Shri Vile Parle Kelavani Mandal's

Dwarkadas J. Sanghvi College of Engineering

(Autonomous College Affiliated to the University of Mumbai)

Course Structure and Syllabus

of

Final Year B.Tech

in

Computer Engineering

Prepared by:- Board of Studies in Computer Engineering

Recommended by:- Academic Council of D. J. Sanghvi College of Engineering

Approved by:- Governing Body of D. J. Sanghvi College of Engineering

Revision: 1 (2019)

With effect from the Academic Year: 2022-2023

Shri Vile Parle Kelavani Mandal's
DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)
NAAC Accredited with "A" Grade (CGPA : 3.18)

Scheme for Fourth Year B.Tech. Program in Computer Engineering : Semester VII (Autonomous)
(Academic Year 2022-2023)

Semester VII

Sr	Course Code	Course	Teaching Scheme				Semester End Examination (A)						Continuous Assessment (B)					Aggregate (A+B)	Credits earned	
			Theory (hrs.)	Practical (hrs.)	Tutorial (hrs.)	Credits	Duration (Hrs)	Theory	Oral	Pract	Oral & Pract	End Sem Exam Total	Term Test 1 (TT1)	Term Test 2 (TT2)	Avg (TT1 & TT2)	Termwork	CA Total			
1	DJ19CEC701	Digital Signal Processing and Applications	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	4
	DJ19CEL701	Digital Signal Processing and Applications Laboratory	--	2	--	1	2	--	25	--	--	25	--	--	--	25	25	50	1	
2	DJ19CEC702	Distributed Computing	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	4
	DJ19CEL702	Distributed Computing Laboratory	--	2	--	1	2	--	25	--	--	25	--	--	--	25	25	50	1	
3@	DJ19CEEC7011	Deep Learning	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	4
	DJ19CEEL7011	Deep Learning Laboratory	--	2	--	1	2	--	25	--		25	--	--	--	25	25	50	1	
	DJ19CEEC7012	Blockchain Technology	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
	DJ19CEEL7012	Blockchain Technology Laboratory	--	2	--	1	2	--	25	--	--	25	--	--	--	25	25	50	1	
	DJ19CEEC7013	Predictive Modeling	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
	DJ19CEEL7013	Predictive Modeling Laboratory	--	2	--	1	2	--	25	--	--	25	--	--	--	25	25	50	1	
4#	DJ19ILO7011	Product Life Cycle Management	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	3
	DJ19ILO7012	Management Information System	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
	DJ19ILO7013	Operations Research	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
	DJ19ILO7014	Cyber Security and Laws	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
	DJ19ILO7015	Personal Finance Management	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
	DJ19ILO7016	Energy Audit and Management	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
	DJ19ILO7017	Disaster Management and Mitigation Measures	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
	DJ19ILO7018	Science of Well-being	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
	DJ19ILO7019	Research Methodology	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
	DJ19ILO7020	Public Systems and Policies	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	
5	DJ19CEP703	Project-Stage I	--	4	--	2	2	--	50	--	--	50	--	--	--	50	50	100	2	2
		Total	**12**	**10**	**0**	**17**	**20**	**300**	**125**	--	--	**425**	**100**	**100**	**100**	**125**	**225**	**650**	**17**	**17**

@ Any 1 Elective Course

Any 1 Institute Professional Elective

Prepared by: **HoD**

Name and Signatures (with date) **Department of Computer Engineering** **Vice-Principal** **Principal**

Checked By

<table>
<tr><td colspan="5">Program: Final Year B.Tech. in Computer Engineering</td><td colspan="6">Semester: VII</td></tr>
<tr><td colspan="5">Course: Project-Stage I</td><td colspan="6">Course Code: DJ19CEP703</td></tr>
<tr><td colspan="4" rowspan="2">Teaching Scheme
(Hours / week)</td><td colspan="6">Evaluation Scheme</td></tr>
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<tr><td>50</td><td>-</td><td>-</td><td>-</td><td>-</td><td>50</td></tr>
</table>

Course Objectives:

The Project work enables students to develop further skills and knowledge gained during the program by applying them to the analysis of a specific problem or issue, via a substantial piece of work carried out over an extended period. For students to demonstrate proficiency in the design of a research project, application of appropriate research methods, collection and analysis of data and presentation of results.

Guidelines:

1. Project Topic:

- To proceed with the project work it is very important to select a right topic. Project can be undertaken on any subject addressing the programme. Research and development projects on problems of practical and theoretical interest should be encouraged.
- Project work must be carried out by the group of at least two students and maximum three and must be original.
- Students can certainly take ideas from anywhere, but be sure that they should evolve them in the unique way to suit their project requirements.
- The project work can be undertaken in a research institute or organization/company/any business establishment.
- Student must consult internal guide along with external guide (if any) in selection of topic.
- Head of department and senior staff in the department will take decision regarding selection of projects.

