Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
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Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING&EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			ENDSEM University Exam	Two Term Exam	Teachers Assessment*	ENDSEM University Exam	Teachers Assessment*				
ML307	BS	Environmental Management and Sustainability	60	20	20	0	0	4	0	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Course Objectives:

The student will have ability to:

1. To create awareness towards various environmental problems.
2. To create awareness among students towards issues of sustainable development.
3. To expose students towards environment friendly practices of organizations.
4. To sensitize students to act responsibly towards environment.

Course Outcomes:

The students will be able to:

1. The course will give students an overview of various environmental concerns and practical Challenges in environmental management and sustainability.
2. Emphasis is given to make students practice environment friendly behavior in day-to-day Activities.

Unit I: Introduction to Environment Pollution and Control **10HRS**

1. Pollution and its types (Air, Water, and Soil): Causes, Effects and Control measures
2. Municipal Solid Waste: Definition, Composition, Effects
3. Electronic Waste: Definition, Composition, Effects
4. Plastic Pollution: Causes, Effects and Control Measures

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Unit II: Climate Change and Environmental Challenges **9HRS**

1. Global Warming and Green House Effect
2. Depletion of the Ozone Layer
3. Acid Rain
4. Nuclear Hazards

Unit III: Environmental Management and Sustainable Development **8HRS**

1. Environmental Management and Sustainable Development: An overview
2. Sustainable Development Goals (17 SDGs)
3. Significance of Sustainable Development
4. Environment Friendly Practices At Workplace and Home (Three Rs' of Waste Management,
Water Conservation, Energy Conservation)

Unit IV: Environmental Acts **7HRS**

1. The Water (Prevention and Control of Pollution) Act, 1974: Objectives, Definition of Pollution under this act, Powers and Functlons of Boards
2. The Air (Prevention and Control of Pollution) Act, 1981: Objectives, Definition of Pollution under this act, Powers and Functions of Böards

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3. The Environment (Protection) Act, 1986: Objectives, Definition of important terms used in this Act, Details about the act.
4. Environmental Impact Assessment: Concept and Benefits

Unit V: Role of Individuals, Corporate and Society **8HRS**

1. Environmental Values
2. Positive and Adverse Impact of Technological Developments on Society and Environment
3. Role of an individual/ Corporate/ Society in environmental conservation
4. Case Studies: The Bhopal Gas Tragedy, New Delhi's Air Pollution, Arsenic Pollution in Ground Water (West Bengal), Narmada Valley Project, Cauvery Water Dispute,Fukushima Daiichi Disaster (Japan), Ozone Hole over Antarctica, Ganga Pollution, Deterioration of Taj Mahal. Uttarakhand flash floods

TEXTBOOKS:

1. Rogers, P.P., Jalal, K.F., Boyd, I.A.(Latest Edition) . An Introduction to Sustainable Development. Earthscan
2. Kalam, A.P.J. (Latest Edition). Target 3 Billon: Innovative Solutions Towards Sustainable Development. Penguin Books

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in Light of NEP-2020
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Semester-IV(2021-2025)

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

3. Kaushik, A. and Kaushik (Latest Edition). Perspectives in Environmeniaf Studies. New Delhi: New Age International Publishers.
4. Dhameja, S.K. (Latest Edition). Environmental Studies. S.K. Kataria and Sons.New Delhi
5. Bharucha,E. (Latest Edition). Environmental Studies for Undergraduate Courses. New Delhi: University Grants Commission.
6. Wright, R. T. (Latest Edition). Environmental Science: towards a sustainable future. New Delhi: PHL Learning Private Ltd.
7. Rajagopalan, R. (Latest Edition). Environmental Studies. New York: Oxford University Press.

REFERENCES:

1. R. Rajagopalan(2006).Environmental Studies. Oxford University Press.
2. M. AnjiReddy(2006).Textbook of Environmental Sciences and Technology. BS Publication.
3. Richard T. Wright (2008).Enviromental Science: towards a sustainable future PHL Learning Private Ltd. New Delhi.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
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Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

4. Gilbert M. Masters and Wendell P. Ela.(2008).Environmental Engineering and science. PHI Learning Pvt Ltd. Daniel B. Botkin& Edwards A. Keller (2008). Environmental
5. Science Wiley INDIA edition. AnubhaKaushik(2009).EnviromentalStudies. New age international publishers.

