Systems Applications: 33rd International Conference, DEXA 2022, Vienna, Austria, August 22–24, 2022, Proceedings, Part II	2022
2	Elaine Rich, Kevin Knight and ShivashankarB.Nair, 'Artificial Intelligence', 3rd Edn., Tata McGraw-Hill, 2009.	1994
3.	Stuart J. Russell and Peter Norvig, 'Artificial Intelligence: A Modern Approach', Pearson Education Asia, 2nd Edn., 2003.	2003
4.	N.P. Padhy, 'Artificial Intelligence and Intelligent System', Oxford University Press, 2nd Edn., 2005.	2008
5.	RajendraAkerkar, 'Introduction to Artificial Intelligence', Prentice-Hall of India, 2005.	1998
6.	Patrick Henry Winston, 'Artificial Intelligence', Pearson Education Inc., 3rd Edn., 2001.	2003
7.	Eugene Charniak and Drew Mc Dermott, 'Introduction to Artificial Intelligence', Addison-Wesley, ISE Reprint, 1998.	2013

RIMT UNIVERSITY

NAME OF DEPT.**:** **Computer Science and Engineering**

1. Subject Code**: BCSE-3620** Course Title: Mobile Application Development

2. Contact Hours: **40** **L: 3** **T: 2** **P: 0**

3. Examination Duration (Hrs.): **Theory** **0 3** **Practical 0 0**

4. Relative Weight**: CWA** 16 **LWA** **MTE** 24 **ETE** 60 **EPE**

5. Credits**: 0 3** 6. Semester **6**

11. Pre-requisite:

12. **Subject Area: Departmental Course (DC)**

13. **Course Objective:** At the end of this course student will: CO1: Understand & familiar with programming technologies, design and development related to mobile applications. CO2: To analyse & accessing device capabilities, industry standards, operating systems, and programming for mobile applications using an OS Software Development Kit (SDK). CO3: Interpret features of Andriod OS. CO5: to create basic applications for mobile devices

14. **Outcomes**:

BCSE-3620.1	To learn application models of mobile application frameworks.
BCSE-3620.2	To learn Mobile OS architectures
BCSE-3620.3	To be database access in different mobile OS.
BCSE-3620.4	To learn testing methodologies for mobile applications

11. Details of the Course:

Sr. No.	Content	Contact Hours
1.	**Unit-1** Introduction to Android: The Android Developing environment, Android SDK, Introduction to Open Handset Alliance, Development Framework, Application Fundamentals; Device Compatibility, System permissions, Understanding Anatomy of Android Application, Android Development Tools	10

2.	**Unit-II** Mobile OS Architectures: Comparing and contrasting architectures of all three- Android, iOS and Windows, Underlying OS, Kernel structure and native level programming. Approaches to power management, Security.		11
3.	**Unit-III** Android/iOS/Win8 Apps: DB Access, network access, contacts/ photos/ etc. Underneath the frameworks: Native level programming on Android, Low Level programming on iOS, Windows low level APIs		7
4.	**Unit-IV** Intents and services: Android intents and services, characteristics of mobile applications, Successful mobile development.		4
5.	**Unit-V** Storing and Retrieving data: Synchronization and replication of mobile data, Android storing and retrieving data, working with content provider, Putting it all together: packaging and deploying, Performance best practices, Android field service app.		10
	TOTAL		42

12.Suggested Books:

S.No.	Name of Book/Author/Readings	Year of publication
1	Rick Rogers, John Lombardo, Meike Blake, "Android application development", Ist Edition, O'Reilly	2010
2	Lauren Darcey and Shane Conder,"Android Wireless Application Development", 2nd ed. Pearson Education,	2011
3.	Wei-Meng Lee , Beginning Android 4 development by John Wiley & Sons	2012
4.	Reto Meier, "Professional Android 4 Application Development", Wrox.	2012
5	https://www.geeksforgeeks.org/architecture-of-ios-operating-system/	2022

RIMT UNIVERSITY

NAME OF DEPT.**:**   **Computer Science and Engineering**

1.Subject Code**: BCSE-3671**   Course Title: **Software Engineering Lab**

2. Contact Hours: **16**   **L: 0**   **T: 0**   **P: 02**

3. Examination Duration (Hrs.):   **Theory   0 0   Practical   0   0**

4. Relative Weight**:   CWA   LWA** 50 **MTE   ETE   EPE** 50

5. Credits**:   0   1   6. Semester 6**

7.   Pre-requisite:

8.   Subject Area: **Departmental Course (DC)**

9.   Course Objective: It aims to develop a broad understanding of the discipline of software engineering, to develop methods and procedures for software development.

