SCHEME & SYLLABUS

(Choice Based Credit System)

for

B. TECH.

In

COMPUTER SCIENCE and ENGINEERING

(w.e.f. Session 2021-22)

Program Code: CSE 301

DEPARTMENT OF COMPUTER SCIENCE and ENGINEERING

SCHOOL OF ENGINEERING

RIMT UNIVERSITY, MANDIGOBINDGARH, PUNJAB

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SECTION 1

Vision & Mission of the University

VISION

- To become one of the most preferred learning places a centre of excellence to promote and nurture future leaders who would facilitate in desired change in the society

MISSION

- To impart teaching and learning through cutting edge technologies supported by the world class infrastructure
- To empower and transform young minds into capable leaders and responsible citizens of India instilled with high ethical and moral values

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 programis 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 thecommunity 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 Bechelor's degree in B.Tech (CSE) and its break-down in terms of University Core courses, Program Core courses and electives atboth the University and the Program levels.

SECTION 5

Curriculum / Scheme with Examination Grading 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. (COMPUTER SCIENCE AND ENGINEERING)

S. No.	Semester	No. of Contact Hours	Marks	Credits
1.	I	**31**	900	**25**
2.	II	**31**	800	**25**
3	III	**35**	900	**27**
4	IV	**35**	900	**25**
5	V	**35**	1100	**27**
6	VI	**31**	1000	**24**
7	VII	**31**	800	**23**
8	VIII	-	500	**16**

COURSE CATEGORY-WISE CREDIT DISTRIBUTION

S.N.	CATEGORY	NUMBER OF CREDITS	PERCENTAGE WEIGHTAGE
1	University Core	7	4.26 %
2	University Open	3	1.82%
3	Program Core	78	47.56%
4	Program Elective	9	5.48%
5	Program Specialization	NA	NIL
6	MOOCs	upto 3	upto 5%
7	Project / Research Projects	4	2.43 %
8	Thesis/Dissertation	NA	NIL
9	Training/Internships/Field Trips	10	6.09 %
10	Professional Skills	2	1.21 %
11	Any Other (Fundamental Courses& Basic Sciences)	51	31.09 %
TOTAL CREDITS		164	

EXAMINATION GRADING SCHEME

Marks Percentage Range	Grade	Grade Point	Qualitative Meaning
80-100	O	10	Outstanding
70-79	A+	9	Excellent
60-69	A	8	Very Good
55-59	B	7	Good
50-54	B	6	Above Average
45-49	C	5	Average
40-44	P	4	Fail
0-39	F	0	Fail
ABSENT	AB	0	Fail

Semester Wise Scheme

	Semester Wise Scheme							
	Batch: 2022 Name of Degree- B.Tech (CSE)		Total Credits:110					
		Third Semester Scheme						
Course Code	Course Type	Course Name	L	T	P	S	C	
BTCS-2302	4 YR UG Degree (B.Tech CSE)	Mathematics-III	3	2	-	0	4	
BTCS-2303	4 YR UG Degree (B.Tech CSE)	Digital circuits & logic design	3	2	-	0	4	
BTCS-2304	4 YR UG Degree (B.Tech CSE)	Data structures	3	2	-	0	4	
BTCS-2314	4 YR UG Degree (B.Tech CSE)	Programming With Python	3	2	-	0	4	
BTCS-23AAA	4 YR UG Degree (B.Tech CSE)	Department Elective -I	3	0	-	0	3	
BTCS-2371	4 YR UG Degree (B.Tech CSE)	Data Structures Lab	-	-	2	0	1	
BTCS-2372	4 YR UG Degree (B.Tech CSE)	Digital circuits & logic design Lab	-	-	2	0	1	
BTCS-2373	4 YR UG Degree (B.Tech CSE)	Programming With Python Lab	-	-	2	0	1	
BTCS-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								

	Course Code	Course Title
Department Elective -I	BTCS-2301	Computer Architecture
	BTCS-2305	Object Oriented Programming & Concepts
	BTCS-2308	Object oriented programming using C++ Lab
	BTCS-2310	Neural Network and Fuzzy logic

		Fourth SemesterScheme					
Course Code	**Course Type**	**Course Name**	**L**	**T**	**P**	**S**	**C**
BTCS-2401	4 YR UG Degree (B.Tech CSE)	Operating Systems	3	2	-		4
BTCS-2402	4 YR UG Degree (B.Tech CSE)	Discrete Structures	3	0	-		3
BTCS-2403	4 YR UG Degree (B.Tech CSE)	Computer Networks-I	3	2	-		4
BTCS-2405	4 YR UG Degree (B.Tech CSE)	Database Management Systems	3	2	-		4
BTCS-2410	4 YR UG Degree (B.Tech CSE)	Web Development	3	2	-		4
BTCS-2471	4 YR UG Degree (B.Tech CSE)	Operating System Lab	-	-	2		1
BTCS-2472	4 YR UG Degree (B.Tech CSE)	Computer Networks-I Lab	-	-	2		1
BTCS-2473	4 YR UG Degree (B.Tech CSE)	Database Management System Lab			4		2
BTCS-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**
BTCS-3501	4 YR UG Degree (B.Tech CSE)	Computer Networks –II	3	2	-		4
BTCS-3502	4 YR UG Degree (B.Tech CSE)	Relational Database Management System II	3	2	-		4
BTCS-3503	4 YR UG Degree (B.Tech CSE)	Design and Analysis of Algorithms	3	2	-		4
BTCS-3504	4 YR UG Degree (B.Tech CSE)	Computer Graphics	3	2	-		4
BTCS-35BBB	4 YR UG Degree (B.Tech CSE)	University Open Elective	3	0	-		3
BTCS-3571	4 YR UG Degree (B.Tech CSE)	Computer Networks –II Lab	-	-	2		1
BTCS-3572	4 YR UG Degree (B.Tech CSE)	Relational Database Management System II Lab	-	-	2		1
BTCS-3573	4 YR UG Degree (B.Tech CSE)	Computer Graphics Lab	-	-	2		1
BTCS-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

