

Kumaun University, Nainital, Uttarakhand

BACHELOR OF COMPUTER APPLICATION

Session 2019-2020

BCA 611: Artificial Intelligence

UNIT I

Introduction: Introduction to Artificial Intelligence, Background and Applications, AI techniques, Tic Tac-Toe problem, Problem Characteristics.

UNIT II

Problem Solving and Searching Techniques: Problem Characteristics, Production Systems, Water Jug Problem, Control Strategies, Breadth First Search, Depth First Search, Hill climbing and its Variations, Heuristics Search Techniques: Best First Search. 8-Puzzle Problem.

UNIT III

Knowledge Representation: Definition of Knowledge, Knowledge Based Systems, Representation of Knowledge. Introduction to First Order Predicate Logic, Conversion to clausal form, Unification, Resolution Principle.

UNIT IV

Expert Systems: Introduction to Expert Systems, Characteristic Features of Expert Systems, Applications of Expert Systems, Components and Working of Expert Systems.

UNIT V

Introduction to Machine Learning Techniques: Fuzzy Logic, Fuzzy Set, Membership Function, Union, intersection and complement of a fuzzy set, Introduction to Artificial Neural Network, Introduction to Support Vector Machine.

Recommended Books:

1. DAN.W. Patterson, Introduction to A.I and Expert Systems – PHI, 2007.
2. Russell & Norvig, Artificial Intelligence-A Modern Approach, LPE, Pearson Prentice Hall, 2nd edition, 2005.
3. Rich & Knight, Artificial Intelligence – Tata McGraw Hill, 2nd edition, 1991.
4. W.F. Clocksin and Mellish, Programming in PROLOG, Narosa Publishing House, 3rd edition, 2001.

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BCA 612 (a): Web Technology

UNIT I

Introduction to HTML: Basics of HTML, formatting and fonts, commenting code, hyperlink, lists, tables, images, forms, Meta tags, Character entities, frames and frame sets, Overview and features of HTML5.

UNIT II

Style Sheets: Need for CSS, Introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, CSS2, Overview and features of CSS3

UNIT III

Introduction to JavaScript: JavaScript Variables and Data Types, Declaring Variables, Data Types, Statements and Operators, Control Structures, Conditional Statements, Loop Statements, Object-Based Programming, Functions, Executing Deferred Scripts, Objects, Message box in JavaScript, Dialog Boxes, Alert Boxes, Confirm Boxes, Prompt Boxes, JavaScript with HTML, Events, Event Handlers, Forms, Forms Array.

UNIT IV

PHP: Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions, Object Oriented Programming with PHP

UNIT V

PHP Database Connectivity: Basic commands with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP my admin and database bugs.

Recommended Books:

1. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Prentice Hall, 2007
2. JavaScript: The Good Parts by Douglas Crockford
3. HTML5 for Web Designers by Jeremy Keith
4. The Art and Science of CSS: Create Inspirational, Standards-Based Web Designs by Cameron Adams
5. Headfirst PHP & MySQL by Lynn Beighley & Michael Morrison

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BCA 612 (b): Internet of Things

UNIT I

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs IoT-enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates. Domain Specific IoTs –Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

UNIT II

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT. Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

UNIT III

Introduction to Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

UNIT IV

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT V

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework

Recommended Books:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.
2. Peter Waher, “Learning Internet of Things”, PACKT publishing, BIRMINGHAM – MUMBAI
3. Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on Approach)”, 1st Edition, VPT, 2014.
4. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015

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BCA 613: Cyber Security

UNIT 1

Introduction to Cyber Security: Overview of Cyber Security, Internet Governance – Challenges and Constraints, Cyber Threats: - Cyber Warfare-Cyber Crime-Cyber Terrorism-Cyber Espionage, need for a Comprehensive Cyber Security Policy, need for a Nodal Authority, Need for an International convention on Cyberspace.

UNIT 2

Cyber Security Vulnerabilities and Cyber Security Safeguards: Cyber Security Vulnerabilities- Overview, vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Unprotected Broadband communications, Poor Cyber Security Awareness. Cyber Security Safeguards- Overview, Access control, Audit, Authentication, Biometrics, Cryptography, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Intrusion Detection Systems, Response, Scanning, Security policy, Threat Management.

UNIT 3

Securing Web Application, Services and Servers: Introduction, Basic security for HTTP Applications and Services, Basic Security for SOAP Services, Identity Management and Web Services, Authorization Patterns, Security Considerations, Challenges.

UNIT 4

Intrusion Detection and Prevention: Intrusion, Physical Theft, Abuse of Privileges, Unauthorized Access by Outsider, Malware infection, Intrusion detection and Prevention Techniques, Anti-Malware software, Network based Intrusion detection Systems, Network based Intrusion Prevention Systems, Host based Intrusion prevention Systems, Security Information Management, Network Session Analysis, System Integrity Validation.

UNIT 5

Cryptography and Network Security: Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Applications of Cryptography. Overview of Firewalls- Types of Firewalls, User Management, VPN Security, Security Protocols: - security at the Application Layer- PGP and S/MIME, Security at Transport Layer- SSL and TLS, Security at Network Layer-IPsec.

Recommended Books:

1. Cyber Security by Nina Godbole Sunit Belapure
2. Cybersecurity - Attack and Defense Strategies: Infrastructure security with Red Team and Blue Team tactics by Yuri Diogenes
3. Cryptography and Network Security by Forouzan
4. The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws by Dafydd Stuttard

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BCA 614: Minor Project

All the students of BCA are required to submit a project-report based on the work done by him/her during the minor project.

SUMMARY/ABSTRACT- All students must submit a summary/abstract separately with the project report. The content should be as brief as is enough to explain the objective and implementation of the project that the candidate is going to take up.

TOPIC OF THE PROJECT- This should be explicitly mentioned at the beginning of the Synopsis. Since the topic itself gives a peep into the project to be taken up, candidate is advised to be prudent on naming the project. This being the overall impression on the future work, the topic should corroborate the work.

OBJECTIVE AND SCOPE: This should give a clear picture of the project. Objective should be clearly specified. What the project ends up to and in what way this is going to help the end user must be mentioned.

PROCESS DISCRIPTION: The process of the whole software system proposed, to be developed, should be mentioned in brief.

RESOURCES AND LIMITATIONS: The requirement of the resources for designing and developing the proposed system must be given. The resources might be in form of the hardware/software or the data from the industry. The limitation of the proposed system in respect of a larger and comprehensive system must be given.

CONCLUSION: The write-up must end with the concluding remarks- briefly describing innovation in the approach for implementing the Project, main achievements and any other important feature that makes the system stand out from the rest.

The following suggested guidelines must be followed in preparing the Final project Report: Good quality white A4 size paper should be used for typing and duplication. Care should be taken to avoid smudging while duplicating the copies.

Page Specification:

- Left margin - 3.0 cms
- Right margin- 2.0 cms
- Top margin 2.54 cms
- Bottom margin 2.54 cms
- Page numbers - All text pages as well as Program source code listing should be numbered at the bottom center of the pages.

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Normal Body Text: Font Size: 12, Times New Roman, Double Spacing, Justified. 6 point above and below para spacing

Paragraph Heading Font Size: 14, Times New Roman, Underlined, Left Aligned. 12 point above & below spacing.

Chapter Heading Font Size: 20, Times New Roman, Centre Aligned, 30 point above and below spacing. Coding Font size: 10, Courier New, Normal