10. Course Outcomes:

BCSE-3606.1	To understand requirements of the software projects.
BCSE-3606.2	To analyze software requirements with existing tools.
BCSe-3606.3	To design and develop methods and procedures for software development.
BCSE-3606.4	To evaluate different testing methodologies.
BCSE-3606.5	Ability to work in a team as well as independently on software projects.

11. Details of the Course:

S.No.	CONTENTS	CONTACT HOURS
1	Study and usage of OpenProj or similar software to draft of a project plan	2
2	Study and usage of OpenProj or similar software to track the progress of a project	2
3	Preparation of Software Requirement Specification Document, Design	2

	Documents and Testing Phase related documents for some problems	
4	Preparation of Software Configuration Management and Risk Management related documents	2
5	Study and usage of any Design phase CASE tool	2
6	To perform unit testing and integration testing	2
7	To perform various white box and black box testing techniques	2
8	Testing of a web site	2

RIMT UNIVERSITY

NAME OF DEPT.**:**   **Computer Science and Engineering**

1.Subject Code**: BCSE-3672**   Course Title: **Artificial Intelligence and Expert System Lab**

2. Contact Hours: **16**   **L: 0   T: 0   P: 2**

3. Examination Duration (Hrs.):   **Theory   0 0   Practical   0   2**

4. Relative Weight**:   CWA   LWA 50 MTE   ETE   EPE   50**

5. Credits**:   0   1**   6. Semester **6**

8. Subject Area: **Departmental Course (DC)**

8. Course Objectives: To study the applications of AI and agent based approach to AI. To study and discuss various techniques and algorithms of AI used in general problem solving, optimization problems, constraint satisfaction problems, To familiarize students with various sub-areas of AI, such as expert systems, natural language processing and machine learning.

9. Course Outcomes:

BCSE-3620.1	To understand artificial intelligence, its characteristics and its application areas.
BCSE-3620.2	Formulate real-world problems as state space problems, optimization problems orconstraint satisfaction problems.
BCSE-3620.3	Select and apply appropriate algorithms and AI techniques to solve complex problems.
BCSE-3620.4	Design and develop an expert system by using appropriate tools and techniques.

10. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	Write a program for depth first search	2
2	Write a program for best first search	2
3	Write a program to generate the output for a* algorithm.	2
4	Write a lisp program to solve water jug problem using heuristic function.	2
5	Write a program to show the Tic-Tac-Toe game for 0 and X.	2
6	Write a program for career counselling expert system.	3
7	Write a program for medical diagnosis expert system.	3
8	Write a program for structure analysis expert system.	3

RIMT UNIVERSITY

NAME OF DEPT.**: BCSE-3622**   **Computer Science and Engineering**

1.Subject Code**:**   Course Title: **Soft Skills-II**

2. Contact Hours: **16**   **L: 0**   **T: 0**   **P: 2**

3. Examination Duration (Hrs.):   **Theory   0 0   Practical   0   2**

4. Relative Weight**:   CWA   LWA 100 MTE   ETE   EPE**

5. Credits**:   0   1**   6. Semester **6**

7. Course Objectives:
1) Demonstrate soft skills required for business situations.
2) Analyze the value of soft skills for career enhancement.
3) Apply soft skills to workplace environment.
4) Confidently participate in GD and interview process.

8. Course Outcomes:

BCSE-3622.1	Make use of techniques for self-awareness and self-development.
BCSE-3622.2	Apply the conceptual understanding of communication into everyday practice
BCSE-3622.3	Understand the importance of teamwork and group discussions skill
BCSE-3622.4	Develop time management and stress management.
BCSE-3622.5	Apply business etiquette effectively an engineer requires communicate fluently and develop all the soft and profession skills required for corporate sector.
BCSE-3622.6	Learn to overcome problems associated with personality.

9. Details of the Course:

Sr. No	Contents	Contact Hours
UNIT-I	**Art of Speaking** :Introduction.Communication Process. Importance of communication. Formal & informal communication. Barriers to Communication. Tips for conversation. Presentation Skills. Effective multimedia presentation skills. Speeches & Debates. Combating nervousness. Patterns & methods of Presentation. Oral Presentation, Planning and preparation.	15
UNIT-II	**Group Discussion:** Introduction. Importance of Gd. Characters tested in a GD. Tips on GD. Essential elements of GD. Traits tested in a GD. Gd etiquette. Initiating a GD. Non-verbal communication in GD. Movement & gestures to be avoided in a GD. Some topics for GD.	10

UNIT-III	**Preparing CV/Resume:** Introduction-meaning-difference among Bio-data, CV & Resume. CV writing tips. Do's and Don'ts of Resume preparation. Vocabulary for Resume. Common Resume mistakes. Cover letters. Tips for writing cover letters.	5
UNIT-IV	**Interview Skills**- Introduction. Types of Interview. Types of question asked. Reasons for rejections. Post-interview etiquette. Telephonic interview. Dress code at interview. Mistakes during interview. Tips to crack interview. Contextual questions in interview skills. Emotional crack an interview. Emotional intelligence and critical thinking during interview process.	10