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BTCS401N	**DCC**	**Data Base Management Systems**	**60**	**20**	**20**	**30**	**20**	**3**	**0**	**2**	**4**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

The student will have ability to:

1. To differentiate among the various database system according to their function.
2. To understand the process to develop database model and database design.
3. To understand managing a database using Structured Query Language.
4. To expand an understanding of necessary DBMS concepts such as: Database Transactions, Database Security, Integrity, Concurrency.
5. To understand and build a straightforward database system and show competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

Course Outcomes:

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The students will be able to:

1. Construct conceptual data models by identifying the entities and relationships.
2. Evaluate the normality of a logical data model and correct any anomalies.
3. Develop physical data models for relational database management systems.
4. Implement relational databases using a RDBMS
5. Work as a valuable member of a database design and implementation team.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
Shri Vaishnav Institute of Information Technology
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BTCS401N	DCC	Data Base Management Systems	60	20	20	30	20	3	0	2	4

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Syllabus:

UNIT I **10HRS**

Introduction: Concept & Overview of DBMS, Three Schema Architecture of DBMS, Database Approach v/s Traditional File Accessing Approach, Advantages of Database Systems, Data Models, Schema and Instances, Data Independence, Data Base Language and Interfaces, Functions of DBA and Designer, Database Users.
Entity-Relationship Model: Basic concepts, Design Issues, Mapping Constraints, Keys, Entity- Relationship Diagram, Weak Entity Sets and Extended E-R features. ER Diagram to Relational Table conversion.

UNIT II **9HRS**

Relational Model: Structure of Relational Databases, Relational Algebra, Relational Calculus, Extended Relational Algebra Operations, Joins and its type. Integrity Constraints. Referential Integrity, Intension and Extension.

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BTCS401N	DCC	Data Base Management Systems	60	20	20	30	20	3	0	2	4

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UNIT III **8HRS**

SQL and PL/SQL: SQL commands, Set operations, Aggregate Functions, Null Values, Domain Constraints, Assertions, Views, Nested Sub Queries, Stored Procedures and Triggers, Database Security, Application development using PLSQL.**Relational Database Design:** Functional Dependency, Database Anomalies, Normalization and its forms, Multi-Valued Dependencies, 4NF, Join Dependency, 5NF.

UNIT IV **7HRS**

Transaction and Concurrency Control: Physical Data Structures, Query Optimization, Transaction Model properties, State Serializability, Concurrency control protocols, Multiple Granularities, Granularity of Data Item. Multi version schemes, Database Recovery Methods, Recovery in Multi-Database System and Database Backup and Recovery from Catastrophic Failure

UNIT V **8HRS**

File Organization and Index Structure: File & Record Concept, Placing file records on Disk, Types of Records, Types of Single-Level Index, Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree . Mongo DB, NoSQL types, Features and tools.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
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BTCS401N	**DCC**	**Data Base Management Systems**	**60**	**20**	**20**	**30**	**20**	**3**	**0**	**2**	**4**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Textbooks:

1. Henry F. Korth and Silberschatz Abraham, "Database System Concepts", Mc.GrawHill, 6th Edition,2015.
2. Elmasri, Navathe, "Fundamentals of Database Systems", Pearson Educations 7th Edition, 2016.
3. SeemaKedar, Database Management System, Technical Publications, 2009.
4. Rajiv Chopra,Database Management System (DBMS) A Practical Approach. Kindle Edition, S Chand (December 1, 2010), 2017.

References:

1. Raghu Ramakrishnan and Johannes Gehrke "Database Management Systems" McGraw- Hill Education, 2003.
2. Kahate, Atul "Introduction to Database Management Systems" Pearson Education India, 2006.
3. C J Date, "An Introduction to Database System", Pearson Educations, 8th Edition, 2004
4. Ivan Bayross, "SQL, PL/SQL - The Programming Language of Oracle", BPB Publications 4th Revised Edition, 2010.

List of Practical:

1. Design a Database and create required tables. For e.g. Bank, College Database.
2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
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BTCS401N	DCC	Data Base Management Systems	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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3. Write a SQL statement for table and record handling like implementing INSERT statement, using SELECT and INSERT together, DELETE, UPDATE, TRUNCATE statements, and DROP, ALTER statements.
4. Write the queries for Retrieving Data from a Database Using the WHERE clause, using Logical Operators in the WHERE clause, Using IN, BETWEEN, LIKE, ORDER BY, GROUP BY and HAVING Clause, Using Aggregate Functions and Combining Tables Using JOINS.
5. Write the query for implementing the following functions: MAX (), MIN(), AVG (), COUNT ().
6. Write the query to implement the concept of Integrity constrains.
7. Write the query to create the views.
8. Perform the queries for triggers.
9. Perform the following operation for demonstrating the insertion, updating and deletion using the referential integrity constraints.
10. Write the query for creating the users and their role. Using GRANT and REVOKE operations.
11. Develop a small application for a patient admitted in a hospital which has capability of inserting, deleting, updating, the patient record. The application should also be able to search the patients record by its id..

