| Regulation: R20 | | IV / IV - B.Tech. I - Semester | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **INFORMATION TECHNOLOGY** | | | | | | | | | |
| **SCHEME OF INSTRUCTION & EXAMINATION** (With effect from 2020-21 admitted Batch onwards) | | | | | | | | | |
| **Course Code** | **Course Name** | **Category** | **Cr** | **L** | **T** | **P** | **Int. Marks** | **Ext. Marks** | **Total Marks** |
| B20HS4101 | Universal Human Values-2: Understanding Harmony | HS | 3 | 3 | 0 | 0 | 30 | 70 | 100 |
| #PE-III | Professional Elective -III | PE | 3 | 3 | 0 | 0 | 30 | 70 | 100 |
| #PE-IV | Professional Elective -IV | PE | 3 | 3 | 0 | 0 | 30 | 70 | 100 |
| #PE-V | Professional Elective -V | PE | 3 | 3 | 0 | 0 | 30 | 70 | 100 |
| #OE-III | Open Elective-III | OE | 3 | 3 | 0 | 0 | 30 | 70 | 100 |
| #OE-IV | Open Elective-IV | OE | 3 | 3 | 0 | 0 | 30 | 70 | 100 |
| #SOC-V | Skill Oriented Course - V | SOC | 2 | 1 | 0 | 2 | -- | 50 | 50 |
| B20IT4119 | Industrial/Research Internship 2 Months | PR | 3 | -- | -- | -- | -- | 50 | 50 |
| | **TOTAL** | | **23** | **19** | **0** | **2** | **180** | **520** | **700** |

| | Course Code | Course |
|---|---|---|
| #PE-III | B20IT4101 | Cloud Computing |
| | B20IT4102 | Artificial Neural Networks |
| | B20IT4103 | Internet of Things |
| | B20IT4104 | Cyber Security & Forensics |
| | B20IT4105 | Drone Technology |
| #PE-IV | B20IT4106 | Cryptography and Networks Security |
| | B20IT4107 | Deep Learning Techniques |
| | B20IT4108 | Social Network Analysis |
| | B20IT4109 | Advanced Database |
| | B20IT4110 | MOOCS-NPTEL / SWAYAM |
| #PE-V | B20IT4111 | Wireless Adhoc and Sensor Networks |
| | B20IT4112 | Block-Chain Technology |
| | B20IT4113 | E-Commerce |
| | B20IT4114 | Ethical Hacking |
| | B20IT4115 | MOOCS-NPTEL/SWAYAM |
| #SOC-V | B20IT4116 | PYTHON: Deep Learning |
| | B20IT4117 | APSSDC offered courses. |
| | B20IT4118 | Secure Coding Techniques |
| #OE-III & #OE-IV | Student has to study one Open Elective each from OE-III & IV offered by CE or ECE or EEE or ME or S&H from the list enclosed. | |

| Code | Category | L | T | P | C | I.M | E.M | Exam |
|-------|----------|---|----|----|---|-----|-----|--------|
| B20HS4101 | HS | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |

## UNIVERSAL HUMAN VALUES-2: UNDERSTANDING HARMONY
### (Common to AIDS, CSBS, CSE, IT & ME)

**Course Objectives:**

| | |
|----|---|
| 1. | To enable students appreciate the essential complementarity between 'Values' and 'Skills' to ensure sustained happiness and prosperity which are the core aspirations of all human beings. |
| 2. | To understand the harmony in the human being, family, society and nature/existence |
| 3. | To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Value based living in a natural way. |

**Course Outcomes:** At the end of the course, students will be able to

| S.No | Outcome | Knowledge Level |
|------|---------|-----------------|
| 1. | Identify the importance of human values and skills for sustained happiness | K2 |
| 2. | Understand how to balance profession and personal happiness/ goals. | K2 |
| 3. | Express their commitment towards what they have understood (human values, human relationship and human society) | K2 |
| 4. | Explain the significance of trust, mutually satisfying human behavior and enriching interaction with nature. | K2 |
| 5. | Develop/ propose appropriate technologies and management patterns to create harmony in professional and personal life. | K3 |

### SYLLABUS

| | |
|--------|---|
| **UNIT-I (10 Hrs)** | **Course Introduction** - Need, Basic Guidelines, Content and Process for Value Education Purpose and motivation for the course, recapitulation from Universal Human Values-I Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario Method to fulfil the above human aspirations: understanding and living in harmony at various levels. |
| **UNIT-II (08 Hrs)** | **Understanding Harmony in the Human Being** - Harmony in Myself! Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' - happiness and physical facility  Page 29 of 43 Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail; Programs to ensure Sanyam and Health. |

| | |
|---|---|
| **UNIT-III (08 Hrs)** | **Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship** Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship Understanding the meaning of Trust; Difference between intention and competence Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family. |
| | |
| **UNIT-IV (08 Hrs)** | **Understanding Harmony in the Nature and Existence** - Whole existence as Coexistence Understanding the harmony in the Nature Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self regulation in nature Understanding Existence as Co-existence of mutually interacting units in all pervasive space Holistic perception of harmony at all levels of existence. |
| | |
| **UNIT-V (08 Hrs)** | **Implications of the above Holistic Understanding of Harmony on Professional Ethics** Natural acceptance of human values Definitiveness of Ethical Human Conduct Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations |

**Textbooks:**

| 1. | Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010 |
|---|---|

**Reference Books:**

| 1. | Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999. |
|---|---|
| 2. | Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004. |
| 3. | The Story of Stuff (Book). |
| 4. | The Story of My Experiments with Truth |
| 5. | Small is Beautiful E. F Schumacher by Mohandas Karamchand Gandhi |
| 6. | Slow is Beautiful Cecile Andrews |
| 7. | Economy of Permanence J C Kumarappa |
| 8. | Bharat Mein Angreji Raj Pandit Sunderlal |
| 9. | Rediscovering India by Dharampal Hind Swaraj or Indian Home |
| 10. | Rule by Mohandas K. Gandhi |
| 11. | India Wins Freedom Vivekananda Maulana Abdul Kalam Azad 12Romain Rolland (English) |

| Course Code | Category | L | T | P | C | I.M | E.M. | Exam |
|---|---|---|---|---|---|---|---|---|
| B20IT4101 | PE | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |

## CLOUD COMPUTING

(For IT)

**Course Objectives**: Students are expected to learn

| | |
|---|---|
| 1 | The implementation of Virtualization Concepts |
| 2 | The implementation of Task Scheduling algorithms |
| 3 | Map-Reduce concept to applications |
| 4 | How to build Private Cloud |
| 5 | the impact of engineering on legal and societal issues involved |

**Course Outcomes:** At the end of the course, student will be able to

| S. No | Outcome | Knowledge Level |
|---|---|---|
| 1 | Interpret the key dimensions of the challenge of Cloud Computing | K4 |
| 2 | Examine the economics, financial, and technological implications for selecting cloud computing for own organization | K3 |
| 3 | Assess the virtualization concepts and resource management for initiating and installing cloud-based applications | K4 |
| 4 | Evaluate own organizations needs for capacity building and security risks in cloud computing related IT areas | K3 |
| 5. | Apply real time cloud application development through AWS, Google and Microsoft. | K3 |

