T K R COLLEGE OF ENGINEERING &TECHNOLOGY
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B.TECH. COMPUTER SCIENCE & ENGINEERING-R18

COURSE STRUCTURE FOR R-18

B.Tech. VII Semester

S.No.	Course Code	Course Title	L	T	P	Credits
1.	B57PE1	1. Big Data Analytics 2. Network Security 3. Mobile Computing	3	1	0	3
2.	B57PE2	1. Cloud Computing 2. Web Services 3. Computer Graphics	3	1	0	3
3.	B57PE3	1. Machine Learning 2. Computer Forensics 3. Internet of Things	3	1	0	3
4.	B57OE4	OPEN ELECTIVE	3	1	0	3
5.	B57PC5	Technologies Lab	0	0	3	1.5
6.	B57CV6	Comprehensive Test	0	0	6	3
7.	B57PW7	Project Part – A	0	0	8	4
Total Credits						**20.5**

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B.TECH. COMPUTER SCIENCE & ENGINEERING

COURSE STRUCTURE FOR R- 18

B.Tech.VIII Semester

S.No.	Course Code	Course Title	L	T	P	Credits
1.	B58PE1	1. Predictive Analytics 2. Design Patterns 3. Adhoc Wireless Networks	3	1	0	3
2.	B58PE2	1. Software Testing Methodologies 2. Operation Research 3. Storage Area Networks	3	1	0	3
3.	B58OE3	OPEN ELECTIVE	3	1	0	3
4.	B58PW4	Project Work Part – B	0	0	16	8
Total Credits						**17**

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B.TECH. COMPUTER SCIENCE & ENGINEERING – R18

BIG DATA ANALYTICS - B57PE11

B.Tech. VII Semester **L/T/P C**
3/1/0 3

Course Objective:
Provide an overview of apache hadoop, HDFS concepts and interfacing, eco system, apply analytics on structured and unstructured data.

Course Outcomes:
After completion of this course, students will be able to:

1. Design and provide a structured and comprehensive understanding on how to integrate data management with workplace safety measures. L4
2. Apply the knowledge in leveraging Big Data tools, emphasizing the importance of providing data in standardized formats and ensuring optimal performance and security. L3
3. Improve the required skills to run descriptive statistics, handle data collation, and addressing outliers to derive meaningful insights for informed decision-making. L4
4. Apply machine learning algorithms, from hypothesis testing to practical application. L3
5. Apply the knowledge needed to leverage data visualization tools effectively, drawing meaningful insights and implementing impact visualization products in diverse professional settings. L3

Unit – I:
Data Management (NOS 2101): Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/Signal/GPS etc. Data Management, Data Quality (noise, outliers, missing values, duplicate data) and Data Preprocessing. Export all the data onto Cloud ex. AWS/Rackspace etc.
Maintain Healthy, Secure Working Environment (NOS 9003): Introduction, workplace safety, Report Accidents & Emergencies, Protect health & safety as your work, course conclusion, and assessment

Unit – II:
Big Data Tools (NOS 2101): Introduction to Big Data tools like Hadoop, Spart, Impala etc., Data ETL process, Identify gaps in the data and follow-up for decision making
Provide Data/information In Standard Formats (NOS 9004): Introduction, Knowledge Management, and Standardized reporting & compliances, Decision Models, course conclusion. Assessment.

Unit – III:
Big Data Analytics: Run descriptive to understand the nature of the available data, collate all the data sources to suffice business requirement, Run descriptive statistics for all the variables and

observer the data ranges, Outlier detection and elimination.

Unit – IV:

Machine Learning Algorithms (NOS 9003): Hypothesis testing and determining the multiple analytical methodologies, Train Model on 2/3 sample data using various Statistical/Machine learning algorithms, Test model on 1/3 sample for prediction etc.

Unit – V:

(NOS 9004) Data Visualization (NOS 2101): Prepare the data for Visualization, Use tools like Tableau, Click View and 03, Draw insights out of Visualization tool.

Text Book:

1. Student's Handbook for Associate Analytics.

Reference Books:

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addison Wesley, 2006
2. Data Mining Analysis and Concepts, M Zaki and W.Meira (the authors have kindly made an online versionavailable).
3. http:/www.datamininqbook.infoluploads/books.pdf
4. Mining of Massive Datasets Jure Leskovec Stanford Univ. Anand Rajaraman Millliway Labs Jeffrey D. Ullman StanfordUniv.

   (http://www.vistrails.orglindex.phplcourse:_Big_Data_Analysis.

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B.TECH. COMPUTER SCIENCE & ENGINEERING– R18

NETWORK SECURITY (B57PE12)-R18

B.Tech.VII Semester **L/T/P C**
3/1/0 3

Course Objective:
Analyze various security mechanisms in transport layer security, wireless network security, types of intruders, malicious softwares, viruses, firewalls, legal and ethical issues in network security.

Course Outcomes:
After completion of course the student will be able to:

1. Identify and implement secure network communication using SSL/TLS for different network environments. L3
2. Analyze and compare different wireless transport layer security protocols, Evaluating their strengths, weaknesses, and suitability for securing data transmission in diverse wireless environments. L4
3. Analyze and assess various aspects of intruders and malicious software in network security. L4
4. Classify the fundamental principles and functionalities of firewalls in various networks. L4
5. Evaluate network management security practices and protocols. L5

Unit – I:
Transport-Level Security:
Web Security Considerations, Secure Socket Layer and Transport Layer Security, Transport Layer Security, HTTPS, Secure Shell (SSH).

