Samrat Ashok Technological Institute (Engg. College), Vidisha (M.P.)
(An autonomous Institute Affiliated to RGPV, Bhopal)
Computer Science Engineering Department

VIII-SEM B.Tech.	Subject Code	Subject Name / Title	Maximum Marks Allotted						Contract Hrs.			Total Credits
			Theory			Practical						
			End Sem	Mid Sem Exam	Quiz Assign ment	End Sem	Lab Work & Sessional	Total Marks	L	T	P	
	CS-1881(A)	Network Security and cryptography	70	20	10	-	-	100	3	-	-	3

Prerequisite:

Student should have prior knowledge of Discrete structure, Theory of computation and Computer Networks.

Course Objectives:

Understand OSI security architecture and classical encryption techniques.
Acquire fundamental knowledge on the concepts of finite fields and number theory.
Understand various block cipher and stream cipher models.
Describe the principles of public key cryptosystems, hash functions and digital signature.

Course Contents:

UNIT -I: Introduction to network security: Security Needs and Threats, Goals of network security, Types of Computer Crime and Criminals-scavenging, leakage, wire taping etc. Controlling Physical Access: Role of physical Security, Weakness, Types of Identification Badges, security factors. Desktop security: Challenges, security techniques, physical security and procedural methods, Protecting data hardware and software problem and their solutions. Role of Password network security, strength and weakness of password, Administering a password system, Virus, Worms, Trap doors, Trojan horse, Firewall.

UNIT-II: Security: Attacks, Services, Mechanism, OSI security architecture, Symmetric ciphers: Substitution Ciphers: Caesar cipher, Hill cipher, Play fair cipher, Mono-alphabetic Cipher, Poly-alphabetic cipher, Shannon Theorem, One Time pad, Transposition Cipher: Rail fence techniqu, Steganography.

UNIT- III: Block Cipher: Data confidentiality, Simplified DES, Feistal Structure, Blowfish, RC5, Data Encryption Standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design principles, Block Cipher Modes of Operation. Advanced Encryption standard

UNIT- IV: Number Theory: Group, Ring, Field, Modular Arithmetic, Euclidean Theorem, Fermat's Theorem, Euler's Theorem, Chinese Remainder Theorem, Public Key Cryptography: RSA algorithm. Diffie-Hellman Key Exchange Algorithm, Elliptic Curve Cryptography.

UNIT- V: Cryptographic Data Integrity: Hash Function, Requirement and security, Secure hash algorithm (SHA) and its Version, Message Digest MD-4 and MD-5, RIPMED, Message

Authentication Codes, Digital Signature standard, Key Management and Distribution, PKI, User Authentication Protocol: Kerberos. Transport layer Security: SSL, TLS, HTTPS, Email Security: PGP, S/MIME, IP Security.

Reference Books: -

1. William Stallings "Cryptography and Network Security-Principles and Practice Forth Edition", Prentice Hall Publication.
2. Behrouz A. Forouzan, Debdeep Mukhopadhyay "Cryptography and Network Security Second Edition" Tata Macgraw Hill Education.

Course Outcomes: Student will be able to

CO-1: Define basic concepts and algorithms of cryptography, including encryption/decryption and hash functions.
CO-2: Solve and Relate mathematic concepts behind the cryptographic algorithms.
CO-3: Define various network security practice applications.
CO-4: Analyze protocols for various security objectives with cryptographic tools.
CO-5: Apply various security algorithms to solve security related problem.

Mapping of CO and PO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO_{11}	PO_{12}	PSO1	PSO2
CO-1	3	2		1	1								2	
CO-2	3	2			1								1	
CO-3	3		2	3									2	
CO-4					2								2	2
CO-5			3					2					2	

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VI-SEM B.Tech.	Subject Code	Subject Name / Title	Maximum Marks Allotted						Contract Hrs.			Total Credits
			Theory			Practical						
			End Sem	Mid Sem Exam	Quiz Assign ment	End Sem	Lab Work & Sessional	Total Marks	L	T	P	
	CS-1881(B)	Distributed System	70	20	10	-	-	100	3	-	-	3

Prerequisite:
Knowledge of Computer networks and Operating system.