### SYLLABUS

| | |
|---|---|
| **UNIT-I (10 Hrs)** | **Introduction**: Network centric computing, Network centric content, peer-to –peer systems, cloud computing delivery models and services, Ethical issues, Vulnerabilities, Major challenges for cloud computing. <br> **Parallel and Distributed Systems**: introduction, architecture, distributed systems, communication protocols, logical clocks, message delivery rules, concurrency. |
| **UNIT-II (10 Hrs)** | **Cloud Infrastructure**: At Amazon, The Google Perspective, Microsoft Windows Azure, Open Source Software Platforms, Cloud storage diversity, Inter cloud, energy use and ecological impact, responsibility sharing, user experience, Software licensing. <br> **Cloud Computing Applications and Paradigms**: Challenges for cloud, existing cloud applications and new opportunities, architectural styles, workflows, The Zookeeper, HPC on cloud. |
| **UNIT-III (12 Hrs)** | **Cloud Resource virtualization**: Virtualization, layering and virtualization, virtual machine monitors, virtual machines, virtualization- full and para, performance and security isolation, hardware support for virtualization, <br> **Resource Management and Scheduling**: Policies and Mechanisms, Stability of a two- |

| | level resource allocation architecture, coordination, resource bundling, scheduling algorithms, fair queuing, start time fair queuing, cloud scheduling subject to deadlines. |
|---|---|
| | |
| **UNIT-IV** **(12 Hrs)** | **Storage Systems**: Storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Big Table, Megastore (text book 1), Amazon Simple Storage Service(S3) (Text book 2), <br><br>**Cloud Security**: Cloud security risks, security – a top concern for cloud users, privacy and privacy impact assessment, trust, OS security, Virtual machine security, Security risks. |
| | |
| **UNIT-V** **(10 Hrs)** | **Cloud Application Development**: Amazon Web Services : EC2 – instances, connecting clients, security rules, launching, usage of S3 in Java, Cloud based simulation of a Distributed trust algorithm( Text Book 1) <br><br>**Google**: Google App Engine, Google Web Toolkit (Text Book 2), <br><br>**Microsoft**: Azure Services Platform, Windows live, Exchange Online, Share Point Services, Microsoft Dynamics CRM (Text Book 2) |

| Text Books: | |
|---|---|
| 1. | Cloud Computing, Theory and Practice,1st Edition, Dan C Marinescu, MK Elsevier publisher, 2013 |
| 2. | Cloud Computing, A Practical Approach, 1st Edition, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH,2017 |

| Reference Books: | |
|---|---|
| 1. | Mastering Cloud Computing, Foundations and Application Programming,1st Edition, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH,2013 |
| 2. | Essential of Cloud Computing, 1st Edition, K Chandrasekharan, CRC Press, 2014. |
| 3. | Cloud Computing, A Hands on Approach, Arshdeep Bahga, Vijay Madisetti, Universities Press, 2014. |

| Course Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|---|---|---|---|---|---|---|---|
| B20IT4102 | PE | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |

## ARTIFICIAL NEURAL NETWORKS

### (For IT)

**Course Objectives:**

| | |
|---|---|
| 1. | The students will learn about the foundations of Artificial Neural Networks |
| 2. | The students will get knowledge on Soft Computing Concepts |
| 3. | The students will learn about various types of Genetic algorithms and its applications |
| 4. | The students will learn how to apply optimization strategies. |

**Course Outcomes:** At the end of the course, student will be able to

| S. No | Outcome | Knowledge Level |
|---|---|---|
| 1. | Understand the concepts of Artificial intelligence and soft computing techniques | K2 |
| 2. | Analyze the concepts of Neural Networks and select the Learning Networks in modeling real world systems | K4 |
| 3. | Implement the concepts of Fuzzy reasoning and concepts of Genetic algorithm and its applications to soft computing | K3 |
| 4. | Classify Biologically inspired algorithm such as neural networks, genetic algorithms, ant colonyoptimization, and bee colony optimization | K3 |
| 5. | Design hybrid system incorporating neural network, genetic algorithms, fuzzy systems. | K4 |

## SYLLABUS

| | |
|---|---|
| **UNIT-I (10Hrs)** | **Soft Computing and Artificial Intelligence:** Introduction of Soft Computing, Soft Computing vs. Hard Computing, Various Types of Soft Computing Techniques, Applications of Soft Computing, AI Search Algorithm, Predicate Calculus, Rules of Interference, Semantic Networks, Frames, Objects, Hybrid Models |
| **UNIT-II (10 Hrs)** | **Artificial Neural Networks and Paradigms:** Introduction to Neuron Model, Neural Network Architecture, Learning Rules, Perceptrons, Single Layer Perceptrons, Multilayer Perceptrons, Back propagation Networks, Kohnen's self organizing networks, Hopfield network, Applications of NN. |
| **UNIT-III (10 Hrs)** | **Fuzzy Logic:** Introduction, Fuzzy sets and Fuzzy reasoning, Basic functions on fuzzy sets, relations, rule based models and linguistic variables, fuzzy controls, Fuzzy decision making, applications of fuzzy logic. |
| **UNIT-IV (10 Hrs)** | **Genetic Algorithms and Swarm Optimizations:** Introduction, Genetic Algorithm, Fitness Computations, Cross Over, Mutation, Evolutionary Programming, Classifier Systems, Genetic Programming Parse Trees, Variants of GA, Applications, Ant Colony Optimization, Particle Swarm Optimization, Artificial Bee Colony Optimization. |

| | |
|---|---|
| **UNIT-V**<br>**(10 Hrs)** | **Hybrid Systems:** Neuro fuzzy hybrid systems, Adaptive neuro fuzzy inference systems, Fuzzy backpropagation network, Genetic neuro hybrid system, Genetic algorithm based backpropagation network,Genetic-fuzzy hybrid systems. |
| | . |

**Textbooks:**

| | |
|---|---|
| 1. | Simon S. Haykin, Neural Networks, Prentice Hall, 2nd edition. |
| 2. | S. Rajasekaran & G. A. Vijayalakshmi Pai "Neural Networks, Fuzzy Logic and Genetic Algorithms:Synthesis & Applications", PHI,2003. |

**Reference Books:**

| | |
|---|---|
| 1. | S. N. Sivanandam & S. N. Deepa "Principles of Soft Computing" Wiley – India, 2nd Edition, 2007. |
| 2. | Jang J.S.R., Sun C.T. and Mizutani E, "Neuro-Fuzzy and Soft computing", Prentice Hall, 1998. |
| 3. | Jacek M. Zurada, Introduction to Artificial Neural Systems, Jaico Publishing House,1994 |
| 4. | Zimmermann, "Fuzzy Set Theory and its Application", 3rd Edition. |
| 5. | D.E. Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y, 1989. |
| 6. | Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill, 3rd edition 2009 |

| Course Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|---|---|---|---|---|---|---|---|
| B20IT4103 | PE | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |

## INTERNET OF THINGS

(For IT)

**Course Objectives:** From the course the student will learn

| | |
|---|---|
| 1. | The application areas of IOT |
| 2. | The revolution of Internet in Mobile Devices, Cloud & Sensor Networks |
| 3. | Building blocks of Internet of Things and characteristics |

**Course Outcomes:** At the end of the course, student will be able to

| S. No | Outcome | Knowledge Level |
|---|---|---|
| 1. | Understand basics of Internet of Things (IoT). | K2 |
| 2. | Demonstrate various business models relevant to IoT. | K2 |
| 3. | Construct designs for web connectivity | K3 |
| 4. | Organize sources of data acquisition related to IoT, integrate to enterprise systems. | K3 |
| 5. | Describe IoT with Cloud technologies. | K2 |

## SYLLABUS

| | |
|---|---|
| UNIT-I (10Hrs) | **The Internet of Things-** An Overview of Internet of things, Internet of Things Technology, behind IoTs Sources of the IoTs, Examples OF IoTs, Design Principles For Connected Devices, Internet connectivity, **Application Layer Protocols-** HTTP, HTTPS, FTP |
| UNIT-II (10 Hrs) | Business Models for Business Processes in the Internet of Things, IoT/M2M systems LAYERS AND designs standardizations, Modified OSI Stack for the IoT/M2M Systems, ETSI M2M domains and High- level capabilities, Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability |
| UNIT-III (10 Hrs) | Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices |
| UNIT-IV (10 Hrs) | Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/Services/Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems |
| UNIT-V (10 Hrs) | Data Collection, Storage and Computing Using a Cloud Platform for IoT/M2M Applications/Services, Data Collection, Storage and Computing Using cloud platform Everything as a service and Cloud Service Models, IOT cloud-based services using the Xively (Pachube/COSM), Nimbits and other platforms Sensor, Participatory Sensing, |

| | Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology, Sensors Technology, Sensing the World. |
|---|---|
| | |

| **Textbooks:** | |
|---|---|
| 1. | Internet of Things: Architecture, Design Principles and Applications, Rajkamal, McGraw HillHigher Education |
| 2. | Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015 |
| **Reference Books:** | |
| 1. | Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wile |
| 2. | Getting Started with the Internet of Things, CunoPfister , Oreilly |

| Course Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|---|---|---|---|---|---|---|---|
| B20IT4104 | PE | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |

## CYBER SECURITY AND FORENSICS

(For IT)

**Course Objectives:** The main objective of the course is to

| | |
|---|---|
| 1. | Identify security risks and take preventive steps |
| 2. | Understand the forensics fundamentals |
| 3. | Understand the evidence capturing process |
| 4. | Understand the preservation of digital evidence |