	Course Code	**Course Title**
University OpenElective	APBG3105	Intellectual Property Rights
	BTEE-4703	Non- conventional EnergyResources
	AENV	Environmental Studies andDisaster Management

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

	Course Code	**Course Title**
Department Elective -II	BTCS- 3612	Mobile Applications Development
	BTCS- 3613	Expert Systems
	BTCS-3619	Computer Peripherals & Interfaces

		Seventh Semester Scheme					
Course Code	**Course Type**	**Course Name**	**L**	**T**	**P**	**S**	**C**
BTMC-4701	4 YR UG Degree (B.Tech CSE)	Mandatory Courses- non credit***	2	0	0	-	-
BTCS-4702	4 YR UG Degree (B.Tech CSE)	Theory of Computation	3	2	-		4
BTCS-4703	4 YR UG Degree (B.Tech CSE)	Java Programming	3	2	-		4
BTCS-4721	4 YR UG Degree (B.Tech CSE)	Computer Vision	3	2	-		4
BTCS-47YYY	4 YR UG Degree (B.Tech CSE)	Departmental Elective-III	3	-	-		3
BTCS-4771	4 YR UG Degree (B.Tech CSE)	Computer Vision Lab	-	-	2		1
BTCS-4772	4 YR UG Degree (B.Tech CSE)	Java Programming Lab	-	-	2		1
BTMC-4773	4 YR UG Degree (B.Tech CSE)	Major Project	-	-	4		2
		Total	**14**	**6**	**8**		**19**

	Course Code	**Course Title**
Department Elective -III	BTCS- 4714	Software Testing and Quality Assurance
	BTCS- 4715	Introduction of Business System
	BTCS- 4716	Wireless Sensor Networks
	BTCS- 4712	Cloud Computing
	BTCS- 4713	Internet of Things

		Eighth Semester Scheme					
Course Code	**Course Type**	**Course Name**	**L**	**T**	**P**	**S**	**C**
BTCS-4801	4 YR UG Degree (B.Tech CSE)	Industrial Training	-	-	-		5
BTCS-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 Assessment MTE: Mid Term ExaminationETE: End Term Examination EPE: End Practical Examination

SECTION 6

Detailed Syllabus with Course Outcomes

SYLLABUS

SEMESTER-III

RIMT UNIVERSITY

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

1.Subject Code: **BTCS-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. 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:

BTCS-2302.1	Understand the concept of partial differentiation and their applications and the concept Asymptotes of, Curvature & Curve Tracing.
BTCS-2302.2	Apply the techniques of multiple integral.
BTCS-2302.3	Apply concepts of vector calculus
BTCS-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	E. Kreyszig," Advanced Engineering Mathematics", 5th Edition, Wiley Enstern 1985.	1985
2	P. E. Danko, A. G. Popov, T. Y. A. Kaznevnikova, " Higher Mathematics in Problems and Exercise", Part 2, Mir Publishers, 1983.	1983
3	Bali, N. P., "A Text Book on Engineering Mathematics", Luxmi Pub., New Delhi	1986
4	Peter V.O'Neil," Advanced Engineering Mathematics", Cengage Learning	1998

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

1.Subject Code: **BTCS-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. Objective:To teach operation on digital circuits and design various logics. After this course the student will be able to solve complex computer oriented problems.

10. Course Outcome:

Course Outcomes(CO)/Learning Outcomes On successful completion of this course, the learner will be able to	
BTCS-2303.1	Understand number systems, basic logic gates, Boolean algebra and derive digital logic circuits.
BTCS-2303.2	Classify various minimization techniques and choose the best for designing logic circuit
BTCS-2303.3	Apply the knowledge of various electronic Devices and its operations
BTCS-2303.4	Analyse the problem to select suitable electronic device like amplifiers, oscillators, multiplexers, etc.
BTCS-2303.5	Interpretation of various types of memories with their operations.
BTCS-2303.6	Design the solutions related to computations through electronic circuits and devices.

11. 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

2	**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

12. Suggested Books:

SNO.	Name of Books / Authors
1	Morris Mano, **Digital Design**, Prentice Hall of India Pvt. Ltd
2	Thomas L. Floyd, **Digital Fundamentals**, Pearson Education, Inc, New Delhi, 2003
3	R.P.Jain, Modern **Digital Electronics**, 3 ed., Tata McGraw–Hill publishing company limited, New Delhi, 2003.
4	Donald P.Leach and Albert Paul Malvino, **Digital Principles and Applications**, 5 ed., Tata McGraw Hill Publishing Company

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

1.Subject Code: **BTCS-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. 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:

Course Outcomes(CO)/Learning Outcomes On successful completion of this course, the learner will be able to	
BTCS-2304.1	Define data structure and demonstrate the complexity of data structure.
BTCS-2304.2	Analyse the various sorting and searching algorithms with the help of arrays and linked lists
BTCS-2304.3	Distinguish between applications of stack and queues.
BTCS-2304.4	Develop the solution for organizing data in graph and tree data structures
BTCS-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.	5
2	**Arrays**: Linear and multi-dimensional arrays and their representation in memory, operations on arrays, sparse matrices and their storage.	5
3	**Linked Lists**: Singly linked lists, operations on link list, linked stacks and	5

	queues, polynomial addition, sparse matrices, doubly linked lists and dynamic storage management, circular linked list.	
4	**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
5	**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, brief introduction to threaded binary trees, AVL trees and B-trees. Representing a heap in memory, operations on heaps, application of heap in implementing priority queue and heap sort algorithm.	5
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	**Hashing & Hash Tables:** Comparing direct address tables with hash tables, hash functions, concept of collision and its resolution using open addressing and separate chaining, double hashing, rehashing	4
8	**Searching & Sorting**: Searching an element using linear search and binary search techniques, Sorting arrays using bubble sort, selection sort, insertion sort, quick sort, merge sort, heap sort, shell sort and radix sort, complexities of searching & sorting algorithms.	5