Unit – II:
Wireless Network Security: IEEE 802.11 Wireless LAN Overview, IEEE 802.11i Wireless LAN Security, Wireless Application Protocol Overview, Wireless Transport Layer Security, WAP End-to-End Security.

Unit – III:
Intruders: Introduction, Intrusion Detection, Password, the Base-Rate Fallacy Malicious Software, Types of Malicious Software, Viruses, Virus Countermeasures, Worms, Distributed Denial of Service Attacks.

Unit – IV:
Firewalls:
The Need for Firewalls, Firewall Characteristics, Types of Firewalls, Firewall Basing, Firewall

Location and Configurations.

Unit – V:

Network Management Security:

Basic Concepts of SNMP, SNMPv1 Community Facility, SNMPv3 Legal and Ethical Aspects Cybercrime and Computer Crime, Intellectual Property, Privacy, Ethical Issues.

Text Book:

1. Network Security Essentials by William Stallings, Fourth Edition-Pearson Education.

Reference Books:

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addison Wesley,2006
2. Applied Cryptography by Bruce Schneir-John Willey &Sons.
3. Corporate Computer and Network Security by Raymond panko-PearsonEducation.
4. Security in Computing by Charles P Pfleeger-O'ReilleyPublications.

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B.TECH. COMPUTER SCIENCE & ENGINEERING – R18

MOBILE COMPUTING - B57PE13

B.Tech.VII Semester **L/T/P C**
3/1/0 3

Course Objectives:
Illustrate various MAC protocols, telecommunication taxonomy, protocols in network, transport, application layers and mobile application designs.

Course Outcomes:
After completion of course the student will be able to

1. Develop the ability to critically evaluate different mobile communication protocols, considering their advantages, limitations, and suitability for specific applications. L3
2. Compare the mobile telecommunication systems, covering both the undational concepts and practical aspects of GSM, GPRS, and UMTS technologies. L4
3. Apply the through hands-on implementation and simulations, gaining practical experience in configuring and optimizing protocols for covering a range of protocols and technologies relevant to mobile and ad hoc communication, with a specific focus on VANETs. L3
4. Develop the adaptations and optimizations made in Mobile TCP to address challenges in mobile networks, including high latency and intermittent connectivity of mobile Transport and Application Layer, covering Mobile TCP, WAP, and related protocols and technologies. L3
5. Analyze the mobile platforms, applications, and M-Commerce solutions, considering their usability, security, and alignment with user needs. L4

Unit – I:
Introduction : Introduction to Mobile Computing – Applications and characteristics of Mobile Computing-Generations of Mobile Communication Technologies- Multiplexing – Spread spectrum -MAC Protocols – SDMA- TDMA- FDMA-CDMA.

Unit – II:
Mobile Telecommunication System: Introduction to Cellular Systems – GSM – Services & Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – Security – GPRS-UMTS – Architecture – Handover – Security.

Unit – III:
Mobile Network Layer : Mobile IP – DHCP – AdHoc– Proactive protocol-DSDV, Reactive Routing Protocols – DSR, AODV , Hybrid routing –ZRP, Multicast Routing- ODMRP, Vehicular Ad Hoc networks (VANET) –MANET Vs VANET – Security.

Unit – IV:
Mobile Transport And Application Layer : Mobile TCP– WAP – Architecture – WDP – WTLS – WTP –WSP – WAE – WTA Architecture – WML.

Unit – V:

Mobile Platforms And Applications : Mobile Device Operating Systems – Special Constraints & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – MCommerce – Structure – Pros & Cons – Mobile Payment System – Security Issues.

Text Book:

1. Prasant Kumar Pattnaik, Rajib Mall, ―Fundamentals of Mobile Computing, PHI Learning Pvt.Ltd, New Delhi – 2012

Reference Books:

1. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd,2005.
2. Uwe Hansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, ―Principlesof Mobile Computing‖, Springer, 2003.
3. William.C.Y.Lee,―Mobile Cellular Telecommunications-Analog and Digital Systems‖, Second Edition,TataMcGraw Hill Edition,2006.
4. C.K.Toh, ―AdHocMobile Wireless Networks‖, First Edition, Pearson Education,2002.
5. Android Developers :http://developer.android.com/index.html
6. Apple Developer :https://developer.apple.com/
7. Windows Phone DevCenter :http://developer.windowsphone.com
8. BlackBerry Developer :http://developer.blackberry.com

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B.TECH. COMPUTER SCIENCE & ENGINEERING – R18

CLOUD COMPUTING -B57PE21

B.Tech.VII Semester **L/T/P C**
3/1/0 3

Course Objective:
Analyze the concepts of cloud computing, services, security core issues, various applications and access control mechanisms.

Course Outcomes:
After completion of course the student will be able to:

1. Analyze and compare the advantages and limitations of each cloud Computing Type. L4
2. Analyze the key issues and challenges in cloud computing. L4
3. Evaluate the scalability, reliability, and security aspects of different system models in cloud computing. L5
4. Develop and deploy cloud applications using cloud platforms and frameworks, such as Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform (GCP). L3
5. Apply system modeling techniques to design and architect cloud computing solutions for specific use cases. L3

Unit – I:
History of Centralized and Distributed Computing - Overview of Distributed Computing, Cluster computing, Grid computing. Technologies for Network based systems- System models for Distributed and cloud computing- Software environments for distributed systems and clouds.