**Course Outcomes:** At the end of the course, student will be able to

| S. No | Outcome | Knowledge Level |
|---|---|---|
| 1. | Understand the basic terminology of Cybercrimes | K2 |
| 2. | Apply a number of different computer forensic tool to a given | K3 |
| 3. | Understand the basics of Computer Forensics | K2 |
| 4. | Analyze and validate digital evidence data | K3 |
| 5. | Analyze acquisition method for digital evidence related to system security | K3 |

### SYLLABUS

| | |
|---|---|
| UNIT-I (10Hrs) | **Introduction to Cybercrime:** Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Cybercriminals, Classifications of Cybercrime, Cyberstalking, Cybercafe and Cybercrimes, Botnets. Attack Vector, Proliferation of Mobile and Wireless Devices, Security Challenges Posed by Mobile Devices, Attacks on Mobile/Cell Phones, Network and Computer Attacks. |
| UNIT-II (10 Hrs) | **Tools and Methods:** Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, Sniffers, Spoofing, Session Hijacking Buffer overflow, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Identity Theft (ID Theft), Foot Printing and Social Engineering, Port Scanning, Enumeration. |
| UNIT-III (10 Hrs) | **Cyber Crime Investigation:** Introduction, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Hands on Case Studies. Encryption and Decryption Methods, Search and Seizure of Computers, Recovering Deleted Evidences, Password Cracking. |
| UNIT-IV (10 Hrs) | **Computer Forensics and Investigations:** Understanding Computer Forensics, Preparing for Computer Investigations. Current Computer Forensics Tools: Evaluating Computer Forensics Tools, Computer Forensics Software Tools, Computer Forensics Hardware Tools, Validating and Testing Forensics Software, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Graphics and |

| | |
|---|---|
| | Network Forensics, E-mail Investigations, Cell Phone and Mobile Device Forensics. |
| | |
| **UNIT-V** **(10 Hrs)** | **Cyber Crime Legal Perspectives:** Introduction, Cybercrime and the Legal Landscape around the World, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment, Cyberlaw, Technology and Students: Indian Scenario. |
| | |

**Textbooks:**

| | |
|---|---|
| 1. | Sunit Belapure Nina Godbole "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", WILEY, 2011. |
| 2. | Nelson Phillips and Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009. |

**Reference Books:**

| | |
|---|---|
| 1. | Michael T. Simpson, Kent Backman and James E. Corley, "Hands on Ethical Hacking and Network Defence", Cengage, 2019. |
| 2. | Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi. |
| 3. | Alfred Basta, Nadine Basta,Mary Brown and Ravinder Kumar "Cyber Security and Cyber Laws" , Cengage,2018. |

**E- Resources:**

| | |
|---|---|
| 1. | CERT- In Guidelines- http://www.cert-in.org.in/ |
| 2. | https://www.coursera.org/learn/introduction-cybersecurity-cyber-attacks [Online course] |
| 3. | https://online.stanford.edu/computer-science-security/professional-education/free-online-videos [Free online videos] |
| 4. | Nickolai Zeldovich. 6.858 Computer Systems Security. Fall 2014. Massachusetts Institute of Technology: MIT Open Courseware, https://ocw.mit.edu License: Creative Commons BY-NCSA |

| Course Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|---|---|---|---|---|---|---|---|
| **B20IT4105** | **PE** | **3** | **--** | **--** | **3** | **30** | **70** | **3 Hrs.** |

## DRONE TECHNOLOGY

(For IT)

**Course Objectives:**

| 1. | To understand the basics of Unmanned Arial Vehicles (Drones) and its various applications. |
|---|---|
| 2. | To learn fundamental concepts of electrical and electrics required for the drone. |
| 3. | The students will be introduced to the safety and operational considerations duringbuilding and flying the drone. |

**Course Outcomes:** At the end of the course, student will be able to

| S. No | Outcome | Knowledge Level |
|---|---|---|
| 1. | Explore various considerations for building a drone like electrical, electronics, aerodynamics, safety and operations aspects. | K2 |
| 2. | Differentiate between various components used for building application specificdrones. | K3 |
| 3. | Apply the concepts of electrical, electronic and aerodynamics for developing dronesolutions. | K3 |
| 4. | Create a working prototype in teams, involving design, assembling, calibrating andtesting using appropriate hardware components and software tools. | K4 |
| 5. | Understand the effectiveness of payload selection in specific case studies. | K2 |

## SYLLABUS

| **UNIT-I (10Hrs)** | **Introduction to Drones** <br> Definitions, History of UAVs, Classification of UAVs, Applications of Drones, safety &operational considerations**.** |
|---|---|
| **UNIT-II (10 Hrs)** | **Basic Electrical and Electronics** <br> **Electrical:** Voltage, Current, Power, Speed, Torque, series and parallel connection sources. <br> **Electronics:** Basics of Diodes, Transistors and FET's (definitions, V-I Characteristics andSwitching behavior), Concept of Relays, LEDs. <br> **Concepts of Flight** <br> Aerodynamics, Flight Performance, Stability and Control |
| **UNIT-III (10 Hrs)** | **Components and Specifications-1** <br> **Flight Controller:** Basics of Microcontrollers (Definition, types and Applications), Modes of Communications, (IR and RF Transmitter, Receiver.) <br> **Battery:** Types, Selection, Charge-Discharge states, diode bridge rectifier (AC-DC)-5V, 12V,Battery charger. |

| | |
|---|---|
| | |
| **UNIT-IV** **(10 Hrs)** | **Components and Specifications-2**<br>**Propeller System:** Propellers, types of propellers, selection of propellers.<br>**BLDC Motors:** Principles of operation, Construction.<br>**ESC (Motor Driver):** PWM, Speed Control. |
| | |
| **UNIT-V** **(10 Hrs)** | **Payload and Case Studies**<br>**Impact of Payloads:** Types of Payloads and their application sensors, CaseStudies. |

| **Textbooks:** | |
|---|---|
| 1. | Basic Electrical and Electronics Engineering by S.K. Bhattacharya 2011, PearsonEducation. |
| 2. | DIY Drones for the Evil Genius: Design, Build, and Customize Your Own Drones by Fitz Tepper, Ian Cinnamon, and Romi Kadri, Tata McGraw-Hill, 2016 |
| **Reference Books:** | |
| 1. | Build a Drone: A Step-by-Step Guide to Designing |
| 2. | Drones: An Illustrated Guide to the Unmanned Aircraft that are Filling our Skies by Book by Martin J Dougherty |
| 3. | Introduction to UAV Systems by Fahlstrom & Gleason |
| 4. | The Complete Guide to Drones by Juniper |
| 5. | Unmanned Aircarft System, UAVS Design, Development and Deployment, Reg Austin –Wiley |
| 6. | Make: Getting Started with Drones by Terry Kilby & Belinda Kilby, SPD |
| **e-Resources** | |
| 1. | Make an Open Source Drone in Udemy<br>https://www.udemy.com/course/make_a_drone/ |

| Course Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|---|---|---|---|---|---|---|---|
| B20IT4106 | PE | 3 | -- | - | 3 | 30 | 70 | 3 Hrs. |

## CRYPTOGRAPHY & NETWORK SECURITY

(For IT)

**Course Objectives:** The main objectives of this course are to

| 1. | Solve problems using algorithm design methods such as the RSA, DES, AES |
|---|---|
| 2. | Analyze the performance of algorithms. |
| 3. | Demonstrate a familiarity with major algorithms and Approaches. |

**Course Outcomes:** At the end of the course, student will be able to

| S. No | Outcome | Knowledge Level |
|---|---|---|
| 1. | Understand, apply and analyze the algorithms on security problems | K3 |
| 2. | Understand, apply and analyze Symmetric approaches. | K3 |
| 3. | Understand, apply and analyze Asymmetric approaches. | K3 |
| 4. | Understand, apply and analyze security measurements | K3 |
| 5. | Understand, apply and analyze various malicious software. | K3 |