12. Suggested Books:

SNO.	Name of Books / Authors	Year of Publication
1	Tenenbaum, Augenstein, &Langsam, Data Structures using C and C++, Prentice Hall of India	2009
2	R. S. Salaria, Data Structures & Algorithms Using C++, Khanna Book Publishing Co. (P) Ltd.	2012
3	Seymour Lipschutz, Data Structures, Schaum's Outline Series, Tata McGraw Hill	2005
4	Kruse, Data Structures &ProgramDesign, Prentice Hall of India.	1994
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 , and Clifford Stein, Introduction to Algorithms.	2009
7	Ellis Horowitz, SartajSahni, & Dinesh Mehta, Fundamentals of Data Structures in C++.	2008

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

1.Subject Code: **BTCS-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. Objective: The learning objectives of this course are: To understand why Python is a useful scripting language for developers. To learn how to design and program Python applications. To learn how to use lists, Tuples, and dictionaries in Python programs. To learn how to identify Python object types. To learn how to use indexing and slicing to access data in Python programs.

10. Course Outcome:

BTCS-2314.1	Understand Python syntax and semantics and be fluent in the use of Python flow control and Functions
BTCS-2314.2	Develop, run and manipulate Python programs using Core data structures like Lists, Dictionaries, and use of Strings Handling methods
BTCS-2314.3	Develop, run and manipulate Python programs using File Operations and searching pattern using regular expressions.
BTCS-2314.4	Interpret the concepts of object oriented programming using Python
BTCS-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	13

	Making, Loops and Date & Time.	
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.	SheetalTaneja Naveen Kumar," Python Programming: A Modular Approach, by Pearson, 2017.	2017
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: **BTCS-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.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	
BTCS-2301.1	Understand number systems, basic logic gates, Boolean algebra and derive digital logic circuits.
BTCS-2301.2	Classify various minimization techniques and choose the best for designing logic circuit
BTCS-2301.3	Apply the knowledge of various electronic Devices and its operations
BTCS-2301.4	Analyse the problem to select suitable electronic device like amplifiers, oscillators, multiplexers, etc.
BTCS-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

12. Suggested Books:

SNO.	Name of Books / Authors	Year of Publication
1	M. Moris Mano, Computer System Architecture, Prentice-Hall, Revised edition	2017
2	William Stallings, 'Computer Organisation & Architecture: Designing for Performance', 4th Edn., Prentice-Hall International Edition	1996
3	David A. Patterson and John L. Hennessy, 'Computer Organization and Design', 2nd Edn., Morgan Kauffmann Publishers	1997
4	John P. Hayes, 'Computer Architecture and Organization', 3rd Edn., TMH	1998
5	Carl Hamacher and ZvonkoVranesic, 'Computer Organization', 5th Edn., SafwatZaky	2002
6	A.S. Tanenbaum, 'Structured Computer Organisation', 4th Edn.,	1999

	Prentice-Hall of India, Eastern Economic Edition	
7	W. Stallings, 'Computer Organisation & Architecture: Designing for Performance', 4th Edn., Prentice-Hall International Edition	1996
8	Nicholas Carter, 'Computer Architecture', T.M.H	2002

RIMT UNIVERSITY

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

1. Subject Code: **BTCS-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** 60 | **MTE** | **ETE** | **EPE** 40

5. Credits: 0 2 6. Semester **3**

7. 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:

Course Outcomes(CO)/Learning Outcomes On successful completion of this course, the learner will be able to	
BTCS-2371.1	Implement linear and non linear data structures using linked list.
BTCS-2371.2	Apply various data structures such as stack, queue and tree to solve the problems.
BTCS-2371.3	Implement various searching and sorting techniques.
BTCS-2371.4	Analyze the complexity of the algorithms.
BTCS-2371.5	Choose appropriate data structure while designing the applications.

9. 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	2
3	Write a program for Binary search methods.	2
4	Write a program for insertion sort, selection sort and bubble sort.	2
5	Write a program to implement Stack and its operation.	3
6	Write a program for quick sort and merge sort.	3
7	Write a program to implement Queue and its operation.	3
8	Write a program to implement Circular Queue and its	3

	operation.	
9	Write a program to implement singly linked list for the following operations: Create, Display, searching, traversing and deletion.	3
10	Write a program to implement doubly linked list for the following operations: Create, Display, inserting, counting, searching, traversing and deletion.	3
11	Write a program to implement circular linked list for the following operations: Create, Display, inserting, counting, searching, traversing and deletion.	3
12	Write a program to implement insertion, deletion and traversing in B tree	3

RIMT UNIVERSITY

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

1.Subject Code**: BTCS-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 60 MTE ETE EPE** 40

5.Credits**: 0 2** 6. Semester **3**

7. Course Objectives:

Course Outcomes(CO)/Learning Outcomes On successful completion of this course, the learner will be able to	
BTCS-2372.1	Define the digital trainer Kit and associated equipment.
BTCS-2372.2	Study and design of TTL Gates.
BTCS-2372.3	Analysis the working of Half adders and full Adders.
BTCS-2372.4	Examine the procedures for the analysis and design of Multiplexers and de-multiplexers.
BTCS-2372.5	Implement the designing of BCD to seven segment displays.
BTCS-2372.6	Designing of various types of sequential circuits like flip flops, registers.