Recommended Texts

S.No.	Name of Book/Author/Readings	Year of publication
1.	Lucas, Stephen E., 'The Art of Public Speaking', 11th Edn., International Edn., McGraw Hill Book Co.	2014
2.	Goleman, Daniel, 'Working with Emotional Intelligence', Banton Books, London	1998
3.	Thrope, edgar and Showick Trope,'Winning at Interviews', Pearson Education	2004
4.	Turk,Christopher,'Effective Speaking', South Asia Division: Taylor & Francis,	1985

RIMT UNIVERSITY

NAME OF DEPT.**:**   **Computer Science and Engineering**

1. Subject Code**: BCMC-4701**   Course Title: **Constitution of India**

2.Contact Hours:22   **L: 2   T: 0   P: 0**

3. Examination Duration (Hrs.):   **Theory   0 0   Practical   0   0**

4. Relative Weight**:   CWA   0   LWA   -   MTE   0   ETE   0   EPE   -**

5. Credits**:   0   0**   6. Semester: **7**

7. Subject Area: **Departmental Course (DC)**

8. Course Objective:
   1. To acquaint the students with legacies of constitutional development in India and help those to understand the most diversified legal document of India and philosophy behind it.
   2. To make students aware of the theoretical and functional aspects of the Indian Parliamentary System.
   3. To channelize students' thinking towards basic understanding of the legal concepts and its implications for engineers.
   4. To acquaint students with latest intellectual property rights and innovation environment with related regulatory framework.
   5. To make students learn about role of engineering in business organizations and e-governance.

   9. Course Outcomes:

BTMC-4701.1	Identify and explore the basic features and modalities about Indianconstitution.
BTMC-4702.2	Differentiate and relate the functioning of Indian parliamentary system at thecenter and
BTMC -4703.3	state level.
BTMC -4704.4	Differentiate and relate the functioning of
BTMC -4705.5	Indian parliamentary system at the center and state level.

10. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	Introduction and Basic Information about Indian Constitution: Meaning of the constitution law and constitutionalism, Historical Background of the Constituent Assembly, Government of India Act of 1935 and Indian Independence Act of 1947,Enforcement of the Constitution, Indian Constitution and its Salient Features, The Preamble of the Constitution, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy	5
2	Union Executive and State Executive: Powers of Indian Parliament Functions of RajyaSabha, Functions of LokSabha, Powers and Functions of the President, Comparison of powers of Indian President with the United States, Powers and Functions of the Prime Minister, Judiciary – The Independence of the Supreme Court, Appointment of Judges, Judicial Review, Public Interest Litigation, Judicial Activism, LokPal, LokAyukta, The Lokpal and Lokayuktas Act 2013	4
3	Introduction and Basic Information about Legal System: The Legal System: Sources of Law and the Court Structure: Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law, Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court).	4
4	Intellectual Property Laws and Regulation to Information: Intellectual Property Laws: Introduction, Legal Aspects of Patents, Filing of Patent Applications, Rights from Patents, Infringement of Patents, Copyright and its Ownership, Infringement of Copyright, Civil Remedies for Infringement, Regulation to Information Introduction, Right to Information Act, 2005	5
5	Society State and Polity in India State in Ancient India: Evolutionary Theory, Force Theory, Mystical Theory Contract Theory, Stages of State Formation in Ancient India, Kingship , Council of Ministers Administration Political Ideals in Ancient India Conditions' of the Welfare of Societies, The Seven Limbs of the State, Society in Ancient India, Purusārtha, Varnāshrama System, Āshrama or the Stages of Life, Marriage, Understanding Gender as a social category, The representation of Women in Historical traditions, Challenges faced by Women. Four-class Classification, Slavery.	5
6	Indian Literature, Culture, Tradition, and Practices Evolution of script and languages in India: Harappan Script and Brahmi Script. The Vedas, the Upanishads, the Ramayana and the Mahabharata, Puranas, Buddhist And Jain Literature in Pali,Prakrit And Sanskrit, Kautilya'sArthashastra, Famous Sanskrit Authors, Telugu Literature, Kannada Literature,Malayalam Literature ,SangamaLiterature Northern Indian Languages & Literature, Persian And Urdu ,Hindi Literature	4

11. Suggested Books:

SNO.	Name of Books / Authors	Year of Publication
1	Subhash C. Kashyap: Our Constitution: An Introduction to India's Constitution and constitutional Law, NBT,	2018
2	V.K. Ahuja: Law Relating to Intellectual Property Rights	2007
3	Granville Austin: The Indian Constitution: Cornerstone of a Nation. 1966, Oxford Clarendon Press.	1966
4	Companies Act, 2013 Key highlights and analysis by PWC. https://www.pwc.in/assets/pdfs/publications/2013/companies-act-2013-key-highlights-andanalysis.pdf	2013