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
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BTIT301N	DCC	Computer Networks	3	0	2	4	60	20	20	30	20

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

The student will have ability to:

1. Understand the general overview of the concepts and fundamentals of computer networks.
2. Understand the various components required to build different networks.
3. Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.

Course Outcomes:

The students will be able to:

1. Understanding basic computer network technology.
2. Understand the functions of each layer in the OSI and TCP/IP reference model.
3. Obtain the skills of subnetting and routing mechanisms
4. Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
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Choice Based Credit System (CBCS) in Light of NEP-2020
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Semester-IV(2021-2025)

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BTIT301N	DCC	Computer Networks	3	0	2	4	60	20	20	30	20

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Syllabus:

UNIT I **9HRS**

Introduction: Importance of Computer Networks, Classifications & Types. Layered Architecture: Protocol hierarchy, Interfaces and Services, Connection Oriented &Connection less Services, ISO-OSI Reference Model, TCP/IP model overview, comparison of TCP/IP and ISO-OSI reference model.

UNIT II **9HRS**

Data Link Layer &MAC Sublayer: Need, Services Provided, Design issues, Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel. Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, MAC Addressing, Binary Exponential Back-off (BEB) Algorithm, Distributed Random Access Schemes/Contention Schemes: for Data Services (ALOHA and Slotted- ALOHA), CSMA, CSMA/CA, CSMA/CD.

UNIT III **9HRS**

Network Layer: Need, Services Provided, Design Issues, Routing Algorithms and types of Routing Algorithm, IPv4, IPv6, Classful and classless Addressing, Subnetting, Supernetting.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
Shri Vaishnav Institute of Information Technology
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Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
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BTIT301N	DCC	Computer Networks	3	0	2	4	60	20	20	30	20

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UNIT IV **10HRS**

Transport Layer: Need, Design Issues, Multiplexing and Demultiplexing, transport layer services, UDP,UDP Header Format, Principles of reliable data transfer, TCP,Connection Management, TCP Flow Control, TCP Congestion Control, TCP Header Format, TCP Timer Management, SCTP.

UNIT V **8HRS**

Session layer: Overview, Authentication, Session layer protocols, **Presentation layer:** Overview, Data conversion, Encryption and Decryption, Presentation layer protocols (LPP, Telnet, X.25 packet Assembler/Disassembler), **Application Layer:** Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, FTP.

Text Books:

1. Andrew S Tanenbaum, Computer Networks, 6th Edition, Pearson Education, 2016.

References:

1. Behrouz A.Forouzan, TCP/IP-Protocol suite, 4th edition, McGraw-Hill, 2010.
2. William Stallings, Data and Computer Communication, 10th edition Pearson, 2014.
3. Comer, Internet working with TCP/IP Volume one, Addison-Wesley, 2015.
4. W. Richard Stevens, TCP/IP Illustrated, Volume 1, 2nd Edition Addison-Wesley Professional Computing Series.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
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BTIT301N	DCC	Computer Networks	3	0	2	4	60	20	20	30	20

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LIST OF EXPERIEMNTS:

1. Demonstrate Different Types of Network Equipment's.
2. Color coding standard of CAT 5, 6, 7 and crimping of cable in RJ-45.
3. LAN installations and Configurations.
4. Experiment with basic Network configuration commands.
5. Write a program for error detection and correction technique.
6. Write a program for framing.
7. Write a program for routing algorithm.
8. Socket Programming.
9. Study about different network simulators.
10. Establish and simulate peer to peer network using packet tracer.
11. Simulate LAN using hub and switch and discuss pros and cons of hub.
12. Router configuration using packet tracer.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
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Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

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BTCS403N	SEC	Fundamentals of Design Thinking	60	20	20	30	20	1	0	2	2

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Course Objectives:

The student will have ability to:

1. To learn the concepts of Business Process Management.
2. To emphasizing the concepts of reuse, ease of maintenance, and high-quality development strategies.
3. To create a simple case and a business process definition (BPD) from business requirements.