- Student has to submit weekly progress report to the internal guide and whereas internal guide has to keep track on the progress of the project and also has to maintain attendance report. This progress report can be used for awarding term work marks.
- In case of industry projects, visit by internal guide will be preferred.

2. Project Report Format:

At the end of semester, a project report should preferably contain at least following details: -

- Abstract
- Introduction
- Literature Survey
  - Survey Existing system
  - Limitation Existing system or research gap
  - Problem Statement and Objective
  - Scope
- Proposed System
  - Analysis/Framework/ Algorithm
  - Details of Hardware & Software o
  - Design details
  - Methodology (your approach to solve the problem)
- Implementation Plan for next semester
- Conclusion
- References

Evaluation Scheme:

Semester End Examination (A):

Laboratory:

- Oral examination of Project Stage-I should be conducted by Internal and External examiners.
- Students have to give presentation and demonstration on the Project

Continuous Assessment (B):

Laboratory: (Term work)

The distribution of marks for term work shall be as follows:

1. Weekly Attendance on Project Day
2. Project work contribute
3. Mid-Sem Review
4. Project Report
5. Term End Presentation

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

Prepared by Checked by Head of the Department Principal

<table>
<tr><td colspan="8">Program: Final Year B.Tech. in Computer Engineering</td><td colspan="4">Semester : VII</td></tr>
<tr><td colspan="8">Course : Digital Signal Processing and Applications</td><td colspan="4">Course Code: DJ19CEC701</td></tr>
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</table>

Pre-requisite: Engineering Mathematics-III, Engineering Mathematics- IV

Course Objectives:

1. To understand the fundamental concepts of signal processing and applications.
2. To develop a thorough understanding of DFT and FFT and their applications.
3. To apply image enhancement techniques.
4. To apply image segmentation techniques

Outcomes: On successful completion of course learner will be able to:

1. Understand concept of digital signal processing and applications
2. Classify and analyze discrete time signals and systems
3. Apply the efficient computing algorithms of DFT and FFT in finding the response of the system.
4. Use the enhancement techniques for digital Image Processing
5. Apply digital image processing techniques for edge detection

Detailed Syllabus: (unit wise)		
Unit	**Description**	**Duration**
1	**Discrete-Time Signal and Discrete-Time System** 1.1 Introduction to Digital Signal Processing, Sampling and Reconstruction, Standard DT Signals, Concept of Digital Frequency, Representation of DT signal using Standard DT Signals, Signal Manipulations (shifting, reversal, scaling, addition, multiplication). 1.2 Classification of Discrete-Time Signals, Classification of Discrete Systems 1.3 Linear Convolution formulation for 1-D and 2-D signal (without mathematical proof), Circular Convolution (without mathematical proof), Linear convolution using Circular Convolution. Auto and Cross Correlation formula evaluation, LTI system, Concept of Impulse Response and Step Response, Output of DT system using Time Domain Linear Convolution.	10
2	**Discrete Fourier Transform** 2.1 Introduction to DTFT, Relation between DFT and DTFT, DFT of DT signal, Inverse DFT. 2.2 Properties of the DFT: Scaling and Linearity, Symmetry for real valued signal, Periodicity, Time Shift and Frequency Shift, Time Reversal, Convolution Property and Parsevals Energy Theorem. **Fast Fourier Transform** 2.3 Fast Fourier Transform: Need of FFT, Radix-2 DIT-FFT algorithm 2.4 Flow graph for N=4 and 8 using Radix-2 DIT-FFT, Inverse FFT algorithm, Comparison of complex and real, multiplication and additions of DFT and FFT	10
3	**DSP Algorithms** 3.1 Fast Circular Convolution Algorithm, Fast Linear Convolution Algorithm. 3.2 Linear FIR filtering using Overlap Add Algorithm and Overlap Save Algorithm and implementation using FFT **DSP Application** 3.3 Audio and speech processing, statistical signal processing, digital image processing, data compression, video coding, audio coding, image compression, signal processing for telecommunications	04
4	**Digital Image Fundamentals** 4.1 Introduction to Digital Image, Digital Image Processing System, Sampling and Quantization 4.2 Representation of Digital Image, Connectivity, Image File Formats: BMP, TIFF and JPEG	04
5	**Spatial Domain Filtering** 5.1 Intensity transformations, contrast stretching, histogram equalization, 5.2 Smoothing filters, sharpening filters, gradient and Laplacian **Frequency Domain Filtering** 5.3 Hotelling/KL Transform, 2D Fourier Transform, Discrete Cosine Transform, Discrete Sine Transform **Image Compression**	09

	5.4 Fundamentals of compression, The JPEG compression algorithm	
6	**Image Segmentation** Boundary detection-based techniques, Point, line detection, Edge detection, Edge linking, local processing, regional processing, Hough transform, Thresholding, Iterative thresholding, Otsu's method, moving averages, Multivariable thresholding, Region based segmentation, Watershed algorithm, Use of motion in segmentation	07

Books Recommended:

Text Books:

1. John G. Proakis, Dimitris and G.Manolakis, _Digital Signal Processing: Principles, Algorithms, and Applications‘ 4th Edition 2007, Pearson Education.

