Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Forensic Science
B.Sc. (Hons) Digital & Cyber Forensics

SEMESTER- III

Course Code	Category	Course Name	Teaching & Evaluation Scheme								
			Theory			Practical		Th	T	P	Credits
			End Sem University	Two Term Exam	Teacher Assessment*	End Sem University exam	Teacher Assessment*				
BSDFN301	Compulsory	Data Communication	60	20	20	30	20	4	0	2	5

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

COURSE OBJECTIVES

The student will have ability to:
1. Understand fundamentals of techniques to solve the problems related to communication.
2. Formulate and evaluate possible solutions to problems.
3. To defend applied solutions.
4. Configure networks and switches, routers, and draw appropriate network design.

COURSE OUTCOMES

Upon completion of the subject, students will be able to:
1. Develop mathematical algorithmic thinking to apply in problem solving.
2. Understand the basics of discrete probability and number theory.
3. Be able to use techniques to analyze basic network design and algorithms.
4. Understand asymptotic notation, its significance, and be able to use it with basic algorithmic examples.
5. Aquent with some basic properties of communication and network.

SYLLABUS

Unit-I

Introduction to data communication and networking: Why study data communication? Data Communication, Networks, Protocols and Standards, Standards Organizations. Line Configuration, Topology, Transmission Modes, Categories of Networks Internet works.

Unit-II

Study of OSI and TCP/IP protocol suit: The Model, Functions of the layers, TCP/IP Protocol Suites, Study of DTE-DCE in brief: Digital data transmission, DTE-DCE Interface, Modems, 56K Modems, Cable Modems

Unit-III

Definition Of Sets, Venn Diagrams, Complements, Cartesian Products, Power Sets, Counting Principle, Countable and Uncountable Sets, and Pigeonhole Principle. Definition and Types of Function, Composition of Functions, Recursively Defined Functions. Definition of Relation, Properties of Relation, Types of Relation, Composition of Relations, Domain and Range of a Relation, Pictorial Representation of Relation, Partial Ordering Relation.

Unit-IV

Proposition Logic, Basic Logic, Logical Connectives, Truth Tables, Tautologies, Contradiction, Normal Forms (Conjunctive and Disjunctive), Validity, Predicate Logic, Universal and Existential

Quantification. Notion of Proof: Proof by Implication, Converse, Inverse, Contrapositive, Negation, and Contradiction, Direct Proof, Proof by Using Truth Table, Proof by Counter Example.

Unit-V

Introduction to networks and devices: Network classes, Repeaters, Hub, Bridges, Switches, Routers, Gateways Routers, V-SAT, Distance Vector Routing, Link State Routing

List of Practical:

1. Study of Network Components.
2. Study of Analog and Digital Signals.
3. To make straight and cross cable using IBM standard.
4. To connect two pc's using peer to peer communication.
5. Implementation of small network using hub and switch.
6. Study of Networks.

Suggested Reading:

1. Computer Networks by Andrew S. Tanenbaum.
2. Data and Computer Communications by William Stallings
3. Behrouz A. Forouzan, "Data communication and Networking", Fourth Edition, Tata McGraw Hill, 2011.
4. Larry L. Peterson, Peter S. Davie, "Computer Networks", Fifth Edition, Elsevier, 2012.
5. Data communication & Networking by Bahrouz Forouzan.

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SEMESTER-III

Course Code	Category	Course Name	Teaching & Evaluation Scheme								
			Theory			Practical		Th	T	P	Credits
			End Sem University	Two Term Exam	Teacher Assessment*	End Sem University exam	Teacher Assessment*				
BSDFN302	Compulsory	Database Management System	60	20	20	30	20	4	0	2	5

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

COURSE OBJECTIVES

The student will have ability to:
1. Understand basics of database management system.
2. Get acquainted with working SQL.
3. Be able to implement queries in SQL.
4. Implementing operations in SQL.

COURSE OUTCOMES

Upon completion of the subject, students will be able to:
6. Understand structure of database management system.
7. Understand types of data and importance of database management.
8. Acquaint with working of SQL.