Unit – II:
Introduction to Cloud Computing- Cloud issues and challenges - Properties - Characteristics - Service models, Deployment models. Cloud resources: Network and API - Virtual and Physical computational resources - Data-storage. Virtualization concepts - Types of Virtualization- Introduction to Various Hypervisors - High Availability (HA)/Disaster Recovery (DR) using Virtualization, MovingVMs.

Unit – III:
Service models - Infrastructure as a Service (IaaS) - Resource Virtualization: Server, Storage, Network - Case studies. Platform as a Service (PaaS) - Cloud platform & Management: Computation, Storage - Case studies. Software as a Service (SaaS) - Web services - Web 2.0 - Web OS - Case studies – Anything as a service(XaaS).

Unit – IV:

Cloud Programming and Software Environments – Parallel and Distributed Programming paradigms – Programming on Amazon AWS and Microsoft Azure – Programming support of Google App Engine – Emerging Cloud software Environment.

Unit – V:

Cloud Access: authentication, authorization and accounting - Cloud Provenance and meta-data - Cloud Reliability and fault-tolerance - Cloud Security, privacy, policy and compliance- Cloud federation, interoperability and standards.

Text Book:

1. Kai Hwang, Geoffrey C. Fox and Jack J. Dongarra, "Distributed and cloud computing from Parallel Processing to the Internet of Things", Morgan Kaufmann, Elsevier – 2012.

Reference Books:

1. Barrie Sosinsky, "Cloud Computing Bible" John Wiley & Sons,2010.
2. Tim Mather, Subra Kumaraswamy, and Shahed Latif, Cloud Security and Privacy an Enterprise Perspective on Risks and Compliance, O'Reilly2009.

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WEB SERVICES -B57PE22

B.TechVII Semester **L/T/P C**
3/1/0 3

Course Objective:
Understand the details of web services technologies like WSDL.UDDI, SOAP, implement and deploy web service client and server and interoperability between different frameworks.

Course Outcomes:
After completion of course the student will be able to:

1. Analyze the architecture of web services, including its characteristics, building blocks, and communication models. L4
2. Identify limitations of SOAP in the context of web services. L3
3. Analyze the role of WSDL in the world of web services. L4
4. Analyze limitations associated with UDDI. L4
5. Analyze and address challenges in web services interoperability. L4

UNIT – I:
Evolution and Emergence of Web Services - emergence of Web Services and Service Oriented Architecture (SOA). Introduction to Web Services – The definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services. Web Services Architecture – Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication models, basic steps of implementing web services.

UNIT – II:
Fundamentals of SOAP – SOAP Message Structure, SOAP encoding, Encoding of different data types, SOAP message exchange models, SOAP communication and messaging, Java and Axis, limitations of SOAP.

UNIT – III:
Describing Web Services – WSDL – WSDL in the world of Web Services, Web Services life cycle, anatomy of WSDL definition document, WSDL bindings, WSDL Tools, limitations of WSDL.

UNIT – IV:
Discovering Web Services – Service discovery, role of service discovery in a SOA, service discovery mechanisms, UDDI – UDDI registries, uses of UDDI Registry, Programming with UDDI, UDDI data structures, Publishing API, Publishing, searching and deleting information in a UDDI Registry, limitations of UDDI.

UNIT – V:

Web Services Interoperability – Means of ensuring Interoperability, Overview of .NET, Creating a .NET client for an Axis Web Service, creating Java client for a Web service, Challenges in Web Services Interoperability. Web Services Security – XML security frame work, Goals of Cryptography, Digital signature, Digital Certificate, XML Encryption.

Text Book:

1. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India

Reference Books:

1. Java Web Service Architecture, James McGovern, Sameer Tyagi et al.,Elsevier
2. Building Web Services with Java, 2nd Edition, S. Graham and others, PearsonEdn.
3. Java Web Services, D.A. Chappell & T. Jewell,O'Reilly,SPD.
4. Web Services, G. Alonso, F. Casati and others,Springer.

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B.TECH. COMPUTER SCIENCE & ENGINEERING-R18

COMPUTER GRAPHICS -B57PE23

B.TechVII Semester **L/T/P C**
3/1/0 3

Course Objectives:
To learn and make understand about fundamentals of Graphics to construct design animated scenes for virtual object creations, present the content graphically.

Course Outcomes:
After completion of course, students will be able to:

1. Analyze the application areas of computer graphics. L4
2. Apply 2-D Geometric transform to manipulate and position graphical elements effectively. L3
3. Apply general projection transforms and clipping techniques. L3
4. Compare visible surface detection methods. L4
5. Design animation sequences using computer graphics principles. L6

UNIT – I:
Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood fill algorithms.

UNIT – II:
2-D Geometrical Transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems. 2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to viewport coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT – III:
3-D Object Representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-spline curves, Bezier and B-spline surfaces, sweep representations, octrees BSP Trees, 3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations, 3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms andclipping.

UNIT – IV:
Visible surface detection methods: Classification, back-face detection, depth-buffer, scanline, depth sorting, BSP-tree methods, area sub-division and octree methods Illumination Models and

Surface rendering Methods: Basic illumination models, polygon renderingmethods.

UNIT – V:

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications

Text Book:

1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearsonducation.
2. "Computer Graphics Second edition", Zhigandxiang, Roy Plastock, Schaum's outlines, Tata Mc Graw hilledition.