RIMT UNIVERSITY

NAME OF DEPT.**:**   **Computer Science and Engineering**

1. Subject Code**: BTMC-4702**   Course Title: ESSENCE OF INDIAN KNOWLEDGE
                                           TRADITION

2. Contact Hours: **40**   **L: 3**   **T: 2**   **P:**   **0**

3. Examination Duration (Hrs.):   **Theory**   **0**   **3**   **Practical**   **0**   **0**

4. Relative Weight**:**   **CWA**   0   **LWA** -   **MTE**   -   **ETE**   -   **EPE**

5. Credits**:**   **0**   **0**   6. Semester: **7**

6. Pre-requisite:

7. Subject Area: **Departmental Course (DC)**

8. Course Course Objective: The course should enable the students to: I. Understand the concept of Traditional knowledge and its importance II. Know the need and importance of protecting traditional knowledge. III. Know the various enactments related to the protection of traditional knowledge. IV. Understand the concepts of Intellectual property to protect the traditional.

9. Course Outcomes:

BTMC-4702.1	Understand and elucidate the basic knowledge of traditional knowledge to develop the physical and social changes on traditional knowledge system.
BTMC-4702.2	Discuss different characteristics of Indigenous Knowledge (IK) to differentiate it with formal, western and traditional
BTMC-4702.3	Describe the significance of traditional knowledge protection to communicate the traditional knowledge information
BTMC-4702.4	Recognize the role of government on traditional knowledge to measure its impact on global economy
BTMC-4702.5	Explain the acts related to schedule tribes, traditional forest dwellers, plants protection and farmers to inculcate the legal protection information.
BTMC-4702.6	Illustrate the rules of biological diversity and geographical indicators for the protection of traditional knowledge bill.

BTMC-4702.7	Evaluate the legal mechanism of traditional knowledge protection to show the difference between IPR and non-IPR system
BTMC-4702.8	Summarize the strategies of patents and global legal FORA for excel protection of Indian traditional knowledge.
BTMC-4702.9	Demonstrate the engineering, biotechnology, agricultural and medicine system to find the healthcare soundness of the traditional societies.
BTMC-4702.10	Examine the sustainability and development of environment for standardizing the food security and traditional knowledge of the country.

10. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	Module 1: INTRODUCTION TO TRADITIONAL KNOWLEDGE Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditionalknowledge, the physical and social contexts in which traditional knowledge develop, the historical impact ofsocial change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditionalknowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditionalknowledge vis-à-vis formal knowledge	8
2	Module 2: PROTECTION OF TRADITIONAL KNOWLEDGE Protection of traditional knowledge: The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.	8
3.	Module 3:LEGAL FRAMEWORK AND TK A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.	8
4	Module 4: TRADITIONAL KNOWLEDGE AND INTELLECTUAL PROPERTY Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge	8
5	Module 5: TRADITIONAL KNOWLEDGE IN DIFFERENT SECTORS Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment,	8

	Management of biodiversity, Food security of the country and protection of TK. 139	

11. Suggested Books:

SNO.	Name of Books / Authors	Year of Publication
1	Traditional Knowledge System in India, by Amit Jha, 2009.	2009
2	Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and VipinKumarSingh, Pratibha Prakashan 2012.	2012
3	Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002	2002
4	"Knowledge Traditions and Practices of India" Kapil Kapoor1, Michel Danino2	2002

RIMT UNIVERSITY

NAME OF DEPT.**:**   **Computer Science and Engineering**

1.Subject Code**: BCSE-4702**   Course Title: **Theory of Computation**

2. Contact Hours: **40**   **L: 3**   **T: 2**   **P: 0**

3. Examination Duration (Hrs.):   **Theory   0 3   Practical   0   0**

4. Relative Weight**:   CWA** 16   **LWA**-   **MTE** 24   **ETE**   60   **EPE**

5. Credits**:   0   4**   6. Semester: **7**

6. Pre-requisite:

7. Subject Area: **Departmental Course (DC)**

8. Course Objective: To give the students' knowledge of number of areas in theoretical computer science and their interconnections.

9.   Course Outcomes:

BCSE-4702.1	Outline the fundamental concepts in automata theory and formal languages.
BCSE-4702.2	Explain context-free grammars, properties of languages, grammars and automata with rigorously formal mathematical method.
BCSE-4702.3	Differentiate and manipulate formal descriptions of push down automata, its applications and transducer machines
BCSE-4702.4	Illustrate the basic properties of Turing machines and computing the tractability and decidability with Turing machine.
BCSE-4702.5	Analyze the limitations of computational models and possible methods of proving them.
BCSE-4702.6	Apply Automata Theory concepts in engineering applications like designing of compilers.

10. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	Module 1: Introduction Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages	3
2	Module 2: Regular languages and finite automata: Regular	8

	expressions and languages, deterministic finite automata (DFA) and equivalence with regular expressions, nondeterministic finite automata (NFA) and equivalence with DFA, regular grammars and equivalence with finite automata, properties of regular languages, pumping lemma for regular languages, minimization of finite automata.	
3.	Module 3: Context-free languages and pushdown automata Context-free grammars (CFG) and languages (CFL), Chomsky and Greibach normal forms, nondeterministic pushdown automata (PDA) and equivalence with CFG, parse trees, ambiguity in CFG, pumping lemma for context-free languages, deterministic pushdown automata, closure properties of CFLs.	8
4	Module 4: Context-sensitive languages Context-sensitive grammars (CSG) and languages, linear bounded automata and equivalence with CSG	5
5	Module 5: Turing machines The basic model for Turing machines (TM), Turing recognizable (recursively enumerable) and Turing-decidable (recursive) languages and their closure properties, variants of Turing machines, Turing m achines, computable languages and functions, modifications of Turing machines, restricted Turing machines, Church's hypothesis	8
6	Module 6: Properties of Recursive and Recursively Enumerable Languages, Unsolvable Decision Problem, Empty and non empty language, rice theorem, undecidability of Post Correspondence Problem, Church's Thesis, halting problem, Recursive Function Theory, Godel Numbering.	12

11. Suggested Books:

SNO.	Name of Books / Authors	Year of Publication
1	Theory of Computation and Application- 2nd Revised Edition, Laxmi Publication	2022
2	K.L.P. Mishra and N. Chandrasekaran, "Theory of Computer Science, Third Edition", PHI Learning Private Limited	2013
3	Satinder Singh Chahal and Guljeet Kaur Chahal, "Introduction to theory of automata, Formal Language & Computation" ABS Publications	2015(reprint)
4	Adesh Kumar Pandey, "Theory of Automata and Computation" S.K. Kataria& Sons	2013
5	R.K. Shukla," Theory of Computation", Cengage Learning An Introduction to Formal Languages and Automata, by Peter Linz, Third Edition, Narosa Publishers	2016 (Reprint)
6	M. Sipser, "Introduction to the Theory of Computation", Second Edition, Cengage Learning	2012

RIMT UNIVERSITY

NAME OF DEPT.**:**   **Computer Science and Engineering**

1.Subject Code**: BCSE-4703**   Course Title: **Java Programming**

2. Contact Hours: **40**   **L: 3   T: 2   P: 0**

3. Examination Duration (Hrs.):   **Theory   0 3   Practical   0   0**

4. Relative Weight**:   CWA** 16   **LWA**-   **MTE** 24   **ETE**   60   **EPE**   -

5. Credits**:   0 4**   6. Semester: **7**

7. Pre-requisite:

8. Subject Area: **Departmental Course (DC)**

9. Course Course Objective: This course will provide the knowledge of Java and prepare students to be in a position to write object oriented programs in Java.

10. Course Outcomes:

BCSE-4703.1	Understand the basics of object-oriented programming using C++ and JAVA.
BCSE-4703.2	Apply the concept of classes, Java, JDK Components and develop Simple JavaPrograms.
BCSE-4703.3	Develop Simple Java Programs using inheritance and Exception handling.
BCSE-4703.4	Develop Multi-threading Programming and Interfaces.
BCSE-4703.5	Develop GUI applications using Applet classes, Swing components and Event handling programs.

11. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	**Overview of Java**: Object oriented programming, Two paradigms, abstraction, the three OOP principles, Java class libraries Date types, Variables and Arrays: Integers, floating-point types, characters, Boolean, Iterates, Variable, Data types and casting, automatic type promotion in expressions, arrays.	5
2	**Operators and Control Statements:** Arithmetic operators, bit wise operators, relational operators, Boolean logical operators, the? Operator, operator precedence, Java's selection statements, iteration statements, jump statements.	4
3	**Introduction to Classes**: Class fundamentals, declaring object reference variable, Introducing methods, method. Constructors, this	4