8. 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: Realization using XOR gates.	3
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: **BTCS-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** **60** **MTE** **ETE** **EPE** 40
5. Credits: **0** **2** 6. Semester **3**

7. 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:

Course Outcomes(CO)/Learning Outcomes On successful completion of this course, the learner will be able to	
BTCS-2373.1	Identify Python syntax and semantics and be fluent in the use of Python flow control and functions.
BTCS-2373.2	Demonstrate proficiency in handling Strings and File Systems.
BTCS-2373.3	Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions
BTCS-2373.4	interpret the concepts of Object-Oriented Programming as used in Python
BTCS-2373.5	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: **BTCS-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 **x56** 4

7.Pre-requisite:

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

9. 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:

Course Outcomes(CO)/Learning Outcomes On successful completion of this course, the learner will be able to	
BTCS-2401.1	Understand the structure of the operation system .
BTCS-2401.2	Apply the process management mechanism and applications
BTCS-2401.3	Analyze and solve the problems of deadlocks
BTCS-2401.4	Categorize the security threats.
BTCS-2401.5	Evaluate the various features such as memory management, device management and file management of operating system

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.	**Device Management**: Techniques for device management, dedicated devices, shred devices,virtual devices, device characteristics -hardware considerations: input and output devices, storage devices, independent device operation, buffering, multiple paths, device allocation considerations.	5
7.	**Distributed Systems:** Introduction to H/W and S/W concepts in distributed systems, Network operating systems and NFS, NFS architecture and protocol, client- server model, distributed file systems, RPC- Basic operations, parameter passing, RPC semantics in presence of failures threads and thread packages. **Case Studies**: LINUX / UNIX Operating System and Windows based operating systems.Recent trends in operating system	8

12. Suggested Books:

Sl. No.	Name of Books / Authors	Year of Publication
1	William Stallings, 'Operating System', 10th Edn., Pearson Education India,	2016
2	Gary Nutt, 'Operating Systems Concepts', 3rd Edn., 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', 4th Edn., Addison Wesley	1994
6	A.S. Tenanbaum, 'Operating System', PHI	

RIMT UNIVERSITY

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

1.Subject Code: **BTCS-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 **LWA** **MTE** 24 **ETE** 60 **EPE**

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

7. Pre-requisite:

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

9. Objectives: 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:

Course Outcomes(CO)/Learning Outcomes: On successful completion of this course, the learner will be able to	
BTCS-2402.1	Describe the fundamentals of set theory and the related concepts of functions and relations
BTCS-2402.2	Apply the knowledge of the fundamentals related to the algebraic structures.
BTCS-2402.3	Analyze the working of recursion and recurrence relations along with example
BTCS-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 Recurrence relations, Generating Function, Application.	**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**

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	Lipschutz, 'Discrete Mathematics (Schaum Series)', 3 rdEdn., McGraw Hill, 2009.	2009
2	Alan Doerr and Kenneth Levarseur, 'Applied Discrete Structures for Computer Science', Galgotia Publications, 2009.	2009
3	N. Ch SN Iyengar, V.M. Chandrasekaran, 'Discrete Mathematics', 1 stEdn., Vikas Publication House, 2003.	2003
4	Kenneth H. Rosen, 'Discrete Mathematics and its Applications', 7 thEdn., McGraw Hill, 2008.	2008
5	SatinderBal Gupta, 'Discrete Mathematics and Structures', 4 thEdn.,Laxmi Publications, 2008.	2008
6	C.L. Liu, 'Elements of Discrete Mathematics', 4 thEdn., 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 **LWA** **MTE** 24 **ETE** 60 **EPE**

5.Credits: 0 4 6. Semester: 4

7. Pre-requisite:

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

9. 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:

Course Outcomes(CO)/Learning Outcomes On successful completion of this course, the learner will be able to	
BTCS-2403.1	Understand data communication to define various networking and communication terminology
BTCS-2403.2	Compare the available solution and apply the knowledge to fix the issues at various layers related to networking
BTCS-2403.3	Evaluate the performance of various network algorithms and protocols for effective and efficient networking.
BTCS-2403.4	Develop the network with the knowledge of subnetting, networking, supernetting and addresses.

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	W. Stallings, 'Data & Computer Communications', 9th Edn., PHI	2014
2	James F. Kurose and Keith W. Ross, 'Computer Networking', 3rd Edn., Pearson Education	2012
3	Greg Tomsho, 'Guide to Networking Essentials', 6th Ed.., Cengage Learning,	2011
4	Behrouz A. Forouzan, 'Data Communication & Networking', 4th Edn., Tata McGraw Hill,	2006
5	Andrew S. Tanenbaum, 'Computer Networks', 4th Edn., Pearson Education	2002
6	Douglas E. Comer, 'Internetworking with TCP/IP', Volume-I, 2nd Edn., Prentice Hall, India, 1996.	1996
7	Michael W. Graves, 'Handbook of Networking', Cengage Learning	2014

RIMT UNIVERSITY

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

1.Subject Code: **BTCS-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. Objective: To familiarize the students with Data Base Management system.

10. Course Outcomes:

Course Outcomes(CO)/Learning Outcomes On successful completion of this course, the learner will be able to	
BTCS-2405.1	Understand the conceptual of database management system.
BTCS-2405.2	Analyze database objects to enforce integrity constraints on a database using DBMS.
BTCS-2405.3	Apply Structured Query Language (SQL) for database manipulation.
BTCS-2405.4	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
2.	**The Relational Model:** Introduction to the Relational Model, ER to Relational Model Conversion, Integrity Constraints over Relations, Enforcing	12

	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.	
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	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: **BTCS-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:

Course Outcomes(CO)/Learning Outcomes On successful completion of this course, the learner will be able to	
BTCS-2410.1	Understand the fundamentals of web and there by develop web applications using various languages.
BTCS-2410.2	Apply mark-up (HTML/DHTML), Scripting language (JavaScript) and programming language (Java) utilities for static and dynamic environment.
BTCS-2410.3	Analyze the essential technology needed to develop and implement web
BTCS-2410.4	Create 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 javax.servelet Package, Reading Servelet parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security	6

	Issues	
3	**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
4	**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
5	**Error Handling:** Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session	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	Chris Bates, 'Web Programming, Building Internet Applications', 3rd Edn., WILEY,	2006.
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

1.Subject Code**: BTCS-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** 60 **MTE** **ETE** **EPE** 40

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

7. Pre-requisite:

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

9. 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:

BTCS-2471.1	Apply the knowledge to install Linux Operating system.
BTCS-2471.2	Execute various commands in LINUX for specific purpose.
BTCS-2471.3	Develop scripting using Shell Programming for various complex problems
BTCS-2471.4	Investigate various scheduling algorithm.
BTCS-2471.5	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	Installation Process of various operating systems	6
2	Virtualization, Installation of Virtual Machine Software and installation of Operating System on Virtual Machine	6
3	**Commands for files & directories:** cd, ls, cp, md, rm, mkdir, rmdir. Creating and viewing files using cat. **File comparisons.** Disk related commands: checking disk free spaces. Processes in linux, connecting processes with pipes, background processing, managing multiple processes. Manual help. **Background process:** changing process priority, scheduling of processes at command, batch commands, kill, ps, who, sleep. Printing commands, grep, fgrep, find, sort, cal, banner, touch, file. File related commands ws, sat, cut, grep.	10

4	**Shell Programming:** Basic of shell programming, various types of shell, Shell Programming in bash, conditional & looping statement, case, parameter passing and arguments, shell variables, shell keywords, creating shell programs for automate system tasks, report printing.	10
Total		32

RIMT UNIVERSITY

1.Subject Code**: BTCS-2407** 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** 60 **MTE** **ETE** **EPE** 40

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

7. Pre-requisite:

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

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

10. Course Outcomes:

BTCS-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.
BTCS-2407.2	Analyze performance of various communication protocols.
BTCS-2407.3	Configure various routing protocols with the use of packet tracer.
BTCS-2407.4	Practice packet /file transmission between nodes interconnected different networks and routing protocols.

11..Details of the Course:

S. No	Contents	Contact Hours
1	Write specifications of latest desktops and laptops.	1
2	Familiarization with Networking Components and devices: LAN Adapters, Hubs, Switches, Routers etc.	1
3	Familiarization with Transmission media and Tools: Co-axial cable, UTP Cable, Crimping Tool, Connectors etc.	2
4	Preparing straight and cross cables	1
5	Study of various LAN topologies and their creation using network devices, cables and computers.	2
6	Configuration of TCP/IP Protocols in Windows and Linux.	1
7	Implementation of file and printer sharing.	1
8	Designing and implementing Class A, B, C Networks.	1
9	Subnet planning and its implementation	1
10	Installation of ftp server and client.	1
11	Case study on networking using Netsim.	4
Total		16

RIMT UNIVERSITY

1.Subject Code**: BTCS-2408** 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** 60 **MTE** **ETE** **EPE** 40

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

7. Pre-requisite:

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

9. 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:

BTCS-2408.1	Students get practical knowledge on designing and creating relational database systems.
BTCS-2408.2	Understand various advanced queries execution such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL.
BTCS-2408.3	Use of various software to design and build ER Diagrams, UML, Flow chart for related database systems.
BTCS-2408.4	Students will be able to design and implement database applications on their ow

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: **BTCS-2412** 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 60 MTE ETE EPE 40**

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

7. Pre-requisite:

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

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

10. Course Outcomes:

BTCS-2412.1	Installation of PHP and develop simple PHP programs.
BTCS-2412.2	Integrate HTML forms to PHP scripts.
BTCS-2412.3	Build Dynamic web site using server side PHP Programming and Database connectivity.
BTCS-2412.4	Design a responsive web site.

11. Details of the Course:

S.NO	NAME OF EXPERIMENT	CONTACT HOURS
1	Write a program in JSP which take student enrolment number as input and displays the following details: a) Name and Address of the student b) Course and Branch of the Student c) College to which student is enrolled	2
2	Write a program that maintains a counter for the number of the times it has accessed since it loads.	2
3	Write a program to display the grade of the student by inputting the marks of five students.	2
4	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
5	Create a user details page. The page should have First Name, Last	2

	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.	
6	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.	2
7	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
8	Develop any GUI that performs the SQL operations like insert, delete, update and retrieval.	2

RIMT UNIVERSITY

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

1.Subject Code: **BTCS-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. 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:

BTCS-3501.1	Understand the concepts of network security, wireless, Adhoc and various emerging network technologies
BTCS-3501.2	Learn and design the efficient wireless systems
BTCS-3501.3	Evaluate the performance of various advanced network algorithms and protocols for effective and efficient networking.
BTCS-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)	6
2.	**Internet Key Exchange (IKE):** History, Photuris, Simple Key-management for Internet protocols (SKIP), IKE phases, IKE encoding.	6
3.	**Adhoc networks**: Features, advantages and applications, Adhoc versus Cellular networks, Network architecture, Protocols: MAC protocols, Routing protocols, Technologies.	7

4.	**Wireless Communication Systems**: Evolution, examples of wireless communication systems, 2G Cellular networks, Evolution for 2.5G TDMA Standards, IS-95B for 2.5G CDMA	7
5.	**3G wireless networks**: wireless local loop (WLL), Local Multipoint Distribution System (LMDS), Wireless local Area Networks (WLANs), Bluetooth and Personal Area Networks.	7
6.	**Wireless System Design:** Introduction, Frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, improving coverage and capacity in cellular systems.	7

12. Suggested Books:

S.No.	Name of Book/Author
1.	Theodore S. Rappaport, Wireless Communication: Principles and Practices (2ndEdition), Pearson education
2.	Charlie Kaufman, Radio Perlman, Mike Speciner, Neywork security, 2nd ed., PHI.
3.	Sunilkumar S. Manvi, Mahabaleshwar S. Kakkasageri, Wireless and mobile networks: concepts and protocols, Wiley India
4.	Michael A. Gallo & William M. Hancock, "Computer Communications and Networking Technologies", Cengage Learning / Thomson Brooks / Cole
5.	S. Keshav, "An Engineering Approach to Computer Networking", Pearson Education
6.	Mayank Dave, "Computer Networks", Cengage Learning

RIMT UNIVERSITY

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

1.Subject Code: **BTCS-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:

BTCS-3502.1	Acquire the knowledge of Relational database design methodology for implementing real life applications
BTCS-3502.2	Design an information model expressed in the form of ER diagram..
BTCS-3502.3	Apply structured query language to automate the real time problems of databases.
BTCS-3502.4	Analyze the redundancy problem in database tables using normalization.
BTCS-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:

SNO.	CONTENTS	CONTACT HOURS
1	**Introduction to Database Systems:** Database System Concepts and Architecture, Data Models, Data Independence, SQL: DDL, DML, DCL, Normalization: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF.	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 Evaluation Plans.	6
3	**Transaction Processing and Concurrency Control:** Transaction	6

	Processing Concepts, Concurrency Control Techniques: Two-phase Locking, TimestampOrdering, Multiversion, Validation, Multiple Granularity Locking.	
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, Data Marts, Data Mining, Data Mining Process, 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

RIMT UNIVERSITY

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

1.Subject Code: **BTCS-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. 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:

BTCS-3503.1	Analyze running time of algorithms using asymptotic methods.
BTCS-3503.2	Analyze advanced data structure algorithms to calculate their complexities.
BTCS-3503.3	Create solutions of Optimization problems using Dynamic Programming and Greedy Approach..
BTCS-3503.4	Apply backtracking and branch & bound approaches for finding efficient solutions..
BTCS-3503.5	Understand the concepts of NP Completeness and find alternate solutions using Randomized and Approximation Algorithms.

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, Backtracking, Branch andBound, dynamic programming and randomization. Overall technique with example, problems and algorithms illustrating the use of these techniques.	11
2.	**Graph Algorithms**. Graph traversal: breadth-first search (BFS) and depth-	12

	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.	
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	H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, Introduction to Algorithms, 3rdEdn., The MIT Press Ltd,	2009
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

RIMT UNIVERSITY

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

1.Subject Code: **BTCS-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 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:

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

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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 drawing, Circle generating and Ellipse generating algorithms.	4
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-	5

	Point Clipping, Line Clipping, Polygon Clipping and Text Clipping.	
5	**Filling Techniques**: Scan line algorithms, Boundary-fill algorithm, Flood-fill algorithm, Edge fill and fence fill algorithms,	5
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	**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	Donald Hearn and M.Pauline Baker, **"Computer Graphics", Second Edition,** PHI/Pearson Education	2012
2	Zhigand xiang, Roy Plastock, Schaum's outlines, **"Computer Graphics Second Edition",** Tata Mc-Grawhill edition.	2010
3	C, Foley, VanDam, Feiner and Hughes, **"Computer Graphics Principles & Practice"**, **Second Edition**, Pearson Education	2014

RIMT UNIVERSITY

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

1.Subject Code: **BTCS-3506** 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** 60 **MTE** **ETE** **EPE** 40

5. Credits: 0 1 6. Semester 5

7. Pre-requisite:

8. Subject Area: Departmental Course (DC)

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

10. Course Outcomes:

BTCS-3506.1	Understand the structure and organization of computer networks.
BTCS-3506.2	Analyze network layers, role of each layer, and relationships between the layers.
BTCS-3506.3	Analyze performance of various communication protocols.
BTCS-3506.4	Configure various routing protocols with the use of packet tracer.

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: **BTCS-3507** 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** 60 | **MTE** | **ETE** | **EPE** 40

5. Credits: 0 1 6. Semester 5

6. Pre-requisite:

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

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

14. Course Outcomes:

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

9. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	Case studies on normalization	4
2	Study and usage of query optimization techniques.	4
3	Study and usage of backup and recovery features of database management software.	6
4	Server administration of any database management software.	6
5	Study and usage of any object oriented or object relational database management software.	6
6	Study of web databases.	4

7	Development of a project by making use of tools studied above.	6
8	To study the concept of Procedures and Functions using PL/SQL	4

RIMT UNIVERSITY

1. Subject Code: **BTCS-3508** 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** 40

5. Credits: 0 1 6. Semester 5

6. Pre-requisite:

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

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

9. Course Outcomes:

BTCS-3508.1	Analyze Computer graphics and its techniques.
BTCS-3508.2	Apply geometric transformations on graphics objects and their application in composite form.
BTCS-3508.3	Apply computer graphics in computer games, information visualization, and business applications.
BTCS-3508.4	Explore projections and visible surface detection techniques for display of 3D scene on 2D screen
BTCS-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

1. Subject Code: **BTCS-3509** 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** 60 **MTE** **ETE** **EPE** 40

5. Credits: 0 1 6. Semester 5

6. Pre-requisite:

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

8. 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:

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

10. .Details of the Course:

S.No	Contents	Contact Hours
1	Code and analyse to compute the greatest common divisor (GCD) of two numbers.	1
2	Code and analyze to find the median element in an array of integers	1
3	Code and analyze to find the majority element in an array of integers.	1
4	Code and analyze to sort an array of integers using Heap sort.	1
5	Code and analyze to sort an array of integers using Merge sort.	1
6	Code and analyze to sort an array of integers using Quick sort.	1

7	Code and analyze Knapsack problem using dynamic programming	1
8	Code and analyze to find the shortest path for single source shortest path using dynamic programming.	1
9	Code and analyze to find the shortest path for All pair shortest path using dynamic programming	1
10	Code and analyze to do a depth-first search (DFS) on an undirected graph. Implementing an application of DFS such as to find the topological sort of a directed acyclic graph	1
11	Code and analyze to do a breadth-first search (BFS) on an undirected graph. Implementing an application of BFS such as (i) to find connected components of an undirected graph, OR (ii) to check whether a given graph is bipartite.	1
12	Code and analyze to find the minimum spanning tree in a weighted, undirected graph	1
13	Code and analyze to find all occurrences of a pattern P in a given string S using KMP Method	2
14	Code and analyze to compute the convex hull of a set of points in the plane.	2

RIMT UNIVERSITY

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

1.Subject Code: **BTCS-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. Objective: This course will provide the in-depth knowledge of different concepts involved while designing a compiler.