### SYLLABUS

| UNIT-I (12 Hrs) | **INTRODUCTION:** The need for security-Security approaches, principals of security, plain text and cipher Text- Types of attacks –substitution and Transportation Techniques – Encryption Techniques –Encryption and Decryption- Symmetric and Asymmetric Cryptography – Stenography-KDC<br><br>**SYMMETRIC KEY CRYPTOGRAPHIC ALGORITHMS:** Feistel Cipher Structure, Data encryption standard, Triple DES, AES, Stream Ciphers and RC4. |
|---|---|
| UNIT-II (12 Hrs) | **ASYMMETRIC KEY CRYPTOGRAPHIC ALGORITHMS:** Overview of asymmetric key cryptography, Diffie Hellman Key exchange, RSA algorithm-symmetric and asymmetric key cryptography together-Message Digest- MAC- HMAC- digital signatures. |
| UNIT-III (10 Hrs) | **PUBLIC KEY INFRASTRUCTURE:** Introduction-Digital Certificates-Private Key management-The PKIX model.<br><br>**USER AUTHENTICATION MECHANISMS:** Introduction-Authentication basics-passwords authentication tokens-certificate based authentication-biometrics authentication-Kerberos. |
| UNIT-IV (10 Hrs) | **INTERNET SECURITY PROTOCOLS:** Basic concepts -SSL-SHTTP-TSP-SET- SSL versus SET-3D secure protocol -Email security-WAP security -security in GSM – 3G Security, Introduction to firewalls-IP security-Virtual Private Networks**.** |
| UNIT-V (8 Hrs) | **MALICIOUS SOFTWARE:** Types of Malicious Software, Viruses, Viruses countermeasures, Warms, Bots, and Honey pots, Denial of Service Attacks and Flooding Attacks. |

| | |
|---|---|
| **Text Books:** | |
| 1. | Cryptography and Network security, Atul Kahate, Tata McGraw-Hill Pub company Ltd., New Delhi |
| 2. | Computer Security by William stallings and Lawrie Brown, Pearson Pub |
| **Reference Books:** | |
| 1. | Network Security Private Communication in a public world, Charlie Kaufman, Radia Perlman & Mike Speciner, Prentice Hall of India Private Ltd., New Delhi. |
| 2. | Network Security: The Complete Reference by Roberta Bragg, Mark Phodes- Ousley, Keith Strassberg Tata Mcgraw-Hill. |

| Course Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|---|---|---|---|---|---|---|---|
| B20IT4107 | PE | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |

## DEEP LEARNING TECHNIQUES

(For IT)

**Course Objectives:** The main objectives of this course are to

| | |
|---|---|
| 1. | Learn deep learning methods for working with sequential data, |
| 2. | Learn deep recurrent and memory networks, |
| 3. | Learn deep Turing machines, |
| 4. | Apply such deep learning mechanisms to various learning problems. |
| 5. | Know the open issues in deep learning and have a grasp of the current research directions. |

**Course Outcomes:** At the end of the course, student will be able to

| S. No | Outcome | Knowledge Level |
|---|---|---|
| 1. | Demonstrate the fundamental concepts learning techniques of Artificial Intelligence, MachineLearning and Deep Learning. | K2 |
| 2. | Discuss the Neural Network training, various random models**.** | K2 |
| 3. | Explain the Techniques of Keras, TensorFlow, Theano and CNTK | K3 |
| 4. | Classify the Concepts of CNN and RNN | K2 |
| 5. | Implement Interactive Applications of Deep Learning. | K4 |

## SYLLABUS

| | |
|---|---|
| **UNIT-I (10Hrs)** | **Fundamentals of Deep Learning:** Artificial Intelligence, History of Machine learning: Probabilistic Modeling, Early Neural Networks, Kernel Methods, Decision Trees, Random forests and Gradient BoostingMachines, **Fundamentals of Machine Learning:** Four Branches of Machine Learning, Evaluating Machine learning Models, Overfitting and Underfitting. |
| **UNIT-II (10 Hrs)** | **Introducing Deep Learning:** Biological and Machine Vision, Human and Machine Language, Artificial Neural Networks, Training Deep Networks, Improving Deep Networks. |
| **UNIT-III (10 Hrs)** | **Neural Networks:** Anatomy of Neural Network, Introduction to Keras: Keras, TensorFlow, Theano and CNTK, Setting up Deep Learning Workstation, Classifying Movie Reviews: Binary Classification, Classifying newswires: Multiclass Classification. |
| **UNIT-IV (10 Hrs)** | **Convolutional Neural Networks:** Nerual Network and Representation Learing, Convolutional Layers, Multichannel Convolution Operation, **Recurrent Neural Networks:** Introduction to RNN, RNN Code, PyTorch Tensors: Deep Learning with PyTorch, CNN in PyTorch. |

| UNIT-V (10 Hrs) | **Interactive Applications of Deep Learning:** Machine Vision, Natural Language processing, Generative Adversial Networks, Deep Reinforcement Learning. **Deep Learning Research:** Autoencoders**,** Deep Generative Models: Boltzmann Machines Restricted Boltzmann Machines, Deep Belief Networks. . |
|---|---|
|  |  |

| **Textbooks:** | |
|---|---|
| 1. | Deep Learning- Ian Goodfellow, Yoshua Bengio and Aaron Courvile, MIT Press, 2016 |
| 2. | Deep Learning with Python - Francois Chollet, Released December 2017, Publisher(s): Manning Publications, ISBN: 9781617294433 |
| 3. | Deep Learning Illustrated: A Visual, Interactive Guide to Artificial Intelligence - Jon Krohn, Grant Beyleveld, Aglaé Bassens, Released September 2019, Publisher(s): Addison-Wesley Professional, ISBN: 9780135116821 |
| 4. | Deep Learning from Scratch - Seth Weidman, Released September 2019, Publisher(s): O'Reilly Media, Inc., ISBN: 9781492041412 |
| **Reference Books:** | |
| 1. | Artificial Neural Networks, Yegnanarayana, B., PHI Learning Pvt. Ltd, 2009. |
| 2. | Matrix Computations, Golub, G.,H., and Van Loan,C.,F, JHU Press,2013. |
| 3. | Neural Networks: A Classroom Approach, Satish Kumar, Tata McGraw-Hill Education, 2004. |
| **e-Resources** | |
| 1. | Swayam NPTEL:  Deep Learning: https://onlinecourses.nptel.ac.in/noc22_cs22/preview |

| Course Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|---|---|---|---|---|---|---|---|
| B20IT4108 | PE | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |

## SOCIAL NETWORKS ANALYSIS

(For IT)

**Course Objectives:** The main objectives of this course are to

| 1. | Formalize different types of entities and relationships as nodes and edges and represent |
|---|---|
| 2. | This information as relational data |
| 3. | Plan and execute network analytical computations |
| 4. | Use advanced network analysis software to generate visualizations and perform empirical |
| 5. | Investigations of network data |

**Course Outcomes:** At the end of the course, student will be able to

| S. No | Outcome | Knowledge Level |
|---|---|---|
| 1. | Understand basic notation and terminology used in network science | K2 |
| 2. | Compare, Visualize and summarize networks | K3 |
| 3. | Illustrate basic principles behind network analysis algorithms | K3 |
| 4. | Develop practical skills of network analysis in R programming language | K3 |
| 5. | Apply real work networks | K3 |

## SYLLABUS

| UNIT-I (10Hrs) | Social Network Analysis: Preliminaries and definitions, Erdos Number Project, Centrality measures, Balance and Homophily. |
|---|---|
| **UNIT-II (10 Hrs)** | Random graph models: Random graphs and alternative models, Models of network growth, Navigation in social Networks, Cohesive subgroups, Multidimensional Scaling, Structural equivalence, roles and positions. |
| **UNIT-III (10 Hrs)** | Network topology and diffusion, Contagion in Networks, Complex contagion, Percolation and information, Navigation in Networks Revisited. |
| **UNIT-IV (10 Hrs)** | Small world experiments, small world models, origins of small world, Heavy tails, Small Diameter, Clustering of connectivity, The Erdos Renyi Model, Clustering Models. |
| **UNIT-V (10 Hrs)** | Network structure -Important vertices and page rank algorithm, towards rational dynamics in networks, basics of game theory, Coloring and consensus, biased voting, network formation games, network structure and equilibrium, behavioral experiments, Spatial and agent-based models. |