Reference Books:

1. "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner and Hughes, Pearson Education.
2. "Procedural elements for Computer Graphics", David F Rogers, Tata Mc Grawhill, 2ndedition.
3. "Principles of Interactive Computer Graphics", Neuman and Sproul,TMH.
4. "Principles of Computer Graphics", Shalini, Govil-Pai,Springer.
5. "Computer Graphics", Steven Harrington,TMH
6. Computer Graphics, F. S. Hill, S. M. Kelley,PHI.
7. Computer Graphics, P. Shirley, Steve Marschner& Others, CengageLearning.
8. Computer Graphics & Animation, M. C. Trivedi, Jaico PublishingHouse.
9. An Integrated Introduction to Computer Graphics and Geometric Modelling, R. Goldman, CRC Press, Taylor &F rancisGroup.
10. Computer Graphics, Rajesh K.Maurya, WileyIndia.

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MACHINE LEARNING -B57PE31

B.Tech VII Semester **L/T/P C**
3/1/0 3

Course Objective:
To be able to formulate machine learning problems corresponding to different applications and range of machine learning algorithms along with their strengths and weaknesses.

Course Outcomes:
After completion of course the student will be able to:

1. Compare the performance of different machine learning models. Emphasizing concept learning, mistake bounds, and data quality issues, considering their strengths, limitations, and real-world implications. L4
2. Construct decision tree structures, algorithms and apply cross-validation methods. Develop the deeper understanding of neural network and practical implementation. L6
3. Evaluate a comprehensive understanding of sample complexity, over fitting, feature relevance, Support Vector Machines (SVMs), and Bayesian approaches in machine learning. L5
4. Analyze a comprehensive understanding of instance-based techniques as well as unsupervised learning methods. L4
5. Utilize comprehensive understanding of genetic algorithms, explanation-based learning, and various dimensionality reduction techniques. L3

UNIT – I:
Introduction: An illustrative learning task, and a few approaches to it. What is known from algorithms? Theory, Experiment. Biology. Psychology. Overview of Machine learning, related areas and applications. Linear Regression, Multiple Regression, Logistic Regression, logistic functions.

Concept learning: Version spaces. Inductive Bias. Active queries. Mistake bound/ PAC model basic results. Overview of issues regarding data sources, success criteria.

UNIT – II:
Decision Tree Learning: Minimum Description Length Principle. Occam's razor. Learning with active queries Introduction to information theory, Decision Trees, Cross Validation and over fitting. Neural Network Learning: Perceptions and gradient descent back propagation, multilayer networks and back propagation.

UNIT – III:
Sample complexity and over fitting: Errors in estimating means. Cross Validation and jackknifing vc dimension.

Irrelevant Features: Multiplicative rules for weight tuning.

Support Vector Machines: functional and geometric margins, optimum margin classifier, constrained optimization, Lagrange multipliers, primal/dual problems, KKT conditions, dual of the optimum margin classifier, soft margins, and kernels.

Bayesian Approaches: The basics Expectation Maximization. Bayes theorem, Naive Bayes Classifier, Markov models, Hidden Markov Models.

UNIT – IV:

Instance-based Techniques: Lazy vs. eager generalization. K nearest neighbor, case- based reasoning. Clustering and Unsupervised Learning: K-means clustering, Gaussian mixture density estimation, model selection.

UNIT – V:

Genetic Algorithms: Different search methods for induction - Explanation-based Learning:using prior knowledge to reduce samplecomplexity.

Dimensionality Reduction: feature selection, principal component analysis, linear discriminant analysis, factor analysis, independent component analysis, multidimensional scaling, manifold learning

Text Book:

1. Tom Michel, Machine Learning, McGraw Hill,1997.
2. Trevor Has tie, Robert Tibshirani& Jerome Friedman. The Elements of Statically Learning, Springer Verlag,2001.

Reference Books:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge UnivPress.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc.,2001.
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press,1995.

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B.TECH. COMPUTER SCIENCE & ENGINEERING -R18

COMPUTER FORENSICS -B57PE32

B.Tech.VII Semester **L/T/P C**
3/1/0 3

Course Objectives:
Analyze and collect the digital evidences against crime.

Course Outcomes:
After completion of course the student will be able to:

1. Identify the examination and analysis of digital evidence to investigate and prevent crimes. L3
2. Understand the nature and significance of volatile evidence in computer forensics investigations. L2
3. Develop practical skills related to the duplication and preservation of digital evidence and computer image verification. L3
4. Develop practical skills related to computer forensics analysis, electronic document discovery, data identification, event reconstruction, and network forensics. L3
5. Apply the use of current computer forensics tools. L3

UNIT – I:
Computer Forensics Fundamentals: What is Computer Forensics?, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists Types of Computer Forensics Technology: Types of Military Computer Forensic Technology, Types of Law Enforcement — Computer Forensic Technology — Types of Business Computer Forensic Technology Computer Forensics Evidence and Capture: Data Recovery Defined — Data Back-up and Recovery — The Role of Back-up in Data Recovery — The Data-Recovery Solution.

UNIT – II:
Evidence collection and Data seizure: Why Collect Evidence? Collection Options — Obstacles — Types of Evidence — The Rules of Evidence — Volatile Evidence — General Procedure — Collection and Archiving — Methods of Collection — Artifacts — Collection Steps — Controlling Contamination: The Chain of Custody Duplication and Preservation of Digital
Evidence: Preserving the Digital Crime Scene — Computer Evidence Processing Steps Legal Aspects of Collecting and Preserving Computer Forensic Evidence Computer Image Verification and Authentication: Special Needs of Evidential Authentication — Practical Consideration — PracticalImplementation.