2. A. Anand Kumar, Digital Signal Processing‘, PHI Learning Pvt. Ltd., 2nd edition , 2015.

3. Rafel C. Gonzalez and Richard E. Woods, _Digital Image Processing‘, Pearson Education Asia,4th Edition, 2018,

4. S. Sridhar, Digital Image Processing‘, Oxford University Press, Second Edition, 2016.

Reference Books:

1. Sanjit Mitra, Digital Signal Processing: A Computer Based Approach‘, TataMcGraw Hill, 3rd Edition.2007

2. S. Salivahanan, A. Vallavaraj, and C. Gnanapriya, Digital Signal Processing‘ Tata McGraw Hill Publication 1st Edition , 2010.

3. S. Jayaraman, E. Esakkirajan and T. Veerkumar, Digital Image Processing‘ TataMcGraw Hill Education Private Ltd, 2009.

4. Anil K. Jain, Fundamentals and Digital Image Processing‘, Prentice Hall of India Private Ltd, 3rd Edition.,2008

Online Resources

1. **NPTEL**

   Digital Image Processing, By Prof. Prabir Kumar Biswas, IIT Kharagpur

   https://nptel.ac.in/courses/117/105/117105135/

Suggested List of Experiments:

Sr. No.	Title of Experiments
1	Sampling and Reconstruction
2	To perform Discrete Correlation and convolution
3	To perform Discrete Fourier Transform
4	To perform Fast Fourier Transform
5	Implementation of Image negative, Gray level Slicing and Thresholding
6	Implementation of Contrast Stretching, Dynamic range compression & Bit plane Slicing
7.	Implementation of Histogram Processing
8.	Apply DFT, DCT and DST transforms on the image
9.	Implementation of Image smoothing/ Image sharpening
10.	Implementation of Edge detection using Sobel and Prewitt masks
11.	Suggested Mini Projects based on content of the syllabus. (Group of 2-3 students) [Real life Applications/problems]. • License plate recognition • Face Emotion recognition • Face recognition • Cancer detection • Object detection • Pedestrian detection • Lane detection • Blind assistance systems • Face Mask Detection • ECG signals analysis • Speech Pitch Detection • Audio Steganography • Audio Fingerprinting • Beat Tracking • Audio source separation

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus, summing up to 75 marks.

2. Total duration allotted for writing the paper is 3 hrs.

Laboratory:

1. Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Laboratory: (Term work)

The distribution of marks for term work shall be as follows:

i. Experiments and Mini Project work (Design and Implementation): 15 Marks
ii. Documentation (Journal and Report): 10 marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

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Pre-requisite: Java Programming, Operating systems, Computer Network

Course Objectives:

1. To provide students with contemporary knowledge in distributed systems

2. To equip students with skills to analyze and design distributed applications.

3. To provide master skills to measure the performance of distributed synchronization algorithms

Course Outcomes: On successful completion of course learner will be able to:

1. Demonstrate knowledge of the basic elements and concepts related to distributed system technologies;

2. Illustrate the middleware technologies that support distributed applications such as RPC, RMI and Object based middleware.

3. Analyse the various techniques used for clock synchronization and mutual exclusion

4. Demonstrate the concepts of Resource and Process management and synchronization algorithms

5. Demonstrate the concepts of Consistency and Replication Management

6. Apply the knowledge of Distributed File System to analyse various file systems like NFS, AFS and the experience in building large-scale distributed applications.

Detailed Syllabus: (unit wise)		
Unit	**Description**	**Duration**
1	Introduction to Distributed Systems 1.1 Characterization of Distributed Systems: Issues, Goals, and Types of distributed systems, Distributed System Models, Hardware concepts, Software Concept. 1.2 Middleware: Services offered by middleware, Client Server model.	**4**
2	Communication 2.1 Layered Protocols, Interprocess communication (IPC): MPI, Remote Procedure Call (RPC), Remote Object Invocation, Remote Method Invocation (RMI) 2.2 Message Oriented Communication, Stream Oriented Communication, Group Communication	**8**
3	Synchronization 3.1 Exclusion, Distributed Mutual Exclusion-Classification of mutual Exclusion Algorithm, Requirements of Mutual Exclusion Algorithms, Performance measure. 3.2 Non Token based Algorithms: Lamport Algorithm, Ricart–Agrawala‘s Algorithm, Maekawa‘s Algorithm 3.3 Token Based Algorithms: Suzuki-Kasami‘s Broardcast Algorithms, Singhal‘s Heurastic Algorithm, Raymond‘s Tree based Algorithm, Comparative Performance Analysis.	**8**
4	Resource and Process Management 4.1 Desirable Features of global Scheduling algorithm, Task assignment approach, Load balancing approach, load sharing approach, Classification of Static and Dynamic Load Balancing algorithms, Comparison of LBA. 4.2 Introduction to process management, process migration, Threads	**8**
5	Consistency, Replication and Fault Tolerance 5.1 Introduction to replication and consistency, Data-Centric and Client-Centric Consistency Models, Replica Management 5.2 Fault Tolerance: Introduction, Process resilience, Reliable client-server and group communication, Recovery	**7**
6	Distributed File Systems 6.1 Introduction and features of DFS, File models, File Accessing models, File-Caching Schemes, File Replication, 6.2 Case Study: Distributed File Systems (DFS), Network File System (NFS), Andrew File System (AFS) 6.3 Trends in Distributed Computing: Edge Computing, Cloud Computing, Fog Computing	**7**