4. Be able to implement queries in SQL.
5. Implement operations in database management system.

SYLLABUS

Unit-I

Introduction to Data and Information, Data Base, Advantage of database management system, Data models: Relational, Entity-Relationship, Object-oriented, Network, Hierarchical. File organization techniques, Database system architecture, various views of data, data independence, schema and subschema, Database languages, DBA and users, Data Dictionary.

Unit-II

Domains, Relations, and Keys, Relational Model: Relational algebra, relational calculus, SQL examples, Integrity constraints. relational database, various types of keys, candidate, primary, alternate, and foreign keys. Modifications of database, idea of relational calculus, basic structure of SQL.

Unit-III

Relational Database Design: Anomalies, Decomposition, Dependencies and Normal Forms, dependencies, introduction to normalization, non-loss decomposition, Functional Dependency diagram, Different dependencies. dependency preservation.

Unit-IV

Database Integrity, Integrity rules, domain rules, attribute rules, relation rules, Database rules, assertions, triggers, integrity, and SQL. distributed data storage, data replication, data fragmentation horizontal, vertical, and mixed fragmentation.

Unit-V

Concurrency Control: Serializability, lock-based protocols, timestamp-based protocols. ACID properties, Transaction states, Implementation of atomicity and durability, concurrent executions, basic idea of serializability, failure classification, Database modification, control.

List of Practical:

1. Creating tables in SQL for various relations.
2. Implementing the queries in SQL.
3. Views creation in SQL.
4. Writing Assertions
5. Writing Triggers
6. Implementing Operations on relations (tables) using PI/SQL
7. Creating FORMS
8. Report generation.

Suggested Reading:

1. B.C. Desai. “An Introduction To Database Systems”, BPB.
2. Carlos Coronel and Steven Morris, Database Systems: Design, Implementation, & Management 13th Edition, Cengage Learning (2018).
3. Raghurama Krishnan “Database Systems”, TMH.
4. C.J. Date “An introduction to Database Systems”.

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			Theory			Practical		Th	T	P	Credits
			End Sem University	Two Term Exam	Teacher Assessment*	End Sem University exam	Teacher Assessment*				
BSDFN303	Compulsory	Forensic Audio Video Analysis	60	20	20	30	20	4	0	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
*__Teacher Assessment__ shall be based following components: Quiz/Assignment/ Project/ Part

COURSE OBJECTIVES

The student will have ability to:
1. To acquaint with fundamentals voice production theory.
2. Apply techniques to transfer and preserve audio and video recordings.
3. Analyze voice and video recordings.
4. compare and interpret voice and video samples.

COURSE OUTCOMES

Upon completion of the subject, students will be able to:
9. Understand the basic theory of voice production.
10. Understand the basics of video recordings.
11. Be able to use software tools to analyze voice recordings.
4. Be able to use software tools to analyze video recordings.
5. Understand forensic importance of audio and video analysis.

SYLLABUS

Unit-I

Physics of sound: waves and sound, analysis, and synthesis of complex waves, Human and non-human utterances, anatomy of vocal tract, vocal formants, analysis of vocal sound, frequencies, and overtones.
Electronics of Audio Recording, Transmission and Playback devices, noise and distortion, voice storage and preservation.

Unit-II

Various approaches in Forensic Speaker Identification, Instrumental Analysis of speech sample, Interpretation of result, Statistical interpretation of probability scale, Objective/Subjective methods, discriminating tests, closed test, open test.

Unit-III

likelihood ratio calculation. Concept of test and error in Speaker Identification, case studies. Automatic speaker identification and verification system, Voice Biometrics- principle, procedure, application, pros, and cons of voice biometrics.

Unit-IV

Introduction to video technology: electronic photography, scanning, synchronizing the analog signal, Digital signal processing, color video, Digital television standard, HD Video, digital scopes, compression, image acquisition and recording formats, optical media, time code, audio for video, displays.

Unit-V

Basics of CCTV, scope recognizing CCTV evidence & its nature, types of DVRs, DVR recording, evidence, best practices of CCTV evidence retrieval and storage at scene of crime and laboratory. challenges and precaution at the scene of crime. Authentication of Video evidence, video source identification techniques.