UNIT – III:

Computer forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, and performing remote acquisitions Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project. Processing Crime and Incident Scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scenes, preparing for a search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing acase.

UNIT – IV:

Current Computer Forensic Tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.

Cellphoneandmobiledeviceforensics: Understandingmobiledeviceforensics,understanding acquisition procedures for cell phones and mobiledevices.

UNIT – V:

Working With Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS startup tasks, virtual machines.

Text Books:

1. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media,New Delhi.
2. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart,CENGAGE Learning

Reference Books:

1. Real Digital Forensics by Keith J. Jones, Richard Bejtiich, Curtis W. Rose, Addison- Wesley PearsonEducation.
2. Forensic Compiling, A Tractitioneris Guide by Tony Sammes and Brian Jenkinson, Springer Internationaledition.
3. Computer Evidence Collection & Presentation by Christopher L.T. Brown, FirewallMedia.
4. Homeland Security, Techniques & Technologies by Jesus Mena, FirewallMedia.
5. Software Forensics Collecting Evidence from the Scene of a Digital Crime by Robert M. Slade, TMH2005.
6. Windows Forensics by Chad Steel, WileyIndia.

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B.TECH. COMPUTER SCIENCE & ENGINEERING -R18

INTERNET OF THINGS -B57PE33

B.Tech. VII Semester **L/T/P C**
3/1/0 3

Course Objective:
Learn the concepts of IOT and build simple IOTSystems

Course Outcome:
After completion of course the student will be able to:

1. Analyze and explain the basic concepts and principles of the Internet of Things. L4
2. Design and develop IoT and M2M applications, including sensors, actuators, Wireless communication, and cloud computing. L6
3. Develop programming skills specific to IoT applications (e.g., Python, JavaScript, C, or languages specific to IoT platforms). L6
4. Analyze the basics of Raspberry Pi and its role in IoT applications. L4
5. Identify the components and architecture of IoT physical servers and cloud offerings. L3

UNIT – I:
Introduction to Internet of Things: Introduction, physical design of IoT, logical design of IoT-functional blocks, communicational models, communication APIs, IoT enabling technologies, IOT levels & deployment templates.

UNIT – II:
IoT and M2M: Introduction, M2M, Difference between IoT and M2M ,SDN and NFV for IoT, IoT System Management with NETCONF-YANG: Need for IOT systems management, simple network management protocol, network operator requirements, NETCONF,YANG,IoT system management with NETCONF-YANG.

UNIT – III:
IoT Platforms Design Methodology: Introduction, IoT Design Methodology, Motivation for Python
Hardware and Software for IoT: Logical design using Python-data types & Data Structures, control flow, functions, modules, packages, file handling, classes, Python packages of Interest for IoT.

UNIT – IV:
IoT Physical Devices & Endpoints: IoT Device, Exemplary Device Raspberry Pi, Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with python.

UNIT – V:

IoT Physical Servers & Cloud Offerings: Introduction to Cloud Storage Models Communication APIs. WAMP- Auto Bahn for IoT, Xively Cloud for IoT, Python Web Application Framework – Django .Case Studies Illustration IoT Design: Introduction, Home Automation, Cities.

Text Books:

1. ArshdeepBahga, Vijay Madisetti, ―Internet of Things – A hands-on approach, Universities Press,2015.

Reference Books:

1. Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press,2017.
2. Olivier Hersent, David Boswarthick, Omar Elloumi , ―The Internet of Things – Key applications and Protocols, Wiley, 2012 (for Unit2).
3. Jan Ho¨ ller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Aves and. David Boyle, "From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence", Elsevier,2014.
4. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), ―Architecting the Internetof Things, Springer, 2011.
5. Michael Margolis, Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, O'Reilly Media,2011.

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B.TECH. COMPUTER SCIENCE & ENGINEERING - R18

TECHNOLOGIES LAB -B57PC5

B.Tech. VII Semester **L/T/P C**
0/0/3 1.5

Course Objective:
To disseminate the practical demonstration the concepts of machine learning and Internet of things.

Course Outcomes:
After completion of this course will enable students to:
1. Make use of Data sets in implementing the machine learning algorithms. L3
2. Apply the machine learning concepts and algorithms in any suitable language of choice. L3

Note: The programs can be implemented in either JAVA or Python.
1. For Problems 1 to 6 and 10, programs are to be developed without using the built-in classes or APIs ofJava/Python.
2. Data sets can be taken from standard repositories (https://archive.ics.uci.edu/ml/datasets.html) or constructed by thestudents.

Programs:
1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesisbased on a given set of training data samples. Read the training data from a CSVfile.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the trainingexamples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Usean appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the Back propagation algorithm and testthe same using appropriate datasets.
5. Write a program to implement the naïve Bayesian classifier for a sample training dataset stored as a .CSV file. Compute the accuracy of the classifier, considering few test datasets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your dataset.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You canuse Java/Python ML libraryclasses/API.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results ofthese two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print bothcorrectandwrongpredictions.Java/PythonMLlibraryclassescanbeusedforthisproblem.

10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

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B.TECH. COMPUTER SCIENCE & ENGINEERING –R18

PREDICTIVE ANALYTICS - B58PE11

B.Tech.VIII Semester **L/T/P C**
3/1/0 3

Course Objective:
Understand principles involved in analyzing the predictive behavior for business activities.