9. Course Outcomes:

BTCS-3602.1	Acquire knowledge of different phases and passes of the compiler and implement phases using compiler tools like LEX, YACC, etc
BTCS-3602.2	Design and implement different types of parsers i.e. Top-Downand Bottom-up parsers and construct LL, SLR, CLR, and LALR parsing table.
BTCS-3602.3	Apply syntax-directed translation method using synthesized and inherited attributes to generate intermediate code
BTCS-3602.4	Analyze data structures used for symbol table and runtime organization and errors in various phases
BTCS-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 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.	6
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	5

	prefixes, valid items, LR(0) automaton, LR-parsing algorithm, SLR(1), LR(1), and LALR(1) parsing. .	
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	Module6: 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	K.D. Cooper, and Linda Torczon, Engineering a Compiler, Morgan Kaufmann, 2nd edition	2011
2	K.C. Louden, Compiler Construction: Principles and Practice, Cengage Learning	1997
3	D. Brown, J. Levine, and T. Mason, LEX and YACC, O"ReillyMedia	1992
4	Holub: Compiler Design in C, PHI	2009
5	Aho, Ullman:Principles of Compiler Design. Narosa Publication	2002
6	Dhamdhere:Compiler Construction- Principles and Practice ,Macmillan, India	

RIMT UNIVERSITY

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

1.Subject Code: **BTCS-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**

6. Pre-requisite:

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

8. 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.

9. Course Outcomes:

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

10. 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 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	10

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, 7th edition**", Adison Wesley,	1996
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

RIMT UNIVERSITY

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

1. Subject Code**:** BTCS-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. **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. **Outcomes**:

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

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.	Elaine Rich, Kevin Knight and ShivashankarB.Nair, 'Artificial Intelligence', 3rd Edn., Tata McGraw-Hill, 2009.	1994
2.	Stuart J. Russell and Peter Norvig, 'Artificial Intelligence: A Modern Approach', Pearson Education Asia, 2nd Edn., 2003.	2003
3.	N.P. Padhy, 'Artificial Intelligence and Intelligent System', Oxford University Press, 2nd Edn., 2005.	2008
4.	RajendraAkerkar, 'Introduction to Artificial Intelligence', Prentice-Hall of India, 2005.	1998
5.	Patrick Henry Winston, 'Artificial Intelligence', Pearson Education Inc., 3rd Edn., 2001.	2003
6.	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: **BTCS-3606** 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** 60 | **MTE** | **ETE** | **EPE** 40

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

7. Pre-requisite:

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

9. 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:

BTCS-3606.1	To understand requirements of the software projects.
BTCS-3606.2	To analyze software requirements with existing tools.
BTCS-3606.3	To design and develop methods and procedures for software development.
BTCS-3606.4	To evaluate different testing methodologies.
BTCS-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 Documents and Testing Phase related documents for some problems	2
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: **BTCS-3620** 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** **60** **MTE** **ETE** **EPE** **40**

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

7. 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:

BTCS-3620.1	To understand artificial intelligence, its characteristics and its application areas.
BTCS-3620.2	Formulate real-world problems as state space problems, optimization problems or constraint satisfaction problems.
BTCS-3620.3	Select and apply appropriate algorithms and AI techniques to solve complex problems.
BTCS-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 counseling 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 DEPTT.: **Computer Science and Engineering**

1.Subject Code: Course Title: **Soft Skills-II/personality Development 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 Outcome:

BTPD-3621.1	Describe how a personality develops.
BTPD-3621.2	Define the stages of personality development.
BTPD-3621.3	Describe methods for changing your personality.
BTPD-3621.4	Demonstrate Nonverbal skills
BTPD-3621.5	Exhibit Team culture, Managerial qualities and communication skills

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

1. K.Alex, S. Chands Publishers.
2. Lucas, Stephen E., 'The Art of Public Speaking', 11thEdn., International Edn., McGraw Hill Book Co., 2014.
3. Goleman, Daniel, 'Working with Emotional Intelligence', Banton Books, London, 1998.
4. Thrope, edgar and ShowickTrope,'Winning at Interviews', Pearson Education,2004.
5. Turk,Christopher,'Effective Speaking', South Asia Division: Taylor & Francis, 1985.

RIMT UNIVERSITY

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

1. Subject Code: **BTMC4701** Course Title: **Constitution of India/Essence of Indian Knowledge tradition**

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. 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:

Course	Outcomes
BTMC4701.1	Identify and explore the basic features and modalities about Indian constitution.
BTMC4701.2	Differentiate and relate the functioning of Indian parliamentary system at the centre and statelevel.
BTMC4701.3	Differentiate different aspects of Indian Legal System and its related bodies.
BTMC4701.4	Apprise the engineers regarding Indian Literature, culture and languages

BTMC4701.5	Discover and apply different laws and regulations related to engineering practices

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	4

	,SangamaLiterature Northern Indian Languages & Literature, Persian And Urdu ,Hindi Literature	

11. Suggested Books:

S. No	Name of Books / Authors
1	Executive programme study material Company Law, Module II, by ICSI (The Institute of CompaniesSecretaries of India) (Only relevant sections i.e., Study 1, 4 and 36).https://www.icsi.edu/media/webmodules/publications/Company%20Law.pdf
2	Handbook on e-Governance Project Lifecycle, Department of Electronics & Information Technology, Government of
3	Companies Act, 2013 Key highlights and analysis by PWC. https://www.pwc.in/assets/pdfs/publications/2013/companies-act-2013-key-highlightsand- analysis.pdf Non Credit Course 2020-21 AICTE Model Curriculum K series (V & VI Semester) Page 5Referred Case Studies:
4	Maneka Gandhi V. Union of India AIR, 1978 SC 597.
5	KeshavanandBharati V. State of Kerala, AIR 1973 SC 1461.

RIMT UNIVERSITY

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

1.Subject Code: **BTCS-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. Objective: To give the students' knowledge of number of areas in theoretical computer science and theirinterconnections.