Course Objectives:
The work of Operating System is different in the distributed environment.
Student should understand Message passing, RPC, Synchronization, Load Balancing.
Migration of processes, Deadlock management etc in distributed environment.

Course Contents:

UNIT-I: Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges. Architectural models, Fundamental Models.Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks.Concepts in Message Passing Systems: causal order, total order, total causal order, Techniques for Message Ordering, Causal ordering of messages, global state, termination detection.

UNIT-II: Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

UNIT-III: Agreement Protocols: Introduction, System models, classification of Agreement Problem,Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system.Distributed Resource Management: Issues in distributed File Systems, Mechanism for building distributed file systems, Design issues in Distributed Shared Memory, Algorithm for Implementation of Distributed Shared Memory.

UNIT–IV: Failure Recovery in Distributed Systems: Concepts in Backward and Forward recovery, Recovery in Concurrent systems, Obtaining consistent Checkpoints, Recovery in Distributed Database Systems.Fault Tolerance: Issues in Fault Tolerance, Commit Protocols, Voting protocols, Dynamic voting protocols.

UNIT–V: Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control. Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

Reference Books:

1. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
2. Pradeep K. Sinha, Distributed Operating Systems, PHI, 2005.
3. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Education
4. Tenanuanbaum, Steen," Distributed Systems", PHI
5. Gerald Tel, "Distributed Algorithms", Cambridge University Press

Course Outcomes: The students would be able to-

CO-1: Explain distributed architecture, characteristics and models for distributed processing and communication.

CO-2: identify the core concepts of Message Passing RPC distributed.

CO-3: Explain and Analyze synchronization, consistency and replication in Distributed System.

CO-4: Evaluates the performance and characteristics of Failure recovery in a particular distributed system.

CO-5: Analyze Transaction and Concurrency Control in distributed systems .

Mapping of CO and PO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO_{11}	PO_{12}	PSO1	PSO2
CO-1	3	1			1					1			1	1
CO-2	2	3	2	2	1								2	2
CO-3	3	1								1			1	1
CO-4	2	2	3	3	2		2						3	2
CO-5	2	3	1		2								1	1

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			Theory			Practical						
			End Sem	Mid Sem Exam	Quiz Assign ment	End Sem	Lab Work & Sessional	Total Marks	L	T	P	
	CS-1881(C)	Bio-Informatics	70	20	10	-	-	100	3	-	-	3

Prerequisites:

Concepts in chemistry, Databases & Information retrieval.

Course objectives:

To provide the knowledge of information storage, management, retrieval and analysis procedures and techniques which are useful and applicable in the field of biosciences.

Course Contents:

UNIT I: Introduction to bioinformatics, objectives of bioinformatics, Basic chemistry of nucleic acids, structure of DNA and RNA, Genes, structure of bacterial chromosome, cloning methodology, Data maintenance and Integrity Tasks.

UNIT II:Bioinformatics Databases and Image Processing: Types of databases, Nucleotide sequence databases, Protein sequence databases, Protein structure databases, Normalization, Data cleaning and transformation, Protein folding, protein function, protein purification and characterization, Introduction to Java clients, CORBA, Using MYSQL, Feature Extraction.

UNIT III:Sequence Alignment and database searching: Introduction to sequence analysis, Models for sequence analysis, Methods of optimal alignment, Tools for sequence alignment, Dynamics Programming, Heuristic Methods, Multiple sequence Alignment.

UNIT IV:Gene Finding and Expression: Cracking the Genome, Biological decoder ring, finding genes through mathematics and learning, Genes prediction tools, Gene Mapping, Application of Mapping, Modes of Gene Expression data, Mining the Gene Expression Data.

UNIT V: Proteomics and Problem solving in Bioinformatics: Proteome analysis, tools for proteome analysis, Genetic networks, Network properties and analysis, complete pathway simulation: E-cell, Genomic analysis for DNA and Protein sequences, Strategies and options for similarity search , flowcharts for protein structure prediction.

Course Outcomes:

CO-1: Understanding of retrieval and analysis techniques and approaches for the data related to biosciences

CO-2: Familiarity with the application of molecular hylogenetic analysis and structural prediction approaches.

CO-3: Ability to perform molecular modelling and simulation.