Course Outcomes:
After completion of the course, students will be able to:

1. Critically analyse and apply linear regression principles, focusing on advanced data modeling techniques, variable rationalization, and least square estimation for effective business modeling. L4
2. Gain through knowledge on logistic regression concepts, differentiate it from linear regression, and apply it to various business domains. L3
3. Develop skills on how to classify decision trees, both in supervised and unsupervised learning contexts, along with knowledge management competencies. L3
4. Apply time series forecasting methods like ARIMA, and extract and analyze features for prediction accuracy. L3
5. Create and manage professional documents with a focus on structure, intellectual property, and effective knowledge sharing. L6

UNIT – I:
Introduction to Predictive Analytics & Linear Regression : What and Why Analytics, Introduction to Tools and Environment, Application of Modelling in Business, Databases & Types of data and variables, Data Modelling Techniques, Missing imputations etc. Need for Business Modelling. Regression — Concepts, Blue property-assumptions-Least Square Estimation. Variable Rationalization, and Model Building etc.

UNIT – II:
Logistic Regression: Model Theory, Model fit Statistics, Model Conclusion, Analytics applications to various Business Domains etc. Regression Vs Segmentation — Supervised and Unsupervised Learning, Tree Building — Regression, Classification, Overfitting, Pruning and complexity. Multiple Decision Treesetc.

UNIT – III:
Objective Segrnentation: Regression Vs Segmentation — Supervised and Unsupervised Learning, Tree Building — Regression, Classification, Overfitting, Pruning and complexity, Multiple Decision Trees etc. Develop Knowledge, Skill and Competences (NOS 9005) Introduction to Knowledge skills & competences, Training & Development, Learning & Development, Policies and Record keeping,etc.

UNIT – IV:

Time Series Methods Forecasting, Feature Extraction: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average, Energy etc and Analyze for prediction Project.

UNIT – V:

Working with Documents: Standard Operating Procedures for documentation and knowledge sharing. Defining purpose and scope documents, Understanding structure of documents — case studies, articles, white papers, technical reports, minutes of meeting etc., Style and format, Intectual Property and Copyright, Document preparation tools — Visio, PowerPoint, Word, Excel etc., Version Control, Accessing and updating corporate knowledge base. Peer review and feedback.

Text Book:

1. Student's Handbook for Associate Analytics-III.

Reference Book:

1. Gareth James • Daniela Witten • Trevor Hastie Robert Tibshirani. An Introduction to Statistical Learning with Applications in R.
2. For more information about all JNTU updates please stay connected to us on FB anddon't hesitate to ask any questions in thecomment.

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B.TECH. COMPUTER SCIENCE & ENGINEERING – R18

DESIGN PATTERNS - B58PE12

B.Tech.VIII Semester **L/T/P C**
3/1/0 3

Course Objective:
Analyze the various patterns for software applications.

Course Outcomes:
After completion of the course the student will be able to:

1. Solve and design problems, proficiently utilize the phenomenon of design patterns in software development scenarios. L6
2. Design principles to address Document Editor challenges, demonstrate proficiency in problem-solving. L5
3. Make Use of the adapter, bridge, composite, decorator, facade, flyweight, and proxy structural patterns in real-world situations. L3
4. Apply and implement various Behavioral Patterns (Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, and Observer) in practical applications. L3
5. Make use of Visitor, State, Strategy, and Template Method patterns. L3

UNIT – I:

Introduction: What is a Design Pattern? Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design patterns, Organizing the Catalog, How Design patterns solve Design problems, How to select a Design Pattern, How to use a Design Pattern.

UNIT – II:

A Case Study: Designing a Document Editor, Design Problems, Document Structure, Formatting Embellishing the User Interface, Supporting Multiple Look and Feel Standards, Supporting Multiple Window systems, User Operations Spelling Checking and Hyphenation, Summary.
Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

UNIT – III:

Structural Pattern Part – I: Adaptor, Bridgeand Composite.
Structural Pattern Part – II: Decorator, acade, flyweight, proxy.

UNIT – IV:

Behavior Patterns Part – I: Chain of Responsibility, Command, Interpreter, and Iterator.
Behavior Patterns Part – II: Mediator, Memento, Observer.

UNIT – V:

Behavior Patterns Part – Ii (cont'd) State, strategy, Template Method, Visitor, Discussion of Behavioral Patterns.

What to Expect from Design Patterns, A brief History, and the Pattern Community an Invitation, A Parting Thought.

Text Books:

1. Design Patterns by Erich Gamma, Pearson Education.

Reference Book:

1. Pattern's in JAVA Vol-I By Mark Grand, Wiley DreamTech.
2. Peeling Design Patterns, Prof MedaSrinivasa Rao, NarsimhaKarumanchi, CareerMonk Publication.
3. Design Patterns Explained By Alan Shallowy, PearsonEducation.
4. Pattern Oriented Software Architecture, af.Buschman& others, John Wiley &Sons.

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B.TECH. COMPUTER SCIENCE & ENGINEERING – R18

AD HOC WIRELESS NETWORKS - B58PE13

B.Tech.VIII Semester **L/T/P C**
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Course Objective:
Analyze the issues and challenges, various MAC and routing protocols, challenges in the transport layer security and issues in designing security protocols for adhoc wireless sensor networks to QoS parameters.