Books Recommended:

Text books:

1. Andrew S. Tanenbaum and Maarten Van Steen, ―Distributed Systems: Principles and Paradigms, 2nd edition, Pearson Education.

2. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems: Concepts and Design", 4th Edition, Pearson Education, 2005.

Reference Books:

1. A. S. Tanenbaum and M. V. Steen, "Distributed Systems: Principles and Paradigms", Second Edition, Prentice Hall, 2006.

2. M. L. Liu, ―Distributed Computing Principles and Applications‖, Pearson Addison Wesley, 2004.

Suggested List of Experiments:

Sr. No.	Title of Experiments
1	Client/server using RPC/RMI.
2	Inter-process communication
3	Group Communication
4	Load Balancing Algorithm
5	Name Resolution protocol
6	Election Algorithm
7	Clock Synchronization algorithms
8	Deadlock management in Distributed systems
9	Distributed File System
10	Suggested Mini Projects based on content of the syllabus. (Group of 2-3 students) 1) The Global Name Service 2) Designing Distributed Systems: Google Case Study 3)The X.500 Directory Service 4) Facebook Distributed file system 5) Design And Development Of The Data Synchronization/Clock Synchronization 6) Any real world application of Distributed Computing

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus, summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Laboratory:

1. Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Laboratory: (Term work)

The distribution of marks for term work shall be as follows:

i. Laboratory work (Performance of Experiments): 15 Marks
ii. Journal Documentation (Write-up and Assignments: 10 marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

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Pre-requisite: Artificial Intelligence, Machine Learning

Course Objective:

1. To understand Hyper parameter Tuning
2. To explore Deep Learning Techniques with different learning strategies
3. To design Deep Learning Models for real time applications

Course Outcomes (CO): At the End of the course, students will be able to

1. Understand and Apply Hyper parameters Tuning
2. Interpret working of deep learning models
3. Create Deep learning Models for real-world problems
4. Investigate suitable deep learning algorithms for various applications.

Detailed Syllabus: (unit wise)		
Unit	**Description**	**Duration**
1	**Introduction to Deep Learning:** Overview of Neural Network, Deep learning and human brain, Why is Deep Learning taking off?, Deep Learning applications Overview of Tools: Torch, TensorFlow, Keras,	04
2	**Hyperparameter Tuning, Batch Normalization** Tuning Process, Using an Appropriate Scale to pick Hyperparameters, Hyperparameters Tuning in Practice: Pandas vs. Caviar, Normalizing Activations in a Network, Fitting Batch Norm into a Neural Network, why does Batch Norm work, Batch Norm at Test Time	05
3	**Convolutional Neural Network:** Introduction to CNNs, Kernel filter, Principles behind CNNs, Multiple Filters, CNN applications **ConvNet Architectures** Discussions on famous convnet architectures: AlexNet, VGG, GoogLeNet, ResNet	09
4	**Recurrent Neural Networks:** Introduction to Sequence Models and RNNs, Recurrent Neural Network Model, Backpropagation Through Time, Different Types of RNNs: Unfolded RNNs, Seq2Seq RNNs, Long Short-Term Memory (LSTM), Bidirectional RNN, Vanishing Gradients with RNNs, Gated Recurrent Unit (GRU), RNN applications	10
5	**Adversarial Networks** Introduction to adversarial Networks, Auto encoders (standard, denoising, contractive, etc.), Vibrational Auto encoders, Generative Adversarial Networks, Applications of Adversarial Networks	10
6	**Deep Learning Case Studies:** Image Processing, Natural Language Processing, Speech Recognition, Video Analytics	04

Books Recommended:

Text Book

1. Goodfellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016.
2. Umberto Michelucci , Advanced Applied Deep Learning: Convolutional Neural Networks and Object Detection, 2019
3. Neural Networks and Deep Learning, Michael Nielsen (Goodreads Author)
4. TensorFlow 1.x Deep Learning Cookbook, Gulli and Kapoor, Packt, 2017