Course Outcomes:

The students will be able to:

1. To implement business process management (BPM).
2. List and describe the phases in the BPM lifecycle Procedure.
3. Explore process modeling and creating applications.
4. Understand what came before Design Thinking
5. Learn how design thinking is introduced in an organization
6. Learn how it built upon previous approaches
7. Understand the whole overview of the whole approach to design thinking
8. Understand the principles, loop, and keys

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
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BTCS403N	SEC	Fundamentals of Design Thinking	60	20	20	30	20	1	0	2	2

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Syllabus:

UNIT I **10HRS**

INTRODUCTION TO BUSINESS PROCESS &AS-IS BUSINESS PROCESS

Define business process management (BPM), List and describe the phases in the BPM lifecycle procedure, Define process modelling., Describe how to use IBM Business Process Manager to accomplish process modelling goals, Explain how to create and modify process applications in the Process Centre, Create a process application, Explain case management, Describe the purpose and function of Blue works Live, Create a business process definition (BPD) from the process and nested process tasks and responsible.

UNIT II **9HRS**

MODELING PROCESS

List and describe gateways as they are used in Process Designer, List and describe intermediate event types in Process Designer, model a business process escalation path with an attached timer intermediate event, Describe the Playback 0 validation goals and requirements, validate that a process model meets Playback 0 goals and Requirements.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

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BTCS403N	SEC	Fundamentals of Design Thinking	60	20	20	30	20	1	0	2	2

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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UNIT III **8HRS**

ENTERPRISE DESIGN THINKING

Understand what came before Design Thinking, identify who did what to bring it about, learn how it built upon previous approaches, get an overview of the whole approach to design thinking, Understand the principles, loop, and keys, determine what is most important.

UNIT IV **7HRS**

ENTERPRISE DESIGN THINKING –7 KEY HABITS, THE LOOP, USER RESEARCH

Learn 7 key habits of effective thinker's design, avoid common anti-patterns, optimize for success with these habits, Understand the importance of iteration, learn how to observe, reflect, & make, get ready to drill down & do tomorrow, Understand the importance of user research, appreciate empathy through listening, Learn key methods of user research.

UNIT V **8HRS**

ENTERPRISE DESIGN THINKING – MAKE, USER FEEDBACK: -

Understand how Make fits into the Loop, learn how to leverage Observe information, Learn Ideation, Storyboarding, & Prototyping, understand user feedback and the Loop, Learn the different types of user feedback, learn how to carry out getting feedback.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING&EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			ENDSEM University Exam	Two Term Exam	Teachers Assessment*	ENDSEM University Exam	Teachers Assessment*				
BTCS403N	SEC	Fundamentals of Design Thinking	60	20	20	30	20	1	0	2	2

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Textbooks:

1. Kathryn Christopher, Design Thinking in Engineering, Kendall/Hunt Publishing Co ,U.S. 2019.
2. David West and Rebecca Rinker Design Thinking: The Key to Enterprise Agility, Innovation, and Sustainability Author's Press International , 2017.

References:

1. Design Thinking for Dummies 1st Edition, Writing is designing: Words and the User.
2. Experience, The Design Thinking Toolbox: A Guide to Mastering the Most Popular and Valuable, Innovation Methods, 1st Edition, Design Thinking in Play: An Action Guide for Educators
3. Roger L. Martin Design of Business: Why Design Thinking is the Next Competitive Advantage, Harvard Business Review Press (26 October 2009)

List of Practical:

1. Design your first discovery map in blueworks live study of process life cycle.
2. Designing process model in blueworks live.

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Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

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			THEORY			PRACTICAL		L	T	P	CREDITS
			ENDSEM University Exam	Two Term Exam	Teachers Assessment*	ENDSEM University Exam	Teachers Assessment*				
BTCS403N	SEC	Fundamentals of Design Thinking	60	20	20	30	20	1	0	2	2

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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3. Explore adding and viewing process details in blueworks live
4. Design enterprise thinking - listening.
5. Design enterprise thinking - hmw
6. Design enterprise thinking - user research
7. Design enterprise thinking – reflect
8. Design enterprise thinking – ideation
9. Design enterprise thinking – storyboarding
10. Design enterprise thinking - crafting hills
11. Design enterprise thinking – prototyping.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

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			ENDSEM University Exam	Two Term Exam	Teachers Assessment*	ENDSEM University Exam	Teachers Assessment*				
BTDSE411N	DSE	Principles of Distributed Systems	60	20	20	0	0	3	0	0	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

The student will have ability to:

1. Observe the principles, architectures, algorithms, and programming models used in distributed system.
2. Analyze state-of-the-art distributed system, such as Google File System.
3. Model and implement sample distributed system.
4. Summarize the functionality of Distributed System.