	keyword, garbage collection, the finalize() methods.	
4	**Methods and Classes**: Overloading methods, using objects as parameters, recursion.	5
5	**Inheritance**: Inheritance basics, using super, method overriding, dynamic method dispatch, using abstract Classes, Using final with inheritance, Package and Interfaces, Package access protection, importing packages.	5
6	**Exception Handling**: Exception handling fundamentals, Exception types, Uncaught Exceptions Using try and catch, multiple catch clauses, nested try statements, throw, finally Java's built-in exceptions. exceptions, creating your own exception sub classes, using exceptions.	4
7	**Multithreaded Programming**: The Java thread model, the main thread, creating thread, creating multiple threads, using is alive () and join (), Thread priorities, synchronization, Inter thread communications, suspending resuming and stopping threads.	4
8	**String Handling**: The string constructors, string length, special string operations, character extraction, string comparison, searching string, modifying string, data conversion, changing the case of characters, string buffer.	4
9	**I/O and Applets**: I/O Basics, Reading Console Input, Writing Console Output, Reading and Writing Files, Applet Fundamentals, Applet Architecture, The HTML Applet tag, Passing parameters to Applets. Networking: Networking basics, Java and the Net, TCP/IP Client Sockets URL, URL Connection, TCP/IP Server Sockets, Database connectivity.	5

11. Suggested Books:

SNO.	Name of Books / Authors	Year of Publication
1	Herbert Schildt, The Complete Reference Java2, McGraw-Hill.	2015
2	Joyce Farrell, Java for Beginners, Cengage Learning	2014
3	Deitel and Deitel, Java: How to Program, 6th Edition, Pearson Education.	2008
4	James Edward Keogh, Jim Keogh, J2EE: The complete Reference, McGraw Hill	2015
5	Khalid A. Mughal, TorillHamre, Rolf W. Rasmussen, Java Actually , Cengage Learning.	2016
6	ShirishChavan, Java for Beginners.	2009
7	Joshua Bloch, Effective Java Third Edition	2022

RIMT UNIVERSITY

Name of Department**:**   **Computer Science and Engineering**

1. Subject Code**: BTCS-4722**   Course Title: **CYBER SECURITY**

2. Contact Hours: **40**   **L: 3**   **T: 2**   **P: 0**

3. Examination Duration (Hrs.):   **Theory   0   3   Practical   0   0**

4. Relative Weight**:   CWA   16   LWA   MTE   24   ETE   60   EPE**

5. Credits**:   0   4**   6. Semester **7**

9. Pre-requisite:

10.   Subject Area: **Departmental Course (DC)**

11. Course Objectives:
1. To understand various types of cyber-attacks and cyber-crimes

2. To learn threats and risks within context of the cyber security

3. To have an overview of the cyber laws & concepts of cyber forensics

4. To study the defensive techniques against these attacks

12. Course Outcomes

CO1	Analyze and evaluate the cyber security needs of an organization.
CO2	Understand Cyber Security Regulations and Roles of International Law.
CO3	Design and develop security architecture for an organization.
CO4	Understand fundamental concepts of data privacy attacks

10. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.	4

2	Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics	6
3	Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Organizational security Policies and Measures in Mobile Computing Era, Laptops	11
4	Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations	8
5	Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc	4

11. Suggested Books:

SNO.	Name of Books / Authors	Year of Publication
1	Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley	2011
2	B.B. Gupta, D.P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335.	2018
3	Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press	2016
4	Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group	2013
5	https://www.simplilearn.com/tutorials/cyber-security-tutorial/cyber-security-for-beginners	2022

RIMT UNIVERSITY

Name of Department**:** **Computer Science and Engineering**

1. Subject Code**: BTCS-4774**   Course Title: CYBER SECURITY LAB

2. Contact Hours: **40**   **L: 3**   **T: 2**   **P:**   **0**

3. Examination Duration (Hrs.):   **Theory**   **0**   **3**   **Practical**   **0**   **0**

4. Relative Weight**:**   **CWA**   **LWA 50**   **MTE**   **ETE**   **EPE 50**

5. Credits**:**   **0**   **1**   6. Semester **7**

11.   Pre-requisite:

12.   Subject Area: **Departmental Course (DC)**

9. Course Objectives:
To get practical exposure of Cyber security threats and Forensics tools.

10. Course Outcomes:

CO1	Get the skill to identify cyber threats/attacks.
CO2	Get the knowledge to solve security issues in day to day life.
CO3	Able to use Autopsy tools 4.
CO4	Perform Memory capture and analysis
CO5	Demonstrate Network analysis using Network miner tools

11. Details of the Course:

S. No	Contents	Contact Hours
1	Perform an Experiment for port scanning with n-map	1
2	Set Up a honeypot and monitor the honeypot on the network	1
3	Install Jscript/Crypto tool (or any other equivalent) and demonstrate Asymmetric, Symmetric crypto algorithm, Hash and Digital/PKI signatures.	1
4	Perform practical approach to implement Foot-printing	1
5	Working with sniffers for monitoring network communication (Wireshark).	1
6	Using Snort, perform real time traffic analysis and packet logging.	1
7	Perform email analysis using the Autopsy tool.	1
8	Perform Registry analysis and get boot time logging using process monitor tool	1
9	Perform File type detection using Autopsy too	1
10	Perform Memory capture and analysis using FTK imager tool	1
11	Perform Network analysis using the Network Miner tool	1