Mapping of COs and POs

COs	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO_{11}	PO_{12}
CO-1	3	3	2	1	1	2	2	3	2	1	2	3
CO-2	3	3	3	2		1	1	2	1		1	1
CO-3	3	3		3	2	1	3	1	2	3	2	2
CO-4	3	3	2	2	1		1	2		1	3	1

References:

1. Gopal and Jones, "BIOINFORMATICS with fundamentals of Genomics and Proteomics", TMH Pub.
2. Rastogi, "Bioinformatics – Concepts, skills and Applications", CBS Pub.
3. Bergeron, "Bioinformatics computing", PHI.
4. Claverie , "Bioinformatics", Wiley pub

Computer Science Engineering Department

VIII-SEM B.Tech.	Subject Code	Subject Name / Title	Maximum Marks Allotted						Contract Hrs.			Total Credits
			Theory			Practical						
			End Sem	Mid Sem Exam	Quiz Assign ment	End Sem	Lab Work & Sessional	Total Marks	L	T	P	
	CS-1882(A)	Internet of Things	70	20	10	-	-	100	3	-	-	3

Course Objectives:

1..Vision and Introduction to IoT.
2.Understand IoT Market perspective.
3.Data and Knowledge Management and use of Devices in IoT Technology.
4.Understand State of the Art – IoT Architecture.
5.Real World IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT.

Unit –I: M2M to IoT-The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics. M2M to IoT – A Market Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains.

Unit-II: An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An architecture IoT outline, standards considerations.

Unit-III: M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management.

Unit-IV: IoT Architecture-State of the Art – Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model. IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views

Unit-V:. Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control. Industrial Automation- Service-oriented architecture-based device integration, SOCRADES: realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the Cloud of Things, Commercial Building Automation- Introduction, Case study: phase one-commercial building automation.

Reference Books:

1.Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.

2.Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.

3.Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013

Course Outcomes: The students would be able to

CO-1: To Understand the Architectural Overview of IoT

CO-2: To Understand the IoT Reference Architecture and RealWorld Design Constraints

CO-3: To Understand the various IoT Protocols (Datalink, Network, Transport, Session, Service.

CO-4: Discuss the architecture, operation an business benefits of IOT solution.

CO-5: Design IoT applications in different domain and be able to analyze their performance.

Mapping of CO and PO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO_{11}	PO_{12}	PSO 1	PSO 2
CO-1	2	2		1	1							2	2	
CO-2	3	2	2		1							2	1	1
CO-3	3	2	2	3								1	1	
CO-4	2	2			2							2	2	2
CO-5			3					2				2	2	

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VIII-SEM B.Tech.	Subject Code	Subject Name / Title	Maximum Marks Allotted						Contract Hrs.			Total Credits
			Theory			Practical						
			End Sem	Mid Sem Exam	Quiz Assign ment	End Sem	Lab Work & Sessional	Total Marks	L	T	P	
	CS-1882(B)	Android Programming	70	20	10	-	-	100	3	-	-	3

Prerequisite: Building an Android app comes down to two major skills/languages: Java and Android.

Course Objectives:

- Explain different techniques for developing applications for mobile devices.
- Understand the Android OS architecture.
- Understand the operation of the application, application lifecycle, configuration files, intents, and activities, services & Receivers.
- Install and use appropriate tools for Android development, including IDE, device emulator, and profiling tools.

Course Contents:

UNIT I: Introduction to Android, A little Background about mobile technologies , Overview of Android - An Open Platform for Mobile development, Open Handset Alliance Developing for Android:First Android Application, setup Android Development Environment. Android development Framework - Android-SDK, Eclipse Emulators, Creating & setting up custom Android emulator Android Project Framework.

UNIT II: Android Activities and UI Design, Understanding Intent, Activity, Activity Lifecycle and Manifest, Creating Application and new Activities, Expressions and Flow control, Android Manifest Simple UI -Layouts and Layout properties, Fundamental Android UI Design, introducing Layouts, Creating new Layouts, Drawable Resources, Resolution and density independence (px ,dip, dp, sip, sp) XML Introduction to GUI objects viz. Push Button, Text / Labels, EditText, ToggleButton, WeightSum Padding, Layout Weight.