9.Course Outcomes:

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

10. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	**Concepts:** Basics of Strings and Alphabets, Kleene's closure	4
2	**Finite Automata:** Introduction,DFA, Transition graphs, Regular languages, Non-deterministic FA, Equivalence of DFA and NDFA, Myhill-nerode theorem.	6
3.	**Automata with output:** Moore Machine, Mealy Machine, Conversion from Moore to Mealy, Conversion from Mealy to Moore	4
4	**Regular Language and regular expressions**: Introduction,	6

	equivalence between regular languages, properties of regular languages, pumping lemma.	
5	**Context Free Languages**: Leftmost and rightmost derivation, parsing and ambiguity, ambiguity in grammar and languages, normal forms; Chomsky and Greibach	7
6	**Pushdown Automata:** NDPDA, DPDA, context free languages and PDA, comparison of deterministic and non-deterministic versions, closure properties, pumping lemma for CFL	5
7.	**Turing Machines:** Variations, halting problem, PCP	3
8.	**Chomsky Hierarchy**: Hierarchy, LR(k) Grammars, properties of LR(k) grammars, Decidability and Recursively Enumerable Languages	5

11. Suggested Books:

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

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RIMT UNIVERSITY

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

1.Subject Code: **BTCS-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**

1. Pre-requisite:

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

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

4. Course Outcomes:

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

5. 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 keyword, garbage collection, the finalize() methods.	4
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	5

	with inheritance, Package and Interfaces, Package access protection, importing packages.	
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

6. 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

RIMT UNIVERSITY

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

1.Subject Code:**BTCS-4721** Course Title: **Computer Vision**

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. Objective: Use image processing techniques and deep learning techniques to detect faces in an image and find facial key points, such as the position of the eyes, nose, and mouth on a face. This project tests your knowledge of image processing and feature extraction techniques that allow you to programmatically represent different facial features. You'll also use your knowledge of deep learning techniques to program a convolutional neural network to recognize facial keypoints. Facial key points include points around the eyes, nose, and mouth on any face and are used in many applications, from facial tracking to emotion recognition.

9. Course Outcomes:

BTCS-4721.1	Apply the knowledge of basic concepts of Computer Vision, its need and applications in real life uses.
BTCS-4721.2	Analyze image processing algorithms to apply on various type of image and video data.
BTCS-4721.3	Study various pattern recognition classifiers for classification problems.
BTCS-4721.4	Develop and evaluate solutions to problems in computer vision.

10. Details of the Course:

SNO.	CONTENTS	Contact Hours
1	Introduction : Image Processing, Computer Vision and Computer Graphics , What is Computer Vision - Low-level, Mid-level, High-level , Overview of Diverse Computer Vision Applications: Document Image Analysis, Biometrics, Object Recognition, Tracking, Medical Image Analysis, Content-Based Image Retrieval, Video Data Processing, Multimedia, Virtual Reality and Augmented Reality	5
2	Image Formation Models : Monocular imaging system , Radiance, Irradiance, BRDF, coloretc, Orthographic & Perspective Projection, Camera model and Camera calibration, Binocular imaging systems, Construction of 3D model from images	5

3	Image Processing and Feature Extraction: Image preprocessing, Image	6

	representations (continuous and discrete) , Edge detection	
4	Shape Representation and Segmentation : Contour based representation, Region based representation, Deformable curves and surfaces , Snakes and active contours, Level set representations , Fourier descriptors	5
5	Object recognition : Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal component analysis , Shape priors for recognition	5
6	Image Understanding : Pattern recognition methods, HMM, GMM and EM	6
7	Applications: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians	8

11. Suggested Books:

SNO.	Name of Books / Authors
1	Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall Robot Vision, by B. K. P. Horn, McGraw-Hill.
2	Introductory Techniques for 3D Computer Vision, by E. Trucco and A. Verri, Publisher: Prentice Hall
3	R. C. Gonzalez, R. E. Woods. Digital Image Processing. Addison Wesley Longman, Inc., 1992.
4	D. H. Ballard, C. M. Brown. Computer Vision. Prentice-Hall, Englewood Cliffs, 1982.
5	Richard Szeliski, Computer Vision: Algorithms and Applications (CVAA). Springer, 2010
6	Image Processing, Analysis, and Machine Vision. Sonka, Hlavac, and Boyle. Thomson.
7	E. R. Davies, Computer & Machine Vision, Fourth Edition, Academic Press, 2012
8	Simon J. D. Prince, Computer Vision: Models, Learning, and Inference, Cambridge University Press, 2012
9	Mark Nixon and Alberto S. Aquado, Feature Extraction & Image Processing for Computer Vision, Third Edition, Academic Press, 2012.

RIMT UNIVERSITY

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

1. Subject Code**: BTCS-4722** Course Title: **Computer Vision Lab**

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

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

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

5. Credits**: 0 2** 6. Semester **7**

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

8. Objective: Use image processing techniques to detect pattern in an image and find features key points. This project tests your knowledge of image processing and feature extraction techniques that allow to programmatically representing different pattern features.

9. Course Outcomes:

BTCS-4722.1	Identify basic concepts, terminology, theories, models and methods in the field of computer vision.
BTCS-4722.2	Analyze known principles of human visual system.
BTCS-4722.3	Implement basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition.
BTCS-4722.4	Create a design of a computer vision system for a specific problem.

10. Details of the Course:

SNO.	CONTENTS	CONTACT HOURS
1	Implement image preprocessing	3
2	Implement Edge detection segmentation	4
3	Implement region based segmentation	4
4	Implement threshold based segmentation	4
5	Implement extraction of shape based features	3
6	Implement extraction of color based features	3
7	Implement extraction of texture based features	3
8	Construct 3D model from Images	4
9	Implement object detection from images	5
10	Work on project: application of pattern classification	7

11. List of Software's needed:

You will need a computer running a 64-bit operating system (most modern Windows, OS X, and Linux versions will work) with at least 8GB of RAM, programs including Anaconda with Python 3.5 and supporting packages. Your network should allow secure connections to remote hosts (like SSH).

RIMT UNIVERSITY

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

1. Subject Code: **BTCS-4705** 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** 60 **MTE** **ETE** **EPE** 40

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

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

8. 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:

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