Reference Books

1. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
2. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.
3. Neural Networks: A Systematic Introduction, Raúl Rojas, 1996
4. David Foster, Generative Deep Learning: Teaching Machines to Paint, Write, Compose, and Play O'Relly
5. Maxim Lapan , Deep Reinforcement Learning HandsOn: Apply modern RL methods, with deep Q-networks, value iteration, policy gradients, TRPO, AlphaGo Zero and more, Packt 2018
6. SantanuPattanaya K, Pro Deep Learning with TensorFlow A Mathematical Approach to Advanced Artificial Intelligence in Python, APress

Online Resources

1. **NPTEL:**

   Deep Learning, By Prof. Prabir Kumar Biswas, IIT Kharagpur

   https://onlinecourses.nptel.ac.in/noc22_cs22/preview

2. **Coursera:**

   Deep Learning Specilization, By DeepLearning.AI

   https://www.coursera.org/specializations/deep-learning#courses

Suggested List of Experiments:

Sr. No.	Title of the Experiment
1	Building own Neural Network from scratch
2	To implement EBPTA algorithm.
3	Understanding ANN using Tensor Flow
4	Visualizing Convolutional Neural Network using Tensor Flow with Keras Data.
5	Object detection using RNN using Tensor Flow
6	Students are supposed to complete any one mini project not limited to following list of projects. 1. Sequence Prediction 2. Object Detection 3. Traffic Sign Classification 4. Automatic Music Generation 5. Music Genre Classification 6. Text Summarizer 7. Gender and Age Detection Using Voice 8. Chatbot Using Deep Learning 9. Neural Style Transfer 10. Face Aging 11. Driver Drowsiness Detection 12. Language Translator 13. Image Reconstruction

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus, summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Laboratory:

1. Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Laboratory: (Term work)

Laboratory work will be based on satisfactory completion of Experiments conducted in **DJ19CEEl7011** lab **along with minimum One Mini project**.

The distribution of marks for term work shall be as follows:

i. Experiments and Mini Project work (Design and Implementation): 15 Marks
ii. Documentation (Journal and Report): 10 marks

The final certification and acceptance of term work will be subject to satisfactory performance of Laboratory and Mini Project work and upon fulfilling minimum passing criteria in the term work.

Prepared by Checked by Head of the Department Principal

<table>
<tr><td colspan="5">Program: Fourth Year B.Tech. in Computer Engineering</td><td colspan="5">Semester : VII</td></tr>
<tr><td colspan="5">Course : Blockchain Technology</td><td colspan="5">Course Code: DJ19CEEC7012</td></tr>
<tr><td colspan="5">Course : Blockchain Technology Laboratory</td><td colspan="5">Course Code: DJ19CEEL7012</td></tr>
<tr><td colspan="4" rowspan="2">Teaching Scheme
(Hours / week)</td><td colspan="9">Evaluation Scheme</td></tr>
<tr><td colspan="4">Semester End Examination Marks (A)</td><td colspan="3">Continuous Assessment Marks (B)</td><td rowspan="2">Total marks (A+ B)</td></tr>
<tr><td rowspan="3">Lectures</td><td rowspan="3">Practical</td><td rowspan="3">Tutorial</td><td rowspan="3">Total Credits</td><td colspan="4">Theory</td><td>Term Test 1</td><td>Term Test 2</td><td>Avg.</td></tr>
<tr><td colspan="4">75</td><td>25</td><td>25</td><td>25</td><td>100</td></tr>
<tr><td colspan="4">Laboratory Examination</td><td colspan="3">Term work</td><td rowspan="3">Total Term work</td><td rowspan="3">50</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">2</td><td rowspan="2">-</td><td rowspan="2">4</td><td>Oral</td><td>Practical</td><td>Oral &Practical</td><td>Laboratory Work</td><td colspan="2">Tutorial / Mini project / presentation/ Journal</td></tr>
<tr><td>25</td><td>-</td><td>-</td><td>15</td><td colspan="2">10</td><td>25</td></tr>
</table>

Pre-requisite: Knowledge of

1. Information Security
2. Network Fundamentals

Objectives:

1. To understand emerging abstract models for Blockchain Technology and its relevance with cryptography.
2. To identify major research challenges and technical gaps existing between theory and practice in crypto currency domain.
3. To provide conceptual understanding of the function of Blockchain as a method of securing distributed ledgers, how consensus on their contents is achieved, and the new applications that they enable.
4. To apply hyperledger Fabric and Etherum platform to implement the Block chain Application.

Outcomes: On completion of the course, learner will be able to:

1. Acquire basic knowledge of Blockchain technology and Analyze various algorithms used in Blockchain.
2. Introduce about cryptocurrency and various regulations.
3. Aware of privacy and security issues and applications in Blockchain.
4. Design and understand various applications using Blockchain and Distributed Foundation and case studies.