UNIT III: Advanced UI Programming , Event driven Programming in Android(Text Edit, Button clicked etc.),Creating a splash screen, Event driven Programming in Android, Android Activity Lifecycle, Creating threads for gaming requirement, Understanding the Exception handler, Toast, Menu, Dialog, List and Adapters, Custom Vs. System Menus Creating and Using Handset menu Button (Hardware), Android Themes, Dialog, create an Alter Dialog, Toast in Android, List & Adapters, Manifest.xml File Update.

UNIT IV: Multimedia Programming using Android, Multimedia audio formats - Creating and Playing, Multimedia audio formats - Kill / Releasing (Memory Management),e audio in any application video playback with an event, Database - SQLite, SQLiteOpenHelper and creating a database, Opening and closing a database, Working with cursors Inserts, updates, and deletes, Location Based Services and Google Maps, Using Location Based Services, Working with Google Maps.

UNIT V: Notifications Notification Manager, Pending Intent Notifications (Show and Cancel), custom made Web browser, WebView object in XML, Methods for associated with 'Go', 'Back', 'Forward' etc. Android Development using other Tools, Other ways to Develop Android Applications, Graphics / Game development using , Installation of .apk, install .apk into your Android Mobile.

References Books:

1. Android Developer Tools Essentials by Mike Wolfson - O'Reilly Media Publication
2. Learn Java for Android Development, 2nd Edition - Jeff Friesen- Apress Publications
3. OpenGL ES 2 for Android - Kevin Brothaler - The Pragmatic Programmers.

Course Outcomes: The students would be able to:

CO-1: Explain the purpose of different development tools for Android
CO-2: Utilize Android Studio to Design simple and complex graphical user interface
CO-3: Develop the algorithm to manage simple and complex Event handle
CO-4 : Develop and design the database design for storage based application
CO-5: Plan, prepare, build and Publish an application to the Android Market

Mapping of CO and PO

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO11	PO12	PSO 1	PSO 2
CO-1	2				2				1			1	2	
CO-2	3	2	2	2	2			2	2		1	1	2	2
CO-3	2	2	3	2	2	2		2	2	1	1	2	2	2
CO-4	3	3	3	2	3	3		2	2	2	2	2	2	2
CO-5	3	3	2	2	3	3		2	3	2	2	2	2	2

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VIII-SEM B.Tech.	Subject Code	Subject Name / Title	Maximum Marks Allotted						Contract Hrs.			Total Credits
			Theory			Practical						
			End Sem	Mid Sem Exam	Quiz Assign ment	End Sem	Lab Work & Sessional	Total Marks	L	T	P	
	CS-1882(C)	Deep Learning	70	20	10	-	-	100	3	-	-	3

Course Objective

The objective of this course is to introduce students to deep learning algorithms and their applications in order to solve real problems.

UNIT I

History of Deep Learning, Deep Learning Success Stories, review of Neuron model, activation functions, Perceptron Learning, Multilayer Perceptrons (MLPs), Feedforward Neural Networks,Backpropagation, weight initialization methods,Batch Normalization, Representation Learning,GPU implementation, Decomposition – PCA and SVD.

UNIT II

Deep Feed forward Neural Networks, Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, AdaGrad,Adam,RMSProp,Autoencoder, Regularization in auto-encoders, Denoising auto-encoders, Sparse auto encoders, Contractive auto-encoders,Variational auto-encoder, Auto-encoders relationship with PCA, Dataset augmentation..

UNIT III

Introduction to Convolutional neural Networks (CNN) and its architectures, CCN terminologies: ReLu activation function, Stride, padding, pooling, convolutions operations, Convolutional kernels, types of layers: Convolutional,pooling,fully connected,Visualizing CNN, CNN examples: LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, RCNNetc.Deep Dream, Deep Art. Regularization:Dropout, drop Connect, unit pruning, stochastic pooling, artificial data,injectingnoise in input,early stopping,Limit Number of parameters, Weight decay etc.

UNIT IV

Introduction to Deep Recurrent Neural Networks and its architectures, Backpropagation Through Time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, Gated Recurrent Units (GRUs), Long Short Term Memory (LSTM), Solving the vanishing gradient problem with LSTMs, Encoding and decoding in RNN network, Attention Mechanism, Attention over images, Hierarchical Attention, Directed Graphical Models.