Course Outcomes:

The students will be able to:

1. Understand architecture and communication systems in Distributed Systems.
2. Understand synchronization and various election algorithms in Distributed Systems.
3. Discuss different Distributed File System.
4. Evaluate Distributed Shared Memory.
5. Analyze various consistency and replication protocols and methods.
6. Understand various types of Distributed Systems.
7. Determine performance evaluation of various types of Distributed System.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

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BTDSE411N	DSE	Principles of Distributed Systems	60	20	20	0	0	3	0	0	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Syllabus:

UNIT I **10HRS**

Characterization of Distributed System: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.
System Models: Introduction, Architectural Models, Fundamental Models.

UNIT II **9HRS**

Time and Global States: Introduction, Clocks Events and Process States, Synchronizing Physical Clocks, Logical Time and Logical Clocks, Global States, Distributed Debugging.
Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication, Consensus and Related Problems

UNIT III 8**HRS**

Inter Process Communication: Introduction, the API for the Internet Protocols, External Data Representation and Marshalling, Client-Server Communication
Distributed Computing Paradigms: Basic Message Passing Model – The Client Server, Message Passing, RPC basics, RPC implementation, RPC communication and issues, Remote Procedure Call Model – RPC in conventional languages and in Java - The Distributed Objects – The Collaborative Application

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Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

.			TEACHING&EVALUATION SCHEME								
			THEORY			PRACTICAL					
COURSE CODE	CATEGORY	COURSE NAME	ENDSEM University Exam	Two Term Exam	Teachers Assessment*	ENDSEM University Exam	Teachers Assessment*	L	T	P	CREDITS
BTDSE411N	DSE	Principles of Distributed Systems	60	20	20	0	0	3	0	0	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT IV **7HRS**

Distributed File Systems: File system, DFS- definition, Characteristics, Goals, File Service Architecture.

Name Services: Introduction, Name Services and the Domain Name System, Directory Services, Case Study of the Global Name Services.

Distributed Shared Memory: Introduction, Design and Implementation Issues, Sequential Consistency, Release Consistency, , Other Consistency Models.

UNIT V **8HRS**

Transactions and Concurrency Control: Introduction, Transactions, Nested Transactions, Locks, Optimistic Concurrency Control, Timestamp Ordering, Comparison of Methods for Concurrency Control.

Distributed Transactions: Introduction, Flat and Nested Distributed Transactions, Atomic Commit Protocols, Concurrency Control in Distributed Transactions, Distributed Deadlocks, Transaction Recovery.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

.			TEACHING&EVALUATION SCHEME								
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COURSE CODE	CATEGORY	COURSE NAME	ENDSEM University Exam	Two Term Exam	Teachers Assessment*	ENDSEM University Exam	Teachers Assessment*	L	T	P	CREDITS
BTDSE411N	DSE	Principles of Distributed Systems	60	20	20	0	0	3	0	0	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Textbooks:

1. Distributed Systems, Principles and Paradigms, Andrew S. Tanenbaum, Maarten Van Steen, 3rd Edition 2017, PHI.

References:

1. Distributed Systems, Concepts and Design, George Coulouris, J Dollimore and Tim Kindberg, Pearson Education, 5th Edition. 2017.
2. Distributed Systems, An Algorithm Approach, Sukumar Ghosh, hapman&Hall/CRC, Taylor & Fransis Group, 2014.
3. P. K. Sinha, Distributed Operating Systems: Concepts and Design, IEEE press 3rd Edition, 2009
4. M. Singhal and N. G. Shivaratri, Advanced Concepts in Operating Systems, McGraw-Hill, 2011.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING&EVALUATION SCHEME								
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BTDSE412N	**DSE**	**Information Storage and Management**	**60**	**20**	**20**	**0**	**0**	**3**	**0**	**0**	**3**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

1. An ability to understand various storage architecture & technologies.
2. An ability to understand various technologies used to provide backup & recovery.
3. An ability to understand various techniques used to provide security.
4. Ability to identify information storage system requirements.
5. An ability to develop policy for information storage system.
6. An ability to develop policy for backup& recovery.

Course Outcomes:

On completion of the course students will be able to:

1. Describe & apply storage technologies.
2. Identify storage technologies that provide cost effective IT solution for medium to large scale businesses & data centers.
3. Manage Virtual Server & Storage between Remote locations.
4. Design analysis and manage clusters of resources

Syllabus:

UNIT-I Introduction: Digital data and its types, Information storage, Key characteristics of data center, Evolution of computing platforms. Introduction to storage technology: Data Proliferation,

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

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			ENDSEM University Exam	Two Term Exam	Teachers Assessment*	ENDSEM University Exam	Teachers Assessment*				
BTDSE412N	DSE	Information Storage and Management	60	20	20	0	0	3	0	0	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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evolution of various storage technologies, Overview of storage infrastructure components, Information life Cycle Management, Data categorization.