Detailed Syllabus: (unit wise)		
Unit	**Description**	**Duration**
1	**Introduction and Basics of Distributed Computing:** Need for Distributed Record Keeping, Modeling faults and adversaries Byzantine Generals problem, Consensus algorithms and their scalability problems, Why Nakamoto Came up with Blockchain based cryptocurrency? Technologies Borrowed in Blockchain – hash pointers, consensus, byzantine fault-tolerant distributed computing, digital cash. Atomic Broadcast, Consensus, Byzantine Models of fault tolerance.	**07**
2	**Basic Crypto primitives and Blockchain 1.0:** Hash functions, Puzzle friendly Hash, Collison resistant hash, digital signatures, public key crypto, verifiable random functions, Zero-knowledge systems. Bitcoin blockchain, the challenges, and solutions, proof of work, Proof of stake, alternatives to Bitcoin consensus, Bitcoin scripting language and their use.	**07**
3	**Blockchain 2.0:** Ethereum and Smart Contracts, The Turing Completeness of Smart Contract Languages and verification challenges, using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts.	**07**
4	**Blockchain 3.0:** Hyperledger fabric, the plug and play platform and mechanisms in permissioned blockchain. The Linux Foundation's Hyperledger Fabric and Microsoft Azure's Blockchain as a Service.	**07**
5	**Privacy, Security Issues in Blockchain:** Pseudo-anonymity vs. anonymity, Zcash and Zk-SNARKS for anonymity preservation, attacks on Blockchains such as Sybil attacks, selfish mining, 51% attacks advent of algorand, and Sharding based consensus algorithms to prevent these attacks.	**07**
6	**Blockchain Applications and DiFi Foundations:** Applications of Blockchain in Healthcare, Automotive, Government, Insurance, Media and Entertainment. Distributed Ledger Technology: Governance and Regulations, Applications in Governance, Global Perspectives, Case Study: – Estonian block chains transform paying, trading, and signing. DiFi Foundations, Role of quantum computing in crypto ecosystem. a key ingredient for Distributed Finance.	**07**

Books Recommended:

Text books:

1. Josh Thompson, - Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming, Create Space Independent Publishing Platform, 2017.
2. S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, -Blockchain Technology: Cryptocurrency and Applications, Oxford University Press, 2019.

Reference Books:

1. Dr. Gavin Wood -ETHEREUM: A Secure Decentralized Transaction Ledger, Yellow paper.2014
2. Antony Lewis, Basics of Bitcoins and Blockchain, Mango Publishing, 2018.

Web resources:

1. Centre of Excellence, IIT Bombay (https://isrdc.iitb.ac.in/blockchain/coe/areas.html, portal accessed on 15.11.2021).
2. Course Link by IIT Kanpur (https://www.cse.iitk.ac.in/pages/CS731.html, portal accessed on 15.11.2021)
3. Course Link by Coursera (https://www.coursera.org/learn/decentralized-finance-infrastructure-duke, portal accessed on 10.11.2021)
4. Course Link by Coursera (Bitcoin and Cryptocurrency Technologies | Coursera, portal accessed on 09.11.2021)

Suggested Mini Project:

Students are supposed to complete any one mini project not limited to the following list of projects.

1. Design and Implement Trusted Crowdfunding Platform Using a Smart Contract. A smart contract helps to block the funds within blockchain until the project or startup founder makes progress in the project.
2. Implement a system that collects location data from many interconnected systems and delivers exact location details to the customers.
3. Implement blockchain applications where both riders and drivers can get connected directly to provide safe and reliable transportation.
4. Design and Implement Fake Product Identification System, by embedded a 2D barcode on the product which is tied to a blockchain system.
5. Design and Implement Electronic voting systems where a blockchain-based system can ensure transparent and publicly verifiable elections in the country. Voting can be done using a mobile application that is attached to a blockchain system.
6. Design and Implement Transparent and Genuine Charity Application. The blockchain system can bring transparency to online charity trusts. Contributors can see the journey of the donation in realtime and confirm if it is reaching the deserving hands or not.
7. Design and Implement a Decentralized Web Hosting System. The way web hosting works today is by hosting all the web content including textual content, code and media content on a centralized location which can then be accessed over the world wide web. With blockchain, you can split website content into granules and distribute it all over the internet and then link them together using a blockchain registry.
8. Design and Implement Disk Space Renting System. The idea is to allow everybody on the planet to rent out their unused disk space which can be attached to a blockchain registry to create a massive worldwide cloud.
9. Design and Implement Loyalty Points Exchange System. With blockchain, you can implement a project that allows consumers to combine and transparently trade loyalty rewards.

10. Design and Implement Food Trackback System. Using blockchain technology, you can implement a system that can help consumers trace back the journey of fresh produce or meat to its source.