**Textbooks:**

| 1. | S. Wasserman and K. Faust. "Social Network Analysis: Methods and Applications", Cambridge University Press |
|---|---|

| 2. | D. Easley and J. Kleinberg, "Networks, Crowds and Markets: Reasoning about a highly connected world", Cambridge University Press, 1st edition,2010 |
|---|---|
| **Reference Books:** | |
| 1. | Maarten van Steen. "Graph Theory and Complex Networks. An Introduction", 2010 |
| 2. | Reza Zafarani, Mohammed Ali Abbasi, Huan Liu. "Social Media Mining: An Introduction". Cambridge University Press 2014. |
| 3. | Maksim Tsvetovat and Alexander Kouznetsov. "Social Network Analysis for Startups". O'Reilly Media, 2011. |
| **e-Resources** | |
| 1. | https://www.classcentral.com/course/edx-social-network-analysis-sna-9134 |
| 2. | https://www.coursera.org/learn/social-network-analysis |

| Course Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|---|---|---|---|---|---|---|---|
| B20IT4109 | PE | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |

## ADVANCED DATABASE

(For IT)

**Course Objectives:**

| | |
|---|---|
| 1. | This course deals with distributed data processing, and architectures as well as design issues for distributed DBMSs. |
| 2. | This course provides an introduction to how queries are processed and optimized. |
| 3. | This course provides an introduction to database security and timestamp-based concurrency control. |

**Course Outcomes:** At the end of the course, student will be able to

| S. No | Outcome | Knowledge Level |
|---|---|---|
| 1. | **Summarize** distributed database advantages and architectures. | K2 |
| 2. | **Apply** strategies of fragmentation and optimal allocation. | K3 |
| 3. | **Understand** various aspects of query processing and decomposition | K2 |
| 4. | **Apply** algorithms for optimization of queries. | K3 |
| 5. | **Understand** how concurrent access is controlled and security is enforced on databases. | K2 |

## SYLLABUS

| | |
|---|---|
| **UNIT-I** (10Hrs) | **Introduction to Distributed Database Systems**: Distributed Data Processing, Distributed Database System, Promises of DDBSs, Complicating Factors. **Distributed DBMS Architecture**: DBMS Standardization, Architectural Models for Distributed DBMSs, Distributed DBMS Architecture. |
| **UNIT-II** (12 Hrs) | **Distributed Database Design**: Alternative Design Strategies, Distribution Design Issues, Fragmentation, and Allocation. |
| **UNIT-III** (10 Hrs) | **Overview of Query Processing**: Query Processing Problem, Objectives of Query Processing, Complexity of Relational Algebra Operations, Characterization of Query Processors, Layers of Query Processing. **Query Decomposition**: Normalization, Analysis, Elimination of Redundancy, Rewriting. |
| **UNIT-IV** (10 Hrs) | **Optimization of Distributed Queries**: Query Optimization, Centralized Query Optimization, Join Ordering in Fragment Queries, Distributed Query Optimization Algorithms. |
| **UNIT-V** (8 Hrs) | **Timestamp Based Concurrency Control Algorithms**: Conservative and Multiversion TO algorithms. Optimistic Concurrency Control Algorithms. **Database Security**: Introduction to Database Security Issues, MAC and RBAC for Multilevel Security, SQL Injection. |

| | |
|---|---|
| **Textbooks:** | |
| 1. | Principles of Distributed Database Systems by M Tamer Ozsu and Patrick Valduriez, Pearson Education, 2$^{nd}$ Edition |
| 2. | Fundamentals of Database Systems: Ramez Elmasri, Shamkant B. Navathe, Pearson, 7$^{th}$ Edition. |
| **Reference Books**: | |
| 1. | Database Systems: C.J. Date, Pearson, 3rd  Edition |
| 2. | Database Systems: Design, Implementation and Management, C.M. Coronel, S. Morris, P. Rob, Boston: Cengage Learning,9th edition-2011 |

| Course Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|---|---|---|---|---|---|---|---|
| B20IT4111 | PE | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |

## WIRELESS ADHOC AND SENSOR NETWORKS

### (For IT)

**Course Objectives:** The main objectives of this course are to

| 1. | Learn about the issues and challenges in the design of wireless ad hoc networks. |
|---|---|
| 2. | Understand the working of MAC and Routing Protocols for ad hoc and sensor networks |
| 3. | Learn about the Transport Layer protocols and their QoS for ad hoc and sensor networks. |
| 4. | Understand various security issues in ad hoc and sensor networks and the corresponding solutions. |

**Course Outcomes:** At the end of the course, student will be able to

| S.No | Outcome | Knowledge Level |
|---|---|---|
| 1. | Identify different issues in wireless ad hoc and sensor networks. | K2 |
| 2. | Analyze protocols developed for ad hoc and sensor networks. | K3 |
| 3. | Identify and understand security issues in ad hoc and sensor networks. | K3 |
| 4. | Apply the knowledge to identify the suitable congestion control algorithm based on the network. | K3 |
| 5. | Analyze the security issues possible in Ad hoc and sensor networks. | K3 |

## SYLLABUS

| | |
|---|---|
| **UNIT-I (10Hrs)** | Introduction – Issues and challenges in ad hoc networks – MAC Layer Protocols for wireless ad hoc networks – Contention-Based MAC protocols – MAC Protocols Using Directional Antennas – Multiple-Channel MAC Protocols – Power-Aware MAC Protocols – Routing in Ad hoc Networks – Design Issues – Proactive, Reactive and Hybrid Routing Protocols |
| **UNIT-II (10 Hrs)** | TCP's challenges and Design Issues in Ad Hoc Networks – Transport protocols for ad hoc networks – Issues and Challenges in providing QoS – MAC Layer QoS solutions – Network Layer QoS solutions – QoS Model |
| **UNIT-III (10 Hrs)** | Introduction – Applications – Challenges – Sensor network architecture – MAC Protocols for wireless sensor networks – Low duty cycle protocols and wakeup concepts – Contention- Based protocols – Schedule-Based protocols – IEEE 802.15.4 Zigbee – Topology Control – Routing Protocols |
| **UNIT-IV (10 Hrs)** | Data-Centric and Contention-Based Networking – Transport Layer and QoS in Wireless Sensor Networks – Congestion Control in network processing – Operating systems for wireless sensor networks – Examples |
| **UNIT-V (10 Hrs)** | Security Attacks – Key Distribution and Management – Intrusion Detection – Software based Anti-tamper techniques – Water marking techniques – Defense against routing attacks - Secure Ad hoc routing protocols – Broadcast authentication WSN protocols – TESLA – Biba – Sensor Network Security Protocols – SPINS |

| | |
|---|---|
| **Textbooks:** | |
| 1. | C.Siva Ram Murthy and B.S.Manoj, ―Ad Hoc Wireless Networks – Architectures and 2 Protocols‖, Pearson Education, 2006. |
| 2. | Holger Karl, Andreas Willing, ―Protocols and Architectures for Wireless Sensor Networks‖, John Wiley & Sons, Inc., 2005. |
| **Reference Books:** | |
| 1. | Subir Kumar Sarkar, T G Basavaraju, C Puttamadappa, ―Ad Hoc Mobile Wireless Networks‖, Auerbach Publications, 2008. |
| 2. | Carlos De MoraisCordeiro, Dharma Prakash Agrawal, ―Ad Hoc and Sensor Networks: Theory and Applications (2nd Edition), World Scientific Publishing, 2011. |
| 3. | Waltenegus Dargie, Christian Poellabauer, ―Fundamentals of Wireless Sensor Networks Theory and Practice‖, John Wiley and Sons, 2010 |
| 4. | Xiang-Yang Li, "Wireless Ad Hoc and Sensor Networks: Theory and Applications‖, 1227 th edition, Cambridge university Press,2008. |

| Course Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|---|---|---|---|---|---|---|---|
| **B20IT4112** | **PE** | **3** | **--** | **--** | **3** | **30** | **70** | **3 Hrs.** |

## BLOCK-CHAIN TECHNOLOGY

(For IT)

**Course Objectives:** The main objectives of this course are to

| | |
|---|---|
| 1. | Understand block chain technology and Cryptocurrency works |
| 2. | Explore the functionalities and applications of crypto currency |
| 3. | Gain knowledge of advanced block chain concepts and applications |
| 4. | Understand the working of specific block chain platforms and technologies |
| 5. | Evaluate the challenges, regulations and real-world applications of bock chain |