RIMT UNIVERSITY

NAME OF DEPT.**:**   **Computer Science and Engineering**

1.Subject Code**: BCSE-4772**   Course Title: **Java Programming Lab**

2. Contact Hours: **16**   **L: 0**   **T: 0**   **P: 2**

3. Examination Duration (Hrs.):   **Theory   0   0   Practical   0   0**

4. Relative Weight**:   CWA   LWA 50   MTE   ETE   EPE 50**

5. Credits**:   0   1**   6. Semester **7**

7. Subject Area: **Departmental Course (DC)**

8. Course Objective: Use object oriented concepts of Java and implement them to design real world programs and connect database to implement the same for management system applications.

9. Course Outcomes:

BCSE-4705.1	Apply the knowledge of development, compilation & executing basic java program and learn the use of data types & variables.
BCSE-4705.2	Implement program using loop control structures: do, while, for loop etc.
BCSE-4705.3	Develop classes and objects and generate programs/software.
BCSE-4705.4	Apply the concept of JDBC to retrieve and update data.

10. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	Implementation of classes	2
2	Implementation of Inheritance	2
3	Implementation of Packages and Interfaces.	2
4	Implementation of Threads.	1
5	Using exception handling mechanisms	1
6	Implementation of Applets	2
7	Implementation of mouse events and keyboard events.	1
8	Implementing basic file reading and writing methods	2
9	Using basic networking features.	1
10	Connecting to Database using JDBC.	2

RIMT UNIVERSITY

NAME OF DEPT.**:**   **Computer Science and Engineering**

1.Subject Code**: BCSE-4712**   Course Title: **Cloud Computing**

2. Hours: Contact **40**   **L: 3**   **T: 0**   **P:**   **0**

3. Examination Duration (Hrs.): **Theory   0 3**   **Practical   0   0**

4. Relative Weight**:   CWA** 16   **LWA**   **MTE** 24   **ETE**   60   **EPE**

5. Credits**:   0 3**   6. Semester: 7

7.   Pre-requisite:

8.   Subject Area: **Departmental Course (DC)**

9.   Course Objective: To learn the ability to understand what is cloud storage, characteristics of cloud computing, cloud computing services and cloud hosting, cloud data storage and deployment models, cloud computing companies and cloud service providers, cloud infrastructure, advantages of cloud computing and issues with cloud computing.

10. Course Outcomes:

S. No.	Cloud Computing (CSE-420N)
CO1	Explain the various paradigms of cloud computing and computing techniques.
CO2	Articulate the concepts ,key technologies, strength and limitation of cloud computing and possible application
CO3	Identify the architecture and infrastructure of cloud computing including SaaS, PaaS,Iaas, public cloud, private cloud and hybrid cloud.
CO4	Interpret various data, scalability and cloud services to acquire efficient database for cloud storage.
CO5	Describe the appropriate cloud computing solutions and recommendations according to application used.
CO6	Explain the core issues of cloud computing such as security, privacy and interoperability and deal with controlling mechanism for accessing sage cloud service.

1.   Details of the Course:

S.No	Contents	Contact Hours
1.	**Overview of cloud computing** : What is a cloud, Definition of cloud , Definition of cloud ,characteristics of cloud ,Why use clouds, How clouds are changing , How clouds are changing , Driving factors towards cloud, Comparing cloud with other computing systems	6
2.	**Cloud computing concepts:** Concepts of cloud computing, Cloud computing leverages the Internet, Positioning cloud to a grid infrastructure, Elasticity and scalability, Virtualization, Characteristics of virtualization, Benefits of virtualization, Virtualization in cloud computing, Hypervisors, Multitenancy, Types of tenancy, Application programming interfaces (API), Management, tooling, and automation in cloud computing, Management: Desktops in the Cloud, Security.	10
3.	**Cloud service delivery:** Cloud service , Cloud service model architectures, Infrastructure as a service (IaaS) architecture, Infrastructure as a service (IaaS) details, Platform as a service (PaaS) architecture, Platform as a service (PaaS) details, Platform as a service (PaaS) , Examples of PaaS software, Software as a service (SaaS) architecture, Software as a service (SaaS) details, Examples of SaaS applications, Common cloud management platform reference architecture: Architecture overview diagram, Common cloud management platform.	10
4.	**Cloud deployment scenarios**: Cloud deployment models, Public clouds, Hybrid clouds, Community, Virtual private clouds, Resource Pooling, Migration paths for cloud, Selection criteria for cloud deployment.	3
5.	**Security in cloud computing** : Cloud security reference model, How security gets integrated , Overview of Data Security in Cloud Computing-Common Risks with Cloud Data Security, Internal security breaches, Data corruption or loss, User account and service hijacking, Steps to reduce cloud security breaches, Steps to reduce cloud security breaches, Reducing cloud security, Identity management: Detection and forensics, Identity management: Detection and Identity management, Benefits of identity, Encryption techniques, Encryption & Encrypting data , Symmetric key encryption, Asymmetric key encryption, Digital signature, What is SSL?	9
6.	IBM Smart Cloud, Amazon Web Services, Google Cloud platform, Windows Azure platform, A comparison of Cloud Computing Platforms, Common building Blocks.	2