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus, summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Laboratory:

1. Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Laboratory: (Term work)

Laboratory work will be based on **DJ19CEEL7012 with minimum One Mini project** to be satisfactorily completed.

The distribution of marks for term work shall be as follows:

i. Mini Project work (Design and Implementation): 15 Marks
ii. Documentation (Report and Assignments): 10 marks

The final certification and acceptance of term work will be subject to satisfactory performance of Mini Project work and upon fulfilling minimum passing criteria in the term work.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

<table>
<tr><td colspan="5">Program: Final Year (Common for All Programs)</td><td colspan="5">Semester: VII</td></tr>
<tr><td colspan="5">Course: Management Information System</td><td colspan="5">Course Code: DJ19ILO7012</td></tr>
<tr><td colspan="4" rowspan="2">Teaching Scheme
(Hours / week)</td><td colspan="9">Evaluation Scheme</td></tr>
<tr><td colspan="3">Semester End Examination Marks (A)</td><td colspan="4">Continuous Assessment Marks (B)</td><td rowspan="2">Total marks (A+ B)</td></tr>
<tr><td rowspan="3">Lectures</td><td rowspan="3">Practical</td><td rowspan="3">Tutorial</td><td rowspan="3">Total Credits</td><td colspan="3">Theory</td><td>Term Test 1</td><td>Term Test 2</td><td>Avg.</td></tr>
<tr><td colspan="3">75</td><td>25</td><td>25</td><td>25</td><td>100</td></tr>
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<tr><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td></tr>
</table>

Objectives:

1. The course is blend of Management and Technical field.
2. Discuss the roles played by information technology in today‘s business and define various technology architectures on which information systems are built
3. Define and analyze typical functional information systems and identify how they meet the needsof the firm to deliver efficiency and competitive advantage
4. Identify the basic steps in systems development

Outcomes: Learner will be able to…

1. Explain how information systems Transform Business
2. Identify the impact information systems have on an organization
3. Describe IT infrastructure and its components and its current trends
4. Understand the principal tools and technologies for accessing information from databases to improve business performance and decision making
5. Identify the types of systems used for enterprise-wide knowledge management and how they provide value for businesses

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	**Description**	**Duration in Hours**
1	**Foundation Concepts:** Information Systems in Business, Functional Area Information System**,** The Components of Information Systems**,** Impact of IT on organizations and society, Organizational Strategy, Information systems for strategic advantage.	**05**
2	**Information Technologies:** Hardware and Software **Computer Systems:** End User and Enterprise Computing **Computer Peripherals:** Input, Output, and Storage Technologies **Application Software:** End User Applications **System Software:** Computer System Management **Data Resource Management:** Technical Foundations of Database Management, Managing Data Resources, Big data, Data warehouse and Data Marts**,** Knowledge Management **Networks:** The Networked Enterprise (Wired and wireless), Pervasive computing, Cloud Computing models	**08**
3	**MIS Tools and applications for Decision making:** ERP and ERP support of Business Process Reengineering, **Business intelligence (BI):** Managers and Decision Making, BI for Data analysis and Visualization **Artificial Intelligence Technologies in Business**	**08**
4	**Security and Ethical Challenges:** Security, Ethical, and Societal Challenges of IT Security Management of Information Technology	**06**
5	**Social Computing (SC):** Web 2.0 and 3.0, SC in business-shopping, Marketing, Operational and Analytic CRM, E-business and E-commerce – B2B B2C, Mobile commerce.	**07**
6	**Information System within Organization:** Acquiring Information Systems and Applications: Various System development life cycle models. **Enterprise and Global Management of Information Technology:** Managing Information Technology, Managing Global IT.	**08**

Books Recommended:

Reference Books:

1. Management Information Systems, 11th edition by James A O'Brien, George M., Ramesh Behl.
2. Kelly Rainer, Brad Prince, Management Information Systems, Wiley.
3. K.C. Laudon and J.P. Laudon, Management Information Systems: Managing the Digital Firm, 10th Ed., Prentice Hall, 2007.
4. D. Boddy, A. Boonstra, Managing Information Systems: Strategy and Organization, Prentice Hall, 2008

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

<table>
<tr><td colspan="8">Program: Final Year (Common for All Programs)</td><td colspan="3">Semester: VII</td></tr>
<tr><td colspan="8">Course: Personal Finance Management</td><td colspan="3">Course Code: DJ19ILO7015</td></tr>
<tr><td colspan="4" rowspan="2">Teaching Scheme (Hours / week)</td><td colspan="7">Evaluation Scheme</td></tr>
<tr><td colspan="4">Semester End Examination Marks (A)</td><td colspan="3">Continuous Assessment Marks (B)</td><td rowspan="2">Total marks (A+ B)</td></tr>
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<tr><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td></tr>
</table>

Pre-requisites: Basic Knowledge of Algebra, Probability and Statistics.