**Course Outcomes:** At the end of the course, student will be able to

| S. No | Outcome | Knowledge Level |
|---|---|---|
| 1. | Demonstrate the block chain basics, Crypto currency | K2 |
| 2. | Compare and Contrast the use of different private vs. public block chain and use cases | K3 |
| 3. | Design an innovative Bit coin Block chain and scripts, Block chain Science on various coins | K4 |
| 4. | Classify Permission Block chain and use cases – Hyper ledger, Corda | K3 |
| 5. | Apply Block-chain technology in E-Governance, Land Registration, Medical Information Systems and others | K3 |

## SYLLABUS

| | |
|---|---|
| **UNIT-I (10Hrs)** | Introduction: Introduction, basic ideas behind block chain, how it is changing the landscape of digitalization, introduction to cryptographic concepts required, Block chain or distributed trust, Currency, Cryptocurrency, How a Cryptocurrency works, Financial services, Bitcoin prediction markets. |
| **UNIT-II (10 Hrs)** | Hashing, public key cryptosystems, private vs public block chain and use cases, Hash Puzzles, Extensibility of Block chain concepts, Digital Identity verification, Block chain Neutrality, Digital art, Block chain Environmen |
| **UNIT-III (10 Hrs)** | Introduction to Bitcoin : Bitcoin Block chain and scripts, Use cases of Bitcoin Blockchain scripting language in micropayment, escrow etc Downside of Bit coin mining, Block chain Science: Grid coin, Folding coin, Block chain Genomics, Bit coin MOOCs. |
| **UNIT-IV (10 Hrs)** | Ethereum continued, IOTA, The real need for mining, consensus, Byzantine Generals Problem, and Consensus as a distributed coordination problem, Coming to private or permissioned block chains, Introduction to Hyper ledger, Currency, Token, Campus coin, Coin drop as a strategy for Public adoption, Currency Multiplicity, Demurrage currency |
| **UNIT-V (10 Hrs)** | Technical challenges, Business model challenges, Scandals and Public perception, Government Regulations, Uses of Block chain in E-Governance, Land Registration, |

| | |
|---|---|
| | Medical Information Systems |
| | |
| **Textbooks:** | |
| 1. | 1. Blockchain Blue print for Economy by Melanie Swan . |
| **Reference Books:** | |
| 1. | 1. Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st Edition, by Daniel Drescher |

| Course Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|---|---|---|---|---|---|---|---|
| **B20IT4113** | **PE** | **3** | **-** | **--** | **3** | **30** | **70** | **3 Hrs.** |

## E-COMMERCE
(For IT)

**Course Objectives:**

| 1 | This course introduces the concepts, vocabulary, and procedures associated with E-Commerce and the Internet. |
|---|---|
| 2 | To explain the students an overview of all aspects of E-Commerce. |
| 3 | To explain the Topics include development of the Internet and E-Commerce, options available for doing business on the Internet, features of Web sites and the tools used to build an E-Commerce web site, marketing issues, payment options, security issues, and customer service. |

**Course Outcomes:** At the end of the course, student will be able to

| S. No | Outcome | Knowledge Level |
|---|---|---|
| 1 | **Analyze** the impact of E-Commerce on business model and strategy | K4 |
| 2 | **Distinguish** security issues and procedure, Protocols used to protect against security threats. | K4 |
| 3 | **Assess** Electronic payment systems and Payment schemes | K4 |
| 4 | **Identify** Internet trading relationships including business to consumer, Business to Business, Intra Organizational. | K3 |

| | SYLLABUS |
|---|---|
| **UNIT-I (12Hrs)** | **Electronic Commerce Environment and opportunities:** Background–The Electronic commerce Environment–Electronic Market Place Technologies. Modes of electronic commerce: Overview– EDI–Migration to open EDI–Ecommerce with WWW/Internet–Commerce Net Advocacy–Web commerce going forward. |
| **UNIT-II (10 Hrs)** | **Approaches to safe electronic Commerce:** Overview– Secure –Transport Protocols–Secure Transactions– Secure Electronic Payment Protocol–Secure Electronic Transaction–Certificates for Authentication–Security on Web Servers and enterprise networks. |
| **UNIT-III (10 Hrs)** | **Electronic cash and electronic payment schemes:** Internet Monitory Payment and Security requirements–payment and purchase order process–online electronic cash. |
| **UNIT-IV (8 Hrs)** | **Master card/ Visa Secure electronic transaction:** Introduction – Business requirements - Concepts - Payment Processing. Email and Secure Email Technologies for Electronic Commerce: Introduction –The means of Distribution –A model for Message Handling – How Does an Email Work. |

| UNIT-V (10Hrs) | **Internet Resources for Commerce: Introduction** –Technologies for Web Servers – Internet Applications for commerce – Internet Charges –Internet Access and Architecture–Searching the Internet. |
| --- | --- |
| | |

| **Text Books:** | |
| --- | --- |
| 1. | Web Commerce Technology Hand Book Daniel Minoli, Emma Minoli McGraw Hill |

| **Reference Books:** | |
| --- | --- |
| 1. | Frontiers of Electronic Commerce Ravi Kalakotar, Andrew B.Whinston Addison-Wesley |

| Course Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|---|---|---|---|---|---|---|---|
| B20IT4114 | PE | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |

## ETHICAL HACKING

### (For IT)

**Course Objectives:** The main objectives of this course are to

| | |
|---|---|
| 1. | Introduce the methodologies and framework of ethical hacking for enhancing the security |
| 2. | The course includes-Impacts of Hacking; Types of Hackers; Information Security Models, Information Security Program, Business Perspective, Planning a Controlled Attack |
| 3. | Framework of Steps (Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Deliverable and Integration) |

**Course Outcomes:** At the end of the course, student will be able to

| S. No | Outcome | Knowledge Level |
|---|---|---|
| 1. | Explain the concepts related to hacking, ports and protocols, pen testing and virtualization | K2 |
| 2. | Determine the applicable foot printing techniques and scanning methods | K3 |
| 3. | Explicate the process of system hacking and explain the concepts Trojans, backdoors, worms and virus and its countermeasures | K3 |
| 4. | Demonstrate systematic understanding of the concepts of Sniffing and Social Engineering and its attacks | K3 |
| 5. | Determine the applicable methods of cryptography, steganography and Vulnerability Assessment | K3 |

### SYLLABUS

| | |
|---|---|
| UNIT-I (10Hrs) | **Introduction to Hacking: Hacking**: Types and phases of hacking, **Introduction to Ports & Protocols:** Ports, Protocols, Primary Network Types, **Virtualization & Introduction to Kali Linux:** Virtualization, Virtualization software, supported platforms, **Introduction to Penetration Testing:** Penetration test, Categories and Types of Penetration tests, Structure of Penetration Test Report. |
| UNIT-II (10 Hrs) | **Foot printing**: Foot printing, Types, using ping and ns Lookup commands in Windows command line, **Scanning:** Scanning, Basics of Scanning, Basic Techniques of Scanning, Enumerating DNS using dns, enum, and Performing flag scan using hping3. |
| UNIT-III (10 Hrs) | **Hacking into System:** System Hacking, Password Cracking, Default password databases, Manual and Automated Password Cracking, Process of System Hacking, Using Key loggers, **Trojans & Backdoors:** Trojans, Working of Trojan, Infection Techniques, Attack, Lifecycle and Classification of Virus, Worms, Virus Construction Kit. |
| UNIT-IV (10 Hrs) | **Sniffing, Packet Analysis & Session Hijacking:** Sniffing, Packet Analysis, Types of Sniffing, Active and Passive Sniffing Techniques, Session Hijacking, **Social Engineering:** Social Engineering, Process, Identity Theft, Human and Computer Based Social |

| | Engineering Techniques, Phishing Process, Types of Phishing Attacks, Social Engineering Toolkit (SET) |
|---|---|
| | |
| **UNIT-V**<br>**(10 Hrs)** | **Cryptography:** Cryptography, Digital Signature, Hash Functions, **Steganography:** Steganography Process, watermarking, Steganography Methods and Attacks, Steganography tools, **Vulnerability Assessment:** Vulnerability, The Open Web Application Security Project (OWASP), Prevention, Damn Vulnerable Web Application (DVWA), installation and testing of DVWA |
| | |

| **Textbooks:** | |
|---|---|
| 1. | Hacking: Be a Hacker with Ethics, Harsh Bothra, Khanna Publications, 2019 |
| 2. | Ethical Hacking and Penetration Testing Guide, Rafay Baloch, 2014 |
| **Reference Books:** | |
| 1. | Kali Linux Wireless Penetration Testing Beginner's Guide, Vivek Ramachandran, Cameron Buchanan, Packt Publishing, 2015 |
| 2. | SQL Injection Attacks and Defense, 1st Edition, Justin Clarke-Salt, Syngress Publication |
| 3. | Mastering Modern Web Penetration Testing, Prakhar Prasad, Packt Publishing, October 2016 |
| **e-Resources** | |
| 1. | https://archive.nptel.ac.in/courses/106/105/106105217/ |
| 2. | https://www.javatpoint.com/ethical-hacking |

| Course Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|---|---|---|---|---|---|---|---|
| **B20IT4116** | **SOC** | **1** | **--** | **2** | **2** | | **50** | **3 Hrs.** |