11. Suggested Books:

Sl. No.	Name of Books / Authors	Year of Publication
1	Raj Kumar Buyya, James Broberg, Andrezei M.Goscinski, Cloud Computing: Principles and paradigms.	2011
2	Michael Miller, Cloud Computing.	2008
3	Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper, Cloud Computing for dummies	2009
4	Anthony T. Velte, Toby J. Velte and Robert Elsenpeter, Cloud	2010

	Computing: A practical Approach, McGraw Hill	
5	Barrie Sosinsky, Cloud Computing Bible, Wiley	2011
6	Borko Furht, Armando Escalante (Editors), Handbook of Cloud Computing, Springer	2010
7	Dr. Dheerendera Singh ,Er. Rini Mahajan Cloud Computing	2015
8	https://algoteque.com/top-cloud-service-models-amp-deployment-models-in-2022/	2022

RIMT UNIVERSITY

NAME OF DEPT.**:** **Computer Science and Engineering**

1. Subject Code**: BCSE-4717**   Course Title: MULTIMEDIA & VIRTUAL REALITY

2. Contact Hours: **40**   **L: 3**   **T: 2**   **P: 0**

3. Examination Duration (Hrs.):   **Theory   0   3   Practical   0   0**

4. Relative Weight**:   CWA   16   LWA   -   MTE   24   ETE   60   EPE**

5. Credits**:   0 3**   6. Semester: **7**

6. Pre-requisite:

7. Subject Area: **Departmental Course (DC)**

8. Course Objective: Multimedia is the combined use of text, graphics, sound, animation, and video. A primary objective is to teach how to develop multimedia programs. Another objective is to demonstrate how still images, sound, and video can be digitized on the computer.

9.Course Outcomes:

BCSE-4702.1	Able to learn about different types of media, its applications, uses and Knowledge of authoring system
BCSE-4702.2	Ability to learn different compression techniques.
BCSE-4702.3	To apply the Knowledge of multimedia information management.
BCSE-4702.4	To create the virtual reality systems for an applications

10. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	Module 1: **INTRODUCTION:** Concept of Non-Temporal and Temporal Media. Basic Characteristics of Non-Temporal Media; Images, Graphics, Text. Basic Characteristics of Temporal Media: Video, Audio, and Animation. Hypertext and Hypermedia. Presentations:	10

	Synchronization, Events, Scripts and Interactivity, Introduction to Authoring Systems.	
2	Module 2: **COMPRESSION TECHNIQUES**: Sampling, quantization, pixel, resolution, Basic concepts of Compression, Run length Coding, Huffman Coding, JPEG, JPEG Compression, Introduction to MP3-Audio Compression Standard.	11
3.	Module 3: **MULTIMEDIA ENVIRONMENTS** The Compact Disc family, CD-interactive, Digital Video Interactive, QuickTime, Multimedia PC and Microsoft Multimedia Extensions.	11
4	Module 4: **VIRTUAL REALITY:** Introduction to Virtual Reality and Virtual Reality Systems, Related Technologies: Teleoperation and Augmented Reality Systems Interface to the Virtual WorldInput; Head and hand trackers, data globes, hap tic input devices. Interface to the Virtual World- Output, Stereo display, head-mounted display, auto-stereoscopic displays, holographic displays, hap tic and force feedback. VRML Programming; Modeling objects and virtual environments Domain Dependent applications: Medical, Visualization, Entertainment, etc.	10

11. Suggested Books:

SNO.	Name of Books / Authors	Year of Publication
1	Andleigh and Thakarar, 'Multimedia System Design', PHI,	2010
2	. D.P. Mukherjee, 'Fundamentals of Computer Graphics and Multimedia', 1st Edn., PHI,	2009
3	John Vince, 'Virtual Reality Systems', 1st Edn., Pearson Education, 2	2007
4	Multimedia Bible – Winn L. Rosch, Sams	2011
5	Steinmetz, 'Multimedia Computing Communication and Application', 1st Edn., Pearson Edn,	2002
6	David Hillman, 'Multimedia Technology & Application', Galgotia Publications,	1998
7	https://www.tandfonline.com/doi/full/10.1080/10494820.2022.2028856	2021