UNIT II

Storage System Architecture: Intelligent disk subsystems overview, Contrast of integrands modular array, Component Architecture of Intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, RAID levels & parity algorithms, hot sparing, Front end to host storage provisioning, mapping and operation.

UNIT III

Introduction to network storage: JBOD, DAS, NAS, SAN & CAS evolution and comparison, Applications, Elements, Connectivity, standards, management, security and limitations of DAS, NAS, CAS & SAN

UNIT IV

Hybrid storage solutions and virtualization: memory, network, server, storage & appliances. Data centre concepts & requirements, Backup and disaster recovery. Industry Management standards, standard framework applications, Key management metrics.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

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BTDSE412N	**DSE**	**Information Storage and Management**	**60**	**20**	**20**	**0**	**0**	**3**	**0**	**0**	**3**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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UNIT-V

Information storage on clouds: concept of cloud, cloud computing, storage on cloud, Cloud benefits, Cloud computing evolution. Application & services on cloud, cloud service providers, cloud deployment models, Essential characteristics of cloud computing.

Text Books:

1. G.Somasundaram & Alok Shrivastava editors, ISM: Storing, Managing, and Protecting Digital Information; Wiley India

Reference Books:

1. Saurabh; Cloud Computing: Insight into New era Infrastructure; Wiley India.
2. Ulf Troppens, Wolfgang Mueller-Friedt, Rainer Erkens, Rainer Wolafka, Nils Haustein; Storage Network explained: Basic and application of fiber channels, SAN, NAS, ISESI, INFINIBAND and FCOE, Wiley India.
3. Sosinsky, Cloud Computing Bible, Wiley India.

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Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

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BTDSE413N	DSE	Wireless networks	60	20	20	0	0	3	0	0	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

The student will have ability to:

1. Understand the fundamental of wireless communication system.
2. Describes wireless channel effects.
3. Able how to model different wireless communication scenarios.
4. An ability to explain multiple access techniques for Wireless Communication.
5. Evaluate the performance of various schemes for wireless communications.
6. Analyze fundamental concept of cellular radio concepts.
7. Apply various wireless communication network systems, standards, and applications.

Course Outcomes:

The students will be able to:

1. Demonstrates wireless communication systems design and working.
2. Determine various advanced techniques for wireless communications.
3. Develop models to understand various characteristics of wireless communications.
4. Analyze design architectures for different Wireless Systems.
5. Evaluates the emerging trends in Wireless communication.
6. Able to Apply concepts of radio communications
7. Understands the applications of wireless communications tools.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

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			ENDSEM University Exam	Two Term Exam	Teachers Assessment*	ENDSEM University Exam	Teachers Assessment*				
BTDSE413N	DSE	Wireless networks	60	20	20	0	0	3	0	0	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Syllabus:

UNIT I **10HRS**

Introduction to Wireless Communication System: Evolution of mobile communications, Types of Wireless communication System, Comparison of Common wireless system, Third Generation (3G) Wireless Networks, Wireless Local Loop (WLL), Wireless Local Area network (WLAN),

UNIT II **9HRS**

The Cellular Concept- Cellular system, Hexagonal geometry cell and concept of frequency reuse Distance to frequency reuse ratio, Channel & co-channel interference reduction factor, Umbrella Cell Concept, Cell sectorization, Repeaters, Micro cell zone concept, Channel antenna system

UNIT III 8**HRS**

Mobile Radio Propagation Model, Small Scale Fading and diversity: Large scale path loss:- Free Space Propagation loss equation, Reflection, Ray ground reflection model, Diffraction, Scattering, Link budget design, Indoor and outdoor propagation models, Small scale multipath propagation, Impulse model for multipath channel, Delay spread, Feher‟s delay spread.

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Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

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			ENDSEM University Exam	Two Term Exam	Teachers Assessment*	ENDSEM University Exam	Teachers Assessment*				
BTDSE413N	DSE	Wireless networks	60	20	20	0	0	3	0	0	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT IV **7HRS**

Mobile Network And Transport Layers :Mobile IP , Dynamic Host Configuration Protocol, Mobile Ad Hoc Routing Protocols, Multicast routing, TCP over Wireless Networks , Indirect TCP , Snooping TCP, Mobile TCP .Wireless Systems: GSM system architecture, Protocols, Authentication and security in GSM, GSM speech coding, GPRS system architecture.