## PYTHON: DEEP LEARNING

(For IT)

**Pre-requisite knowledge :**

| | |
|---|---|
| 1 | • Exploratory data analysis: Collecting, importing, pre-processing, organizing, exploring, analyzing data and deriving insights from data https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012666909428129792728_ shared/ overview<br>• Data visualization using Python: Data visualization functions and plots https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0126051913436938241455 _shared /overview<br>• Regression analysis: Regression, types, linear, polynomial, multiple linear, Generalized linear regression models https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01320408013336576065_s hared/o verview<br>• Clustering using Python: Clustering, techniques, Assessment and evaluation https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013044179942342656119 0 _shared /overview<br>• Machine learning using Python: Machine learning fundamentals, Regression, classification, clustering, introduction to artificial neural networks https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012600400790749184237_ shared/ overview<br>• Time series analysis : Patterns, decomposition models, smoothing time, forecasting data https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012605180474425344128 0 _shared /overview |

**Course Outcomes:** At the end of the course, student will be able to

| S. No | Outcome | Knowledge Level |
|---|---|---|
| 1 | Demonstrate the basic concepts, fundamental learning techniques and layers. | K3 |
| 2 | Perform the Neural Network training for various random models. | K3 |
| 3 | Apply various optimization algorithms to comprehend different activation | K3 |
| 4 | Perform hyper parameter tuning for results optimization | K3 |
| 5 | Build a convolutional neural network, and understand its application, Build a recurrent neural network, and understand its usage and Comprehend auto encoders and demonstrate transfer learning | K4 |

| SYLLABUS | |
|---|---|
| **Note:** There are online courses indicated in the reference links section. Learners need to go through the contents in order to perform the given exercises | |

| Exp No | List of Experiments: |
|---|---|
| 1 | Course name : .Build a Convolution Neural Network for Image Recognition. |
| | Go through the modules of the course mentioned and answer the self-assessment questions given in the link below at the end of the course. |
| | Self-Assessment - Deep Learning - Viewer Page \| Infosys Springboard (onwingspan.com) |
| 2 | Module name : Understanding and Using ANN : Identifying age group of an actor |
| | Exercise : Design Artificial Neural Networks for Identifying and Classifying an actor using Kaggle Dataset. |
| | https://infyspringboard.onwingspan.com/web/en/viewer/webmodule/lex_auth_0127764924166 63552259_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=C ourse |
| 3 | Module name : Understanding and Using CNN : Image recognition |
| | Exercise: Design a CNN for Image Recognition which includes hyper parameter tuning. |
| | https://infyspringboard.onwingspan.com/web/en/viewer/webmodule/lex_auth_0127856944431 67744910_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=C ourse |
| 4 | Module name : Predicting Sequential Data |
| | Exercise: Implement a Recurrence Neural Network for Predicting Sequential Data. |
| | https://infyspringboard.onwingspan.com/web/en/viewer/webmodule/lex_auth_0127914494884 9868822_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=Co urse |
| 5 | Module Name: Removing noise from the images |
| | Exercise: Implement Multi-Layer Perceptron algorithm for Image denoising hyperparameter tuning. |
| | https://infyspringboard.onwingspan.com/web/en/viewer/webmodule/lex_auth_0127920582588 17024272_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=C ourse |
| 6 | Module Name: Advanced Deep Learning Architectures |
| | Exercise: Implement Object Detection Using YOLO. |
| | https://infyspringboard.onwingspan.com/web/en/viewer/webmodule/lex_auth_0131029233732 97664873_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=C ourse |
| 7 | Module Name: Optimization of Training in Deep Learning |
| | Exercise Name: Design a Deep learning Network for Robust Bi-Tempered Logistic Loss. |
| | https://infyspringboard.onwingspan.com/web/en/viewer/webmodule/lex_auth_0131079172266 80320184_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=C ourse |
| 8 | Module name: Advanced CNN |
| | Exercise: Build Alex Net using Advanced CNN. |

| | |
|---|---|
| | https://infyspringboard.onwingspan.com/web/en/viewer/webmodule/lex_auth_013111844422541312984_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=Course |
| 9 | Module name: Autoencoders Advanced |
| | Exercise: Demonstration of Application of Autoencoders. |
| | https://infyspringboard.onwingspan.com/web/en/viewer/webmodule/lex_auth_0131164551289896962081_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=Course |
| 10 | Module name: Advanced GANs. |
| | Exercise: Demonstration of GAN |
| | https://infyspringboard.onwingspan.com/web/en/viewer/webmodule/lex_auth_0131155456664289281901_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=Course |
| 11 | Module name : Capstone project |
| | Exercise : Complete the requirements given in capstone project. |
| | Description: In this capstone, learners will apply their deep learning knowledge and expertise to a real world challenge |
| | https://infyspringboard.onwingspan.com/web/en/viewer/webmodule/lex_auth_013119291805696000651_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=Course |
| 12 | Module name: Capstone project |
| | Exercise: Complete the requirements given in capstone project |
| | https://infyspringboard.onwingspan.com/web/en/viewer/webmodule/lex_auth_013119291805696000651_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=Course |

**Reference Books:**

| 1 | Goodfellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016. |
|---|---|
| 2 | Bishop, C., M., Pattern Recognition and Machine Learning, Springer, 2006. |
| 3 | Navin Kumar Manaswi, "Deep Learning with Applications Using Python", Apress, 2018. |

**Web Links: [Courses mapped to Infosys Springboard platform]**

| 1 | https://infyspringboard.onwingspan.com/en/app/toc/lex_auth_012782105116811264219_shard/contents [Introduction to Deep Learning] |
|---|---|
| 2 | https://infyspringboard.onwingspan.com/web/en/viewer/webmodule/lex_auth_01311929180596000651_shared [Deep learning for Developers] |

| Course Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|---|---|---|---|---|---|---|---|
| **B20IT4118** | **SOC** | **1** | **--** | **2** | **2** | **--** | **50** | **3 Hrs.** |

### SECURE CODING TECHNIQUES

(For IT)

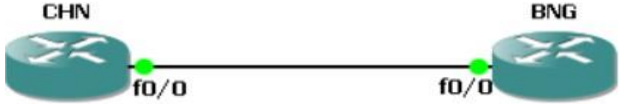**Course Objectives:** The main objectives of this course are to

| | |
|---|---|
| 1 | Identify the need security in your software projects. |
| 2 | Eliminate vulnerabilities within software. |
| 3 | Use a Security by Design approach to design a secure architecture for your software. |
| 4 | Implement common protections to protect users and data. |

**Course Outcomes:** At the end of the course, student will be able to

| S. No | Outcome | Knowledge Level |
|---|---|---|
| 1 | Implement Network Configuration | K3 |
| 2 | Install Programming APIs and Implement OWASP design principles while designing a web application | K3 |
| 3 | Write Python script to implement web request | K3 |
| 4 | Write secure coding using some of the practices in C/C++/Java and Python programming languages | K3 |
| 5 | Perform security tasks in all phases of SDLC and implement | K3 |