UNIT V

Introduction to Deep Generative Models,Restricted Boltzmann Machines (RBMs), Gibbs Sampling for training RBMs, Deep belief networks, Markov Networks,

Markov Chains,Autoregressive Models: NADE, MADE, PixelRNN, Generative Adversarial Networks (GANs), Applications of Deep Learning inObject detection, speech/ image recognition, video analysis, NLP, medical science etc.

References Books:

1. IanGoodfellow, YoshuaBengio and Aaron Courville; Deep Learning, MIT Press, 2017.
2. Chris Bishop; Pattern Recognition and Machine Learning,Springer publication, 2006
3. Aurelien Geon, "Hands-On Machine Learning with Scikit-Learn and Tensorflow: Concepts, Tools, and Techniques to Build Intelligent Systems", First Edition, O'Reilly publication, 2017.
4. Francois Chollet, "Deep Learning with Python", First Edition, Manning Publications, 2018.
5. Andreas Muller, "Introduction to Machine Learning with Python: A Guide for Data Scientists", First edition,O'Reilly Edition, 2016.

Course Outcomes:

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

CO1. Describe the feed-forward and deep networks.
CO2. Design single and multi-layer feed-forward deep networks and tune various hyper-parameters.
CO3. Implement deep neural networks to solve a problem
CO4. Analyse performance of deep networks. Mapping of COs and POs.

Mapping of CO and PO

COs	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO_{11}	PO_{12}
CO-1	3	1	3	1	1	3	3	3	1	1	1	2
CO-2	3	1	1	2	1	2	1	2	2	1	2	3
CO-3	2	1	2	3	2	1	3	3	3	1	3	2
CO-4	1	3	3	2	1	3	2	1	2	2	2	0

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			Theory			Practical						
			End Sem	Mid Sem Exam	Quiz Assign ment	End Sem	Lab Work & Sessional	Total Marks	L	T	P	
	CS-1883	Major Project Final	-	-	-	400	150	550	-	-	16	8

Procedure:

a) Each defined project needs to be from Industry/Research organization/Govt. organization/socio-technical issues.
b) Project identification should be based on Analysis carried out by the students after completion of B.E Semester 6th Examination but before starting of the 7th Semester.
c) Problem definition for the project needs to be submitted by every student in the first week of the 7th Semester to his/her college.
d) Each definition will be evaluated based on merit in the beginning of the 7^{th} semester itself by the College.

Facilitation:

You may contact your Major Project In charge co-ordinator/Faculty /Department Head for skilful Analysis.

Guidelines for the Students:

1. The project work will be in-house industry project, where student need to implement project related to any domain of industry like education, legal, manufacturing, design, pharmaceutical, Ecommerce, etc.

2. Students are required to get approval of project definition from the department.

3. After approval of project definition students are required to report their project work weekly to respective internal guide.
4. Maximum 4 students can allow working in particular project group.

5. The students are required to identify their project within two weeks of the commencement of the classes and they are required to follow all the rules and instructions issued by department.

6. Each student or student group would work under the guidance of the Faculty from the College. In case any problem/other issue arises for the smooth progress of Inter Departmental project work discovery/Practical Training, it should be immediately brought to the notice of the major project in charge co-ordinator/Faculty.

7. The students are required to submit **Project Report** to their Head of the Department with the remarks of guide in their College during **Eighth week** of the semester.

Major Project CO's:

Part-I-VII Semester

CO1- Identify the problem domain correctly and to represent problem using mathematical structures and logics.

CO2- Analyze possible solution strategies and investigate problem domain and design feasible solutions for it.

Part-II-VIII Semester

CO3- Make use of cutting edge tools and technologies to derive solutions for the problems and carried a detailed studied about the feasibility and societal impact of solutions.

CO4- Acknowledges the previous work and support required in the solution. Justify the role of individual in project work. Demonstrate leadership skills in team work.

CO5- Present and communicate the importance of solutions of problem domain. Conduct and accomplish all the subtasks for project completion in time and cost effective manner and conclude the project work with possible scopes.

Mapping COs-POs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3			2								2	2
CO2	2	3		3		1	2						2	
CO3			3		3	2	3						2	2
CO4								3	3					
CO5					2					3	3	3		2