UNIT V **8HRS**

Introduction to Wi-Fi, WiMAX, Zig-Bee Networks, Software Defined Radio, UWB Radio, Wireless Adhoc Network and Mobile Portability, Security issues and challenges in a Wireless network. Application Layer :WAP Model, Mobile Location based services ,WAP Gateway ,WAP protocols wireless bearers for WAP , WML ,WMLScripts

Textbooks:

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education,
2. William Stallings, “Wireless Communications and Networks”, Pearson Education.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

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BTDSE413N	**DSE**	**Wireless networks**	**60**	**20**	**20**	**0**	**0**	**3**	**0**	**0**	**3**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

References:

1. Kaveh Pahlavan, Prasanth Krishnamoorthy, "Principles of Wireless Networks", First Edition, Pearson Education,
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer,
3. C.K.Toh, "AdHoc Mobile Wireless Networks", First Edition, Pearson Education, 2002.
4. Wireless digital communication, KamiloFeher, PH.
5. William D Stanley : Network Analysis with Applications, Pearson Education.
6. Roy Choudhary D: Network and systems, New Age Publication.
7. Wireless Communication, Theodore S. Rappaport, Prentice hall

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

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BTIT407N	DCC	Advanced Java Programming	0	0	0	30	20	0	0	2	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Course Objectives:

The student will have ability to:

1. Understand HTML Tags.
2. Understand Database connectivity and sql queries in java.
3. Design and develop Web applications using servlet and JSP.
4. Understand how to work with JavaBeans.
5. Designing applications using pre-built frameworks.

Course Outcomes:

The students will be able to:

1. learn to access database through Java programs, using Java Data Base Connectivity (JDBC)
2. Design new applications using object-oriented methodologies.
3. Create dynamic web pages, using Servlets and JSP.
4. Make a reusable software component, using Java Bean.
5. Design Data base connectivity program for simple problems.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

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			THEORY			PRACTICAL		L	T	P	CREDITS
			ENDSEM University Exam	Two Term Exam	Teachers Assessment*	ENDSEM University Exam	Teachers Assessment*				
BTIT407N	DCC	Advanced Java Programming	0	0	0	30	20	0	0	2	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Syllabus:

UNIT I **10HRS**

Designing Graphical User Interfaces in Java, Components and Containers, Basics of Components, Using Containers, Layout Managers, AWT Components, Adding a Menu to Window, Extending GUI Features Using Swing Components, Java Utilities (java.util Package)
Event-Driven Programming in Java, Event- Handling Process, Event Handling Mechanism, The Delegation Model of Event Handling, Event Classes, Event Sources, Event Listeners, Adapter Classes as Helper Classes in Event Handling.

UNIT-II **6HRS**

Servlets: Basics of Web, MVC in Server-side Programming, Servlet API, Servlet Interface, Generic Servlet, HTTP Servlet, Servlet Life Cycle, Working with Apache Tomcat Server, Steps to create a servlet in Tomcat, Deployment descriptor. Servlet Request: Various Servlet Request methods for form data and HTTP header data.

UNIT-III **8HRS**

Session Tracking: Purpose and need of Session Tracing. Approaches to session tracking: Cookies, Hidden Form Field, URL Rewriting, Session tracking with JAVA servlet API.

Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore
Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

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			ENDSEM University Exam	Two Term Exam	Teachers Assessment*	ENDSEM University Exam	Teachers Assessment*				
BTIT407N	DCC	Advanced Java Programming	0	0	0	30	20	0	0	2	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT-IV **6HRS**

Database Connectivity and Servlet Collaboration: Database drivers, JDBC, API for Querying with database, API for updating the database. Servlet collaboration: Methods of Request Dispatcher interface: forward, Include. Send redirect.

UNIT-V **8HRS**

Java Server Pages: Basic of JSP: Life Cycle of JSP, JSP API. Scripting Elements: - Scrip let Tag, expression tag, declaration tag. 9 Implicit Object: out, request, response, config, application, session, page context, page, and Exception. Directives: - page directive, include directive, taglib; Exception Handling, Action Elements, JSTL, Custom tags.

Textbooks:

1. Herbert Schildt, "J2EE The Complete Reference Java", Ninth Edition, McGraw Hill, 2017

References:

1. Bert Bates, Kathy Sierra, "Headfirst Java", 2nd Edition, O' Reilly, 2005
2. Advanced Java 2 Plateform, How to program, 2nd edition, Harvey.M.Dietel, Prentice Hall.