### SYLLABUS

| 1 | **EXPERIMENT-1:**<br>1.1 Identification of classes of IPv4 addresses<br>1.2 Classification of IPv4 Address into public and private<br>1.3 Create a Sub net<br>1.4 To determine Network ID, Broadcast ID, Usable Host<br>Weblink:<br>https://infyspringboard.onwingspan.com/web/en/viewer/pdf/lex_auth_01323957463569203 2240_shared?collectionId=lex_auth_01268375129606553 6354_shared&collectionType=CourseR20-Syllabus-Template-Practical.doc |
|---|---|

| 2 | **EXPERIMENT-2:** |
|---|---|
| | 2.1 Configure the given topology deducing from the outputs following it |
| |  |
| | 2.2 Troubleshoot the below topology with below operations |
| | • Configure the below topology |
| | • Protect the privileged mode by assigning it a password |
| | • Display 'Welcome to BENGALURU' and 'Welcome to MYSURU' as message of the day, while entering the consoles of respective DC's |
| | Weblink: |
| | https://infyspringboard.onwingspan.com/web/en/viewer/pdf/lex_auth_0132395746356920322 40_shared?co |
| | llectionId=lex_auth_012683751296065536354_shared&collectionType=Course |
| |  |
| 3 | **EXPERIMENT-3:** |
| | 3.1 Explore cryptography, input and output sanitization, error handling, input validation, logging and auditing, and session and exception management. |
| | 3.2 Install Programming interfaces (APIs), including those that offer different types of functionality, such |
| | 3.3 Implement Concurrency, type safety, memory management, configuration parameter management, tokenizing, and sandboxing. |
| | Weblink: |
| | https://springboard.percipio.com/courses/57a7fcde-9829-4f12-a9af-cb14eacf673e/videos/6135b4f6-29dc-4d44-98c5-60fcbfa859d0?tab=overview |
| 4 | **EXPERIMENT-4:** |
| | 4.1 Server-side and client-side code |
| | 4.2 scan a web app for vulnerabilities using OWASP ZAP and Burp Suite |
| | 4.3 explore secure coding using the OWASP ESAPI |
| | Weblink: |
| | https://springboard.percipio.com/courses/79fb661e-26b5-4ae5-a008-2cf7d4e63e3c/videos/ccaa5e65-ab27-4bd4-8416-cc262569e96c |
| 5 | **EXPERIMENT-5:** |
| | Defensive programming for C/C++ including inspections, testing, and input validation |
| | Weblink: |
| | https://springboard.percipio.com/courses/f44c02f9-1bcc-11e7-b15b-0242c0a80b07/videos/f44ced50-1bcc-11e7-b15b-0242c0a80b07 |

| 6 | **EXPERIMENT-6:** |
|---|---|
| | 6.1 Identify when to use Python, along with a working knowledge of how to write and run a Python script, are beneficial skills in secure coding |
| | 6.2 Create variables, containers including lists, dictionaries, and tuples, conditionals, loops, and functions in a Python script. |
| | 6.3 Imports and file reading and writing using a PowerShell script. Finally, you'll learn how to use a Python script to make a web request. |
| | **Web Link** : |
| | https://springboard.percipio.com/courses/be99adad-1f65-47a8-a4b5-6b5346072b8e/videos/71397986-c553-419f-a525-105965ca3158 |
| 7 | **EXPERIMENT-7:** |
| | Consider the following code in C language: |
| | `int main()` |
| | `{` |
| | `  mybufferOverflow();` |
| | `  }` |
| | `  void mybufferOverflow()` |
| | `    {` |
| | `  char stringLine[10];` |
| | ` printf("Enter the text: ");` |
| | `gets(stringLine); printf("You have entered: ", stringLine);` |
| | `return 0;` |
| | ` }` |
| | What is a buffer overflow attack that can happen on this code? Rewrite the code prevent buffer overflow. |
| 8 | **EXPERIMENT-8:** |
| | Create a login page with user name and password which will connect to a database which will store the name and password. You can use Java and HTML code and database as per convenience. Simulate an SQL injection attack. Write embedded SQL code to avoid SQL injection attack. Document how this is taken care in the later versions of Java |
| 9 | **EXPERIMENT-9:** |
| | Create a login page with user name and password which will connect to a database which will store the name and password. You can use Python as a base and database as per convenience. Simulate an SQL injection attack. Write the revised code in Python that will sanitize the inputs and help prevent an SQL injection attack. |
| 10 | **EXPERIMENT-10 :** |
| | Read and understand the Heartbleed vulnerability. Identify the code in C++ that can simulate this vulnerability and also code to fix it. Document the secure coding practices to take care of this vulnerability and the reasons for it to happen. |
| 11 | **EXPERIMENT-11:** |
| | Go to OWASP.org. Read about the top 10 vulnerabilities mentioned. Document the following: |
| | a. Name of the vulnerability |
| | b. Causes c. Mitigation How will you prevent it in the programming language that you use, if applicable with example codes |

| 12 | **EXPERIMENT-12:**<br>Go to Read about the top 10 vulnerabilities mentioned. Document the following:<br>a. the programming error<br>b. Causes<br>c. Mitigation<br>d. How will you prevent it in the programming language that you use, if applicable with example codes<br>Web Link : http://cwe.mitre.org/top25/archive/2021/2021_cwe_top25.html |

| **Reference Books:** | |
|---|---|
| 1 | https://infyspringboard.onwingspan.com/web/en/viewer/pdf/lex_auth_0132395746356920322 40_share d?collectionId=lex_auth_012683751296065536354_shared&collectionType=Course |
| 2 | https://springboard.percipio.com/courses/57a7fcde-9829-4f12-a9af-cb14eacf673e/videos/6135b4f6- 29dc-4d44-98c5-60fcbfa859d0?tab=overview |
| 3 | https://springboard.percipio.com/courses/79fb661e-26b5-4ae5-a008-2cf7d4e63e3c/videos/ccaa5e65- ab27-4bd4-8416-cc262569e96c |
| 4 | https://www.techtarget.com/searchsecurity/definition/buffer-overflow#:~:text=A%20buffer%20overflow%20occurs%20when,adjacent%20to%20the%20 destinatio n%20buffer |
| 5 | https://www.journaldev.com/34028/sql-injection-in-java |
| 6 | https://realpython.com/prevent-python-sql-injection/ |
| 7 | https://www.securecoding.com/blog/finding-and-fixing-c-vulnerabilities/ |
| 8 | https://owasp.org/www-project-top-ten/ |
| 9 | https://springboard.percipio.com/courses/be99adad-1f65-47a8-a4b5-6b5346072b8e/videos/71397986- c553-419f-a525-105965ca3158 |

| Regulation: R20 | IV / IV - B.Tech. II - Semester | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| INFORMATION TECHNOLOGY | | | | | | | | | |
| SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2020-21 admitted Batch onwards) | | | | | | | | | |
| Course Code | Course Name | Category | Cr | L | T | P | Int. Marks | Ext. Marks | Total Marks |
| B20IT4201 | Project Work (Project work, seminar and internship in industry) | PR | 8 | 0 | 0 | 16 | 60 | 140 | 200 |
| | TOTAL | | 8 | 0 | 0 | 16 | 60 | 140 | 200 |

| Course Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|---|---|---|---|---|---|---|---|
| B20IT4201 | PR | -- | -- | 16 | 8 | 60 | 140 | 3 Hrs. |

## PROJECT WORK

### (For IT)

**Course Objectives:**

| | |
|---|---|
| 1 | To provide an opportunity to work in group on a topic / problem / experimentation |
| 2 | To encourage creative thinking process |
| 3 | To provide an opportunity to analyze and discuss the results to draw conclusions |
| 4 | To acquire and apply fundamental principles of planning and carrying out the work plan of the project through observations, discussions and decision-making process. |

**Course Outcomes:** At the end of the course the students will be able to

| S.No. | Outcome | Knowledge Level |
|---|---|---|
| 1 | Identify a current problem through literature/field/case studies | K3 |
| 2 | Identify the objectives and methodology for solving the problem | K3 |
| 3 | Design and Develop technology/process for solving the problem | K4 |
| 4 | Evaluate the technology/process | K5 |

\*The object of Project Work is to enable the student to take up investigative study in the broad field of Information Technology, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or a group of students, under the guidance of a Supervisor. This is expected to provide a good initiation for the student(s) in R&D work.

The assignment to normally include:

a) Survey and study of published literature on the assigned topic.

b) Working out a preliminary approach to the problem relating to the assigned topic.

c) Conducting preliminary Analysis/Modeling/Simulation/Experiment/Design/ Feasibility.

d) Preparing a written report on the study conducted for presentation to the department.

e) Final Seminar, as oral Presentation before a departmental committee.