List of Practical:

1. Recording of specimen speech samples from a suspect.
2. Preservation of audio evidence.
3. Speaker wise segregation of speech sample of recorded conversation spoken between two speaker software tools.
4. Transfer of audio file from a digital media to other media using standard software and authentication of recorded speech.
5. Detection of discontinuity(s) of voice recordings using voice spectrographic methods.
6. Spectrographic analysis of voice samples using software tool.

Videography of simulated crime scene and its complete documentation.

7. Retrieval of video evidence from DVR.
8. Video analysis and detection of tampered video files using Video analyzing tool.
9. Authentication of video evidence.
10. Video source identification.

Suggested Reading:

1. Bengold & Nelson Moryson; “Speech and Audio signal processing”, John Wiley & Sons, USA (1999)
2. D.B. Fry; “The Physics of Speech, Cambridge University Press”, (2004)
3. Dwight Bolinger et. al.; “Aspects of Language”, Third Edition, Harcourt Brace Jovanovich College Publishers, USA, (1981)
4. Harry Hollien; “Forensic Voice Identification”, Academic Press, London. (2001)
5. Austerberg David; “The Technology of Video & Audio Streaming”, Focal Press, 2013.
6. Millerson Gerald; “Video Camera Techniques”, Focal Press, 2006.
7. Musburger, B. Robert & Michael R. Ogden; “Single Camera Video Production”, Focal Press, 2014.

SEMESTER- III

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			Theory			Practical		Th	T	P	Credits
			End Sem University	Two Term Exam	Teacher Assessment*	End Sem University exam	Teacher Assessment*				
BSDFN3042	Elective (core)	Cyber Security	60	20	20	0	0	4	0	0	4

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Quiz/Assignment/ Project/ Participation in Class, given that no component shall exceed more than 10marks.

COURSE OBJECTIVES

The student will have ability to:
1. Understand cybercrime and cyber security.
2. Get acquainted with status of cybercrime in India.
3. Be able to understand need of cyber security in India.
4. Understand about digital evidence and their legal values.

COURSE OUTCOMES

Upon completion of the subject, students will be able to:
12. Understand history of cybercrime.
13. Understand the basics of cybercrimes and digital evidence.
14. Acquaint with digital evidence and their legal value.
4. Be able to know provisions of IT act.
5. Understand forensic importance of cyber security and IT laws.

SYLLABUS

Unit-I

Introduction to cybercrime and information security, classification of cybercrimes, Legal status of cybercrime in India.
Computer security concepts, Security services, OSI security, Security mechanism, Security attacks and their types, Fundamental security design principle, Model for security network security.

Unit-II

Cyber offence; General idea, planning by criminals, cyber stalking, social engineering. Botnets, attack vector, cloud computing. Mobile and wireless devices as a tool for cybercrimes, security challenges posed by mobile devices, registry setting for mobile devices, attacks on mobile phones.

Unit-III

Modus operandi of cybercrime, proxy server and anonymizers, identity theft, password cracking, virus, and worms; types, manner of attack- trojan horse, backdoors, logic bombs etc.,

steganography, DoS and DDoS attacks, SQL injection, buffer overflow, attacks on wireless networks.

Unit-IV

Networks and their types, wireless network security, IP security, e-mail security, cloud security, forensic analysis of e-mail, digital forensic life cycle, computer forensic investigation, relevance of OSI model of computer forensic.

Unit-V

Cybercrime status in India, need of cyber law, Information Technology Act, digital signature and the IT act, important provisions in information technology act, cyber forensic and digital evidence, admissibility of digital evidence in Indian courts.

Suggested Reading:

1. Kevin Mitnick, The Art of Invisibility, Little, Brown and Company (2017).
2. Don Franke, Cyber Security Basics: Protect your organization by applying the fundamentals, 2016.
3. Raef Meeuwisse, Cybersecurity for Beginners, Cyber Simplicity Ltd; 2nd edition (2017).
4. Digital Forensics and Incident Response: Incident response techniques and procedures to respond to modern cyber threats, 2nd Edition.