Course Outcomes:
After completion of the course the student will be able to:

1. Analyze the scalability and deployment considerations in ad hoc wireless networks. L4
2. Apply knowledge of specific MAC protocols in different scenarios. L3
3. Classify routing protocols and differences between table-driven and on-demand routing protocols and apply routing protocols in designing communication paths in ad hoc wireless networks. L4
4. Classify & Apply transport layer protocols in ensuring reliable communication in ad hoc wireless networks. L4
5. Evaluate the effectiveness of specific security protocols in addressing network vulnerabilities. L5

UNIT – I:
Introduction: Cellular and Ad Hoc Wireless networks, Applications of Ad Hoc wireless networks; Issues in Ad hoc wireless networks: Medium access scheme, routing, multicasting, transport Layer Protocols, Pricing Scheme, Quality of service positioning, Self-organization, Security, Addressing and Service Discovery, Energy Management, Scalability, Deployment considerations.

UNIT – II:
MAC protocols: MAC Protocols for Ad hoc wireless Networks: Introduction, Issues in designing a MAC protocol for Ad hoc wireless Networks, Design goals of a MAC protocol for Ad-hoc wireless Networks, Classification of MAC Protocols, Contention based protocols with reservation mechanisms: D-PRMA, CATA, SRMA/PA, FPRP, HRMA

UNIT – III:
Routing Protocols: Routing protocols for Ad-hoc Wireless Networks: Introduction, Issues in Designing a Routing Protocol for Ad-hoc Wireless Networks, Classification of Routing Protocols.Table driven routing Protocols: DSDV, WRP, On-Demand Routing Protocols: Dynamic source Routing Protocol DSR, AODV, TORA, LAR, ABR.

UNIT – IV:

TRANSPORT LAYER: Transport Layer Protocols for Ad-hoc wireless Networks: Introduction, Issues in Designing a Transport Layer Protocol for Ad-hoc wireless Networks, Design Goals of a Transport Layer Protocol for Adhoc wireless Networks, Classification of Transport Layer Solutions, TCP over Ad-hoc wireless Networks: Feedback-Based TCP, TCP with Explicit Failure Notification, TCP-BUS, Ad-hoc TCP, Split TCP.

UNIT – V:

Security: Security in wireless Ad hoc wireless Networks, Network security Requirements, Issues &Challenges in Security Provisioning, Network security Attacks, Key Management: Symmetric and Asymmetric key Algorithms, key Management Approaches, key management in Ad-hoc Wireless Networks: Secure routing in Ad hoc wireless Networks: Requirements, SAR protocol, Security- Aware AODV protocol.

Text Book:

1. Ad hoc Wireless Networks– C. Siva Ram Murthy & B.S. Manoj, 2nd Edition, Pearson Education, 2005.

Reference Books:

1. Ad hoc Wireless Networks – OzanK. Tonguz and Gianguigi Ferrari, JohnWiley,2006.
2. Ad hoc Wireless Networking – Xiuzhen Cheng, Xiao Hung, Ding-Zhu Du,KluwerAcademic Publishers,2004.
3. Adhoc Mobile Wireless Networks - C.K. Toh, Protocols and Systems, Prentice-Hall PTR,200.

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B.TECH. COMPUTER SCIENCE & ENGINEERING –R18

SOFTWARE TESTING METHODOLOGIES - B58PE21

B.Tech. VIII Semester **L/T/P C**
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Course Objective:
To learn the methodologies like flow graphs and path testing, transaction flow testing data flow testing, domain testing and logic base testing adapted in a Software Testing Process.

Course Outcomes:
After completion of the course the student will be able to:

1. Acquiring knowledge of software testing principles, dichotomies, and practical skills in flow graphs and path testing. L3
2. Develop strategies for testing the seamless interaction of transactional processes and dataflow scenarios. L3
3. Implement domain testing principles, and distinguish between nice and ugly domains. L4
4. Analyze how to manipulate paths, path products, and regular expressions for effective testing. L4
5. Develop the capability to analyze and create state graphs, differentiate between effective and ineffective state graphs, and gather awareness on tools like JMeter or Win-runner. L3

UNIT – I:
Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs.
Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT – II:
Transaction Flow Testing: transaction flows, transaction flow testing techniques.
Dataflow testing: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT – III:
Domain Testing: domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT – IV:
Paths, Path products and Regular expressions: path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.
Logic Based Testing: overview, decision tables, path expressions.

UNIT – V:

State, State Graphs and Transition testing: state graphs, good & bad state graphs, statetesting, Testabilitytips.

Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like JMeter or Win-runner).

Text Books:

1. Software Testing techniques – Boris Beizer, Dreamtech, secondedition.
2. Software Testing Tools – Dr. K. V. K. K. Prasad,Dreamtech.

Reference Books:

1. The craft of software testing - Brian Marick, PearsonEducation.
2. Software Testing, 3rd edition, P.C. Jorgensen, Aurbach Publications (Dist. bySPD).
3. Software Testing, N. Chauhan, Oxford UniversityPress.
4. Introduction to Software Testing, P. Ammann& J. Offutt, Cambridge Univ.Press.
5. Effective methods of Software Testing, Perry, John Wiley, 2nd Edition,1999.
6. Software Testing Concepts and Tools, P. Nageswara Rao, dreamtechPress.
7. Software Testing, M. G. Limaye,TMH.
8. Software Testing, S. Desikan, G. Ramesh,Pearson.
9. Foundations of Software Testing, D. Graham & Others, CengageLearning.
10. Foundations of Software Testing, A. P.Mathur.

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B.TECH. COMPUTER SCIENCE & ENGINEERING – R18

OPERATION RESEARCH - B58PE22

B.Tech.VIII Semester **L/T/P C**
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Course Objectives:

1. Understanding the mathematical importance of development of model in a particular optimization model for the issue and solvingit.
2. Emphasize the mathematical procedures of nonlinear programming search techniques. Operation Research attempts to find the best or optimal solution tothe problem under
3. Consideration, taking into account the goals of theorganization.

Course Outcome:

1. Applying a different linear programming problem technique which has a broad experience in finding the optimum profit. L3
2. Apply the knowledge of the course in solving real life problems. L3
3. Understand the mathematical tools that are needed to solve optimization problems and Identify areas for research-oriented work based on the course content. L3
4. Calculate the knowledge that tries to optimize total return by maximizing the profit and minimizing the cost or loss. L3
5. Recognize the best (optimum) decisions relative to largest possible portion of the total organization. L4

UNIT – I:

Development – Definition - Characteristics and Phases – Types of models — Operations Research models – applications. Allocation: Linear Programming Problem Formulation – Graphical solution – Simplex method - Artificial variables techniques: Two-phase method. Big – M method.

UNIT – II:

Transportation Problem – Formulation – Optimal solution, unbalanced transportation problem — Degeneracy. Assignment problem — Formulation — Optimal solution – Variants of Assignment Problem- Travelling Salesman problem.

UNIT – III:

Sequencing – Introduction – Flow -Shop sequencing – n jobs thorough two machines — n job. Through three machines — Job shop sequencing — two jobs through ‘m machines.

UNIT – IV:

Theory of Games: Introduction -Terminology-. Solution of games with saddle points and without saddle points- 2 x 2 games – dominance principle – m x 2 & 2 x n games -graphical method.

UNIT – V:

Waiting Lines: Introduction – Terminology-Single Channel – Poisson arrivals and Exponential Service times – with infinite population and finite population models- Multichannel – Poisson arrivalsand exponential service times with infinite population.

Text Book:

1. Operations Research / J.K ShaRma 4e/MacMilan
2. Introduction to O.R/Hillier &Libermann/TMH.

Reference Books:

1. Introduction to O.R / Taha /PHI.
2. Operations Research! NVS Raju / SMS Education / 3rd RevisedEdition.
3. Operations Research / A.M.Natarejan /. P.Balasubramaniam. A. Tamilarasi Pearson Education.
4. Operation S Research I Wagner/ PillPublications.
5. Operations Research MA V. Durga Prasad. K. Vqaya Kumar Reddy. J. Suresh Kumar / Cengage Learning.

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B.TECH. COMPUTER SCIENCE & ENGINEERING – R18

STORAGE AREA NETWORKS - B58PE23

B.Tech.VIII Semester **L/T/P C**
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Course Objective:
Demonstrate and understand the storage networks and their products, mechanisms for the backup or recovery.

Course Outcomes:
After completion of the course the student will be able to:

1. Evaluate the value of data creation storage challenges, data center infrastructure, connectivity environments and identify major physical components of a disk drive and their functions. L5
2. Analyze RAID technology, storage systems architecture, networked storage options, and long-term archiving solutions and analyze the appropriateness of different networked storage options for different application environments. L4
3. Identify and analyze the common causes of planned outages in storage infrastructure and Demonstrate proficiency in defining and setting Recovery Time Objective (RTO) and Recovery Point Objective (RPO). L4
4. Evaluate the impact of synchronous and asynchronous replication on data consistency and system performance and Develop strategies for leveraging replication technologies to minimize downtime and ensure continuous business operations in the face of disruptions. L5
5. Identify and describe the key areas that need monitoring in a data center and Analyze and mitigate common threats in various storage security domains. L4

UNIT- I:
Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities Hardware and software components of the host environment, Key protocols and concepts used by each component ,Physical and logical components of a connectivity environment ,Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications.

UNIT- II:
Concept of RAID and its components , Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Compare and contrast integrated and modular storage systems ,High-level architecture and working of an intelligent storage system Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS, and IP-SAN , Benefits of the different networked storage options, Understand the need for long-term archiving solutions and describe how CAS fulfills the need , Understand the appropriateness of the different networked storage options for different application environments.

UNIT- III:

List reasons for planned/unplanned outages and the impact of downtime, Impact of downtime, Differentiate between business continuity (BC) and disaster recovery (DR) ,RTO and RPO, Identify single points of failure in a storage infrastructure and list solutions to mitigate these failures.

UNIT- IV:

Architecture of backup/recovery and the different backup/recovery topologies, replication technologies and their role in ensuring information availability and business continuity, Remotereplication technologies and their role in providing disaster recovery and business continuity capabilities.

UNIT- V:

Identify key areas to monitor in a data center, Industry standards for data center monitoring and management, Key metrics to monitor for different components in a storage infrastructure, Key management tasks in a data center. Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain Virtualization technologies, block-level and file-level virtualization technologies and processes.

Case Studies:

The technologies described in the course are reinforced with EMC examples of actual solutions. Realistic case studies enable the participant to design the most appropriate solution for given sets of criteria.

Text Book:

1. EMC Corporation, Information Storage and Management, Wiley.

Reference Books:

1. Robert Spalding, “Storage Networks: The Complete Reference“, Tata McGraw Hill, Osborne, 2003.
2. Marc Farley, “Building Storage Networks”, Tata McGraw Hill, Osborne,2001.
3. Meeta Gupta, Storage Area Network Fundamentals, Pearson Education Limited,2002.