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Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in Light of NEP-2020
Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)
Semester-IV(2021-2025)

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			THEORY			PRACTICAL		L	T	P	CREDITS
			ENDSEM University Exam	Two Term Exam	Teachers Assessment*	ENDSEM University Exam	Teachers Assessment*				
BTIT407N	**DCC**	**Advanced Java Programming**	**0**	**0**	**0**	**30**	**20**	**0**	**0**	**2**	**1**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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List of Practical:

1. A html program for creating text box, check box, radio button, list, submit button.
2. A html program for Student registration page.
3. WAP in Servlets to get and display value from an HTML page.
4. A program to execute select query using JDBC.
5. A program to update customer information.
6. A simple servlet that just generates plain text.
7. A program to display cookie id.
8. A program for session tracking.
9. Write a program showing Database connectivity.
10. Write a program showing Simple database Operation (CRUD).
11. WAP in JSP to get and display value from an HTML page
12. A program for display student result by JSP page

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Semester-IV(2021-2025)

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			THEORY			PRACTICAL		L	T	P	CREDITS
			ENDSEM University Exam	Two Term Exam	Teachers Assessment*	ENDSEM University Exam	Teachers Assessment*				
CL110	DCC	Red Hat Openstack Administration I	0	0	2	1	0	0	0	0	100

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Course Objectives:

The student will have ability to:

1. P Launch instances to satisfy various use case examples.
2. Manage domains, projects, users, roles, and quota in a multitenant environment.
3. Manage networks, subnets, routers, and floating IP addresses.
4. Manage instance security with group rules and access keys.

Course Outcomes:

The students will be able to:

1. Design and implement on-demand projects, software-defined networks, and virtual machineinstances.
2. Deploy a proof-of-concept Openstack installation for practice, development, demonstration, and testing, back in your own home or business computing environment.
3. Manage software-defined networks such as subnets, routers, floating IP addresses, images, flavors,security groups/rules, and block and object storage.
4. Create and customize advanced VM instances as applications, customize on deploy, and createscalable stacks of multiple VM applications.

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Syllabus:

UNIT I

Introduction to Red Hat OpenStack Platform: Describe OpenStack personas, launch an instance, and describe the OpenStack components and architecture.

Manage application projects in a multitenant cloud: Create and configure projects with secure user access and sufficient resources to support cloud user application deployment requirements.

UNIT II

Manage OpenStack networking : Describe how IP networks are implemented in OpenStack, including fundamental TCP/IP stack behavior, software-defined networking elements, and the common types of networks available to self-service cloud users.

Configure resources to launch a non-public instance: Configure the requisite resource types for launching a basic non-public instance, including vCPUs, memory, and a system disk image, and launch an instance of an application component that runs in a tenant network with no public access.

UNIT III

Configure virtual machine system disks: Identify the available choices for configuring, storing and selecting block-based virtual machine (VM) system disks, including the choice of ephemeral or persistent disks for specific use cases.

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Provide additional storage strategies: Identify the available choices for additional cloud storage techniques, including object-based storage, network file sharing, and volumes sourced from a file sharing service.

UNIT IV

Configure resources to launch an instance with public access: Identify and configure the additional resource types required to launch instances with public access for specific use cases, including networking and access security elements.

Automate customized cloud application launches: Configure and deploy a typical multi-tier cloud application stack, defined as an architected template of scalable VM instances, including per- instance launch customizations.

UNIT V

Manage cloud application placement: Introduce over cloud layouts more complex than a single site, and explain the management resources to control the placement of launched instances, including segregation elements such as cells and availability zones, and placement attributes such as requisite compute node resources.

TEXT BOOKS:

1. Adolfo Vazquez, Chen Chang, Fiona Allen, Herve Quatremain,Morgan Weetman, Snehangshu Karmakar. Red Hat OpenStack Administration I: Core Operations for

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Cloud Operators, Edition 1, Red Hat Inc.

REFERENCES:-

1. Red Hat OpenStack Administration I: Core Operations for Cloud Operators, https://www.redhat.com/en/services/training/cl110-red-hat-openstack-administration-i
2. Red Hat OpenStack Administration I: Core Operations for Cloud Operators (CL110), https://www.redhat.com/en/blog/now-available-openstack-13-red-hat-openstack-administration-i-core-operations-cloud-operators-cl110

LIST OF PRACTICALS:

1. Introduction to the Lab
2. Introduction to Red Hat Openstack
3. Case Study: Manage application projects in a multitenant cloud
4. Case Study: Manage OpenStack networking

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5. Configure virtual machine system disks
6. Case Study: Configure resources to launch a non-public instance
7. Configure resources to launch an instance with public access
8. Case Study: Automate customized cloud application launches
9. Case Study: Manage cloud application placement
10. Case Study: Additional Storage Strategies