Objectives:

1. To create awareness and educate consumers on access to financial services.
2. To make the students understand the basic concepts, definitions and terms related to direct taxation.
3. To help the students compute the Goods and Service Tax (GST) payable by a supplier after considering the eligible input tax credit.
4. To familarise the students with microfinance for accelerating the expansion of local microbusinesses.

Outcomes: On completion of the course, learner will be able to:

1. Use a framework for financial planning to understand the overall role finances play in his/her personal life.
2. Compute income from salaries, house property, business/profession, capital gains and income from other sources.
3. Compute the amount of CGST, SGST and IGST payable after considering the eligible input tax credit.
4. Understand how Microfinance can help in financial inclusion.

Syllabus for Final Year of B.Tech. (Common for All Programs)
Semester VII (Autonomous)
(Academic Year 2022-2023)

Detailed Syllabus (Unit wise)		
Unit	**Description**	**Duration in Hours**
01	**Overview of Indian Financial System:** Characteristics, Components and Functions of Financial System. Financial Instruments and Financial Markets, Financial inclusion. **Introduction to Personal Finance** Person Financial Planning in Action, Money Management Skills, Taxes in Your Financial Plan, Savings and Payment Services. Consumer Credit: Advantages, Disadvantages, Sources and Costs.	**07**
02	**Personal Financial Management** **Loans:** Home, Car, Education, Personal, Loan against property and Jewel loan. **Insurance:** Types of Insurance – ULIP and Term; Health and Disability Income Insurance, Life Insurance. **Investment:** Investing Basics and Evaluating Bonds, Investing in Stocks and Investing in Mutual Funds, Planning for the Future.	**07**
03	**Income Tax** **Income Tax Act Basics-** Introduction to Income Tax Act, 1961 **Heads of Income and Computation of Total Income and Tax Liability-** Heads of Income and Computation of Total Income under various heads, Clubbing Provisions, Set off and Carry forward of Losses, Deductions, Assessment of Income and tax liability of different persons. **Tax Management, Administrative Procedures and ICDS -** TDS, TCS and Advance Tax Administrative Procedures, ICDS.	**08**
04	**Goods and Services Tax** GST Constitutional framework of Indirect Taxes before GST (Taxation Powers of Union & State Government); Concept of VAT: Meaning, Variants and Methods; Major Defects in the structure of Indirect Taxes prior to GST; Rationale for GST; Structure of GST (SGST, CGST, UTGST & IGST); GST Council, GST Network, State Compensation Mechanism, Registration. **Levy and Collection of GST** Taxable event- "Supply" of Goods and Services; Place of Supply: Within state, Interstate, Import and Export; Time of supply: Valuation for GST- Valuation rules, taxability of reimbursement of expenses; Exemption from GST: Small supplies and Composition Scheme: Classification of Goods and Services	**10**
05	**Introduction to Micro – finance** Micro-Finance: Definitions, Scope & Assumptions, Types of Microfinance, Customers of Micro-finance, Credit Delivery Methodologies, SHG concept, origin, Formation & Operation of Self Help Groups (SHGs). **Models in Microfinance -** Joint Liability Groups (JLG), SHG Bank Linkage Model and GRAMEEN Model: Achievements & Challenges, **Institutional Mechanism** Current Challenges for Microfinance, Microfinance Institutions (MFIs): Constraints & Governance Issues, Institutional Structure of Microfinance in India :NGO-MFIs, NBFC-MFIs, Co-operatives, Banks, Microfinance Networks and Associations; Demand & Supply of Microfinance Services in India, Impact assessment and social assessments of MFIs,	**10**

Books Recommended:

Reference Books:

1. Banking and Financial Sector Reforms in India , by Asha Singh, M.S. Gupta, Serials Publication.
2. Indian Banking Sector: Essays and Issues (1st) , by M.S. Gupta & J.B. Singh, Serials Publication.
3. Basics Of Banking & Finance , by K.M. Bhattacharya O.P. Agarwal , Himalaya Publishing House
4. Agricultural Finance And Management, by S. Subba Reddy , P. Raghu Ram .
5. The Indian Financial System And Development , by Dr.Vasant Desai, Himalaya Publishing House; Fourth Edition
6. Income Tax Management , Simple Way of Tax Management, Tax Planning and Tax Saving , By Sanjay Kumar Satapathy
7. Direct Tax System Income Tax by Dr. R. K. Jain, SBPD Publications.
8. Simplified Approach to GST Goods and Services Tax, By S K Mishra , Educreation Publishing.
9. Introduction To Microfinance , By Todd A Watkins , World Scientific Publishing Company

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Consisting **One Class Tests for 25 marks** based on approximately 50% of contents and one case study with presentations for 25 Marks.
2. Total duration allotted for writing test paper is 1 hr.
3. Average of the marks scored in the tests and case study will